



D2.3

“Analysis and Innovation recommendation report”

BioLinX WP 2

Scouting and Innovation Recommendations

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**DELIVERABLE
REPORTING**



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1 Introduction

Deliverable 2.3 “Analysis and Innovation recommendation report” relates to the analysis of the projects selected in Task 2.1, and recommendations for these projects regarding activities within the BioLinX Innovation Programme. It also relates to the region analysis of task 2.2. The descriptions of Tasks 2.3 and 2.4 as laid down in Annex 1 of the Grant Agreement are provided in the text box below.

Task 2.3 Analysis of selected projects (lead: SP, participants: TNO, PNO)

The outcomes and requirements of each selected FP7 project will be analysed in terms of:

- * feedstock basis*
- * technological portfolio offered and used (pre-treatment, conversion, production)*
- * target markets*
- * key innovation activities: knowledge, business, policy, lobby*

For each project the stakeholders of that consortium will be interviewed.

Task 2.4 Recommendations for BioLinX Innovation Programme activities (lead: SP, participants: TNO, PNO)

This task will also include a matching of FP 7 and H2020 projects, results and partners with relevant RIS3 regions’ features and stakeholder communities. Moreover, it will be identified which of the four key innovation activities (knowledge, business, policy or lobbying) the next steps of each selected project should focus. Based on potential analysis results and their combinations, different FP7 and H2020 projects will be clustered, a matrix with innovation recommendations will be developed. Based on the clustering of FP7 and H2020 projects with RIS3 regions and Innovation Activities, a BioLinX Innovation Programme will be fine-tuned as input to WP 3 – 6. This innovation programme will be published and offered to the wider community of project partners as well as RIS3 regional stakeholders that have interest to participate to these activities.

Box 1: Description of Tasks 2.3 and 2.4

Thus, D2.3 can be summarised as

- analysis of the projects regarding feedstock, key markets, etc;
- interviews with stakeholders;
- identification of key innovation activities for the projects;
- matching of projects with regions, for the continuation within WPs 3-6;
- assembly of a matrix with innovation recommendations and an Innovation Programme.

As will be described below, the matching of the projects with the regions has been made on a higher level, in a more general way.

The objectives of the Deliverable 2.3 have been fulfilled, with the analysis of twenty-three projects that have received recommendations for key innovation activities and a preliminary suggestion for regional contacts.

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2 Interviews

2.1 Background

As described in D2.1, the innovation owners to be interviewed were selected from FP7 and Horizon2020 projects. Criteria for selection were based on properties such as feedstock used, market potential, and expected impact for a bio-economy. **In the present report, only the interviews that resulted in a recommendation for further services by the BioLinX programme are treated.** However, all interviews conducted are listed in Table 4 in Appendix 1, also the ones in which the conclusion was that BioLinX would not be able to support the innovation owner in question. In those cases, this was the conclusion of the interview, and was expressed by the interviewee. The interview was made with an innovation owner of the project results, or with the project coordinator. Interviews were normally conducted as phone calls, although in some cases by e-mail, when impossible to fit in a phone call in busy agendas. A number of interviewers divided the interviews between them; they are all listed as authors of this report. Some interviews that may be fruitful still remain to be conducted; they will be done in the near future. For each wave (see D2.1), a new interview template was put together, making use of lessons learned from previous steps. Thus, the templates and the questions were not identical for all interviews.

2.2 Classification of projects

According to the description of Task 2.3, the selected projects are to be analysed in terms of the properties *feedstock basis*, *technological portfolio* offered and used (pre-treatment, conversion, production), *target markets*, and *key innovation activities* (knowledge, business, policy, lobby). Ideally, this analysis would be used in the process of matching a specific project (or innovation) with one or more regions.

However, after trial matching and elaborate discussions with the team it became clear that **the matching of projects on the specific level that the project is aiming at with specific regions is not an easy task.** The reason for this is that although the project may be relatively specific regarding what contacts/services/infrastructure that it would need, the regions are generally very broad regarding knowledge, feedstock, markets, etc. As an example, some of the projects are related to a specific chemical building block, whilst the regions identify 'chemical industry' as a strong asset. However, it is unclear if the specific chemical building block can be used in the particular chemical section that is available in a region. Moreover, the regions often have a broad range of industries (e.g. food industries as well as chemical companies, etc) whilst the substance aimed at in the project can be used in both industrial sectors. Thus it is impossible to find a perfect match within Task 2.4. Despite this 'obstacle' the analysis below will reveal opportunities for BioLinX to support the projects further and to shape the content for the upcoming brokerage (online as well as face-2-face) and linking & support activities.

In discussions among the WP2 BioLinX participants it was thus suggested that the analysis and matching presented in this report would thus not be on a very detailed and single-project-to-region

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level, but on clustering of the challenges in the projects, matching with the challenges of regions and identifying potential content for the upcoming brokerage and linking & support activities.

The analysis of the projects (and thus finding potential synergies between projects) has been based on three axes:

1. Classification of projects by feedstock base
2. Classification of projects by target industry
3. Classification on key innovation activities

The classification on technological portfolio did not make sense to the project team as there is no clear terminology between the projects and industries. E.g. scale-up can be used for any kind of scale-up (from lab to demo, from demo to pilot, from pilot to 'full scale'), and there is no clear definition on 'demo' and 'pilot', and these definitions also differ between industrial sectors. Regarding the key innovation activities the input received to the project team has been 'translated' to a higher level, e.g. some of the project are very specific that they need support in understanding (/ are hampered by REACH) whilst others just refer to 'regulation'.

The analysis that has been performed to provide this report is available at the BioLinX coordinator. This report only reveals the outcome of the analysis of the interview sheets, in order to avoid any 'naming and shaming'.

Below are overviews of the projects classified by feedstock, target industry types and key innovation activities, based on the interviews.

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2.2.1 Classification of projects by feedstock

Table 1 shows the classification of projects by feedstock. For the actual lignocellulosic materials, wood and agro, the feedstock is to some extent interchangeable, and for a given project the choice of one or the other depends to a large extent on availability. On the other hand, the other feedstocks listed are normally very project-specific, in the sense that the use of the specific feedstock in question is one of the main ideas of the project, regardless of whether the feedstock is algae, wastewater, or shrimp shells.

Project	Feedstock: wood	Feedstock: agro	Feedstock: algae	Feedstock: other
AgForward	X			
BioConSepT	X	X		
BIOCORE	X			
BIOREFINE-2G	X	X		
BISIGODOS			X	
COMPAC	X	X		
D-Factory			X	
EggPlant				X (wastewater)
Enlight	X	X		
EuroPruning	X	X		
FertiPlus		X		
GreenLIFE				X (wastewater)
HOTZYME	X	X		
IB2MARKET	X	X		
InBioSoil		X		
INFRES	X			
LOGISTEC	X			
MIRACLES			X	
NANO3BIO		X		
NANOBE**	X	X		
NEMO	X	X		
POLYMODE				X (shrimp shells)
PROSPARE		X		
Sector				X (biogas)
SPLASH			X	
Susy		X		

Table 1: Interviewed BioLinX projects that received support recommendations. Projects classified by feedstock.

**Does not have any specific feedstock focus

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2.2.2 Classification of projects by target industry

Table 2 shows the classification of projects by target industry. As can be seen, most of the projects are targeted towards the chemical industry. Their projects aim at the production of chemical industry intermediates such as carboxylic acids, amines and epoxides (e.g., in BioConSepT), special chemicals such as biosurfactants (e.g., in IB2MARKET), or improved enzymes (e.g., in HOTZYME). It can also be noted that nearly all projects aiming for the food industry also aim for the chemical industry; in many cases, the projects' target industries are not clear, and a given process may yield products that can be used in either the chemical or the food industry. In the "Other" column in Table 2, some projects aim at producing fertilizer, which in these cases is a blend of a large number of substances, in contrast to the rather pure substances from the projects in the "Chemical" column. Two projects (LOGISTEC, EuroPruning) have developed equipment and knowledge regarding harvesting and related services, and aim at farmers/harvesters. Finally, some projects mention "waste stream owners, that want to valorize their waste streams" as target industry; this is most likely valid for all the projects.

Project	Target industries: chemical	Target industries: food	Target industries: other
AgForward			X (biorefinery)
BioConSepT	X		
BIOCORE	X		
BIOREFINE-2G	X		
BISIGODOS	X	X	
COMPAC			X (paper / pulp)
D-Factory	X	X	
EggPlant	X		
Enlight			X (composite materials)
EuroPruning**			X (farmers/harvesters)
FertiPlus			X (producers of fertilizers)
GreenLIFE	X		X (producers of fertilizers)
HOTZYME	X		
IB2MARKET	X		
Inbiosoil			
INFRES***			X (forestry)
LOGISTEC			X (power; farmers/harvesters))
MIRACLES		X	
NANO3BIO	X		
NANOBE	X		
NEMO	X		
POLYMODE	X	X	
PROSPARE	X	X	
Sector			X (biogas)
SPLASH	X		
Suzy		X	

Table 2: Interviewed BioLinX projects that received support recommendations. Projects classified by target industry.

** Equipment and knowledge regarding harvesting and logistics. *** Forestry equipment

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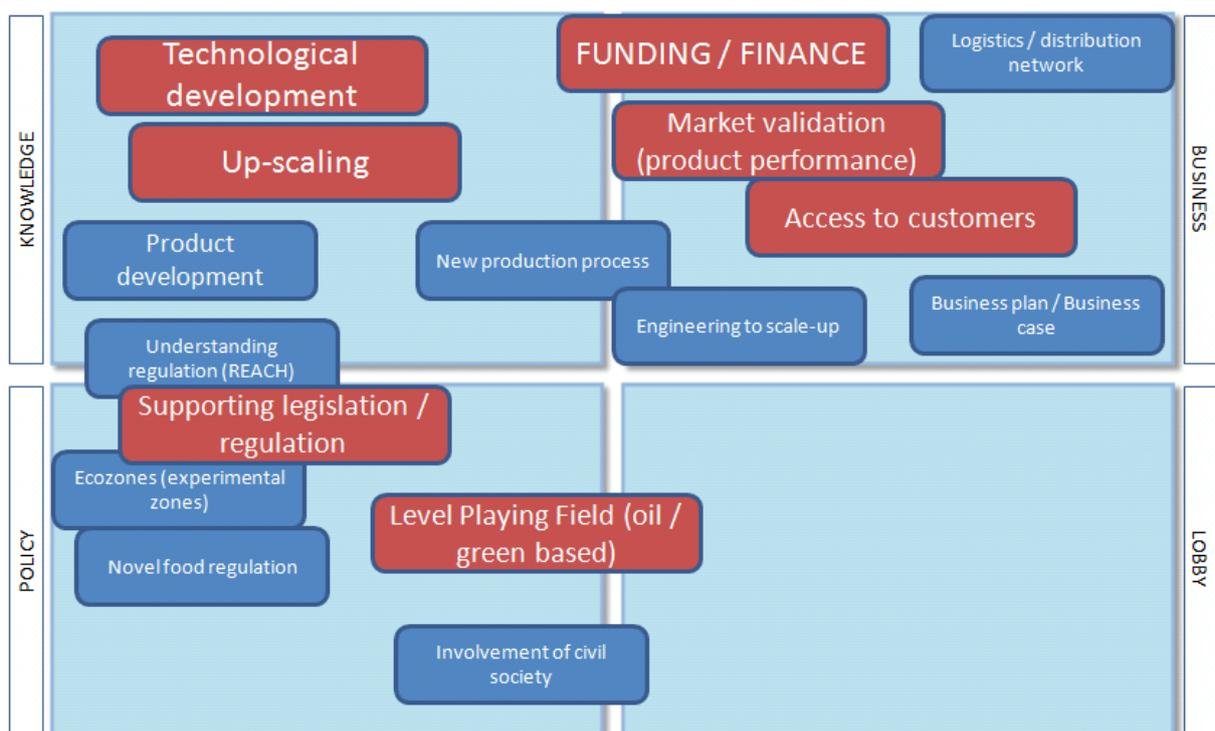
2.2.3 Classification to key innovation activities

During the interviews all of the projects have been asked for the challenges that they face. These challenges have been categorized into ‘Key Innovation Activities’ as derived from the innovation system analysis methodology. The Key Innovation Activities are ‘Knowledge’, ‘Business’, ‘Policy’ and ‘Lobby’.

These key innovation activities can be categorised as follows:

- Knowledge: developing and disseminating of knowledge;
- Business: entrepreneurial activities, market formation and mobilisation of resources ;
- Policy, rules and regulations, government-related framework activities;
- Lobby: non-government-related activities.

As often, some of the challenges in the projects are intertwined between at least two Key Innovation Activities. The challenges identified have been ‘translated’ to a higher level, e.g. ‘funding for scale-up’ and ‘project funding’ are ‘translated’ into ‘funding and finance’. By translating to this level the most dominant challenges can be recognized and thus could become input to the brokerage and linking & support activities during the remainder of BioLinX.



The most dominant topics identified are signalled in red. There is a strong interrelation between these dominant topics. As some of the projects lack sufficient ‘access to customers’ it becomes difficult to perform ‘market validation’. As some of the projects are at a lower TRL the ‘market validation’ will only be done if the innovation is developed further (‘technology development’) and/or available on a larger scale (‘Up-scaling’). However ‘Up-Scaling’ requires financial means to invest in the related hardware. Investments in hardware are expensive and the innovation still needs to prove itself in terms of regulation (‘Supporting legislation and Regulation) and ‘price level with oil

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based' ('Level playing Field'). The consequence of all the insecurities are that companies as well as research organisations are reluctant to invest in the necessary hardware and thus all comes to a stop. The location of the topic in the square (of the Key Innovation Action) has no further purpose except for those that overlap on multiple squares. These latter mean that the topic is (at least) part of these Key Innovation Actions. The overlapping of topics means that there is a clear relation between the topics.

However, there is also another striking conclusion: almost none of the interviewed projects are involved in / relate to 'Lobby' related activities. In other words none of the projects clearly indicated that they need support in the field of 'Lobby'. This is something that is rather strange as 'Lobby' could pave the way to overcome the identified topics, or at least address the issues why projects do not get to market, one of the main reasons for the European Commission to embark on projects such as BioLinX.

Of course, not all issues can be solved via 'Lobby'. There also seems to be a miss in the projects, apparently projects are started without a clear enough 'customer base' (or at least some kind of market pull or good understanding of the market needs) and thus based on a 'technology push' or maybe even overly based on experiments.

The projects interviewed often addressed multiple challenges in terms of the 'Key Innovation Activities'. The picture below gives an overview of the projects that have been matched to the 'Key Innovation Activities'. It must be stated that if a project appears multiple times in the below overview it does not give any measure on the quality of the project.

KNOWLEDGE	<ul style="list-style-type: none"> • Suriox • Bisigodos • Agforward • Eucrf • Ib2market • Inbiosoil • Miracles • Nano3Bio • Greensugar • Polymode 	<ul style="list-style-type: none"> • Prospare • Remeb • Susy • Bioconcepts • Biocore • Biorefine-2G • Enlight • Sector 	<ul style="list-style-type: none"> • Suriox • Bisigodos • D-factory • Europruning • Fertiplus • Greenlife • Agforward • Eucrf • Inbiosoil • Infres 	<ul style="list-style-type: none"> • Logistec • Miracles • Nano3Bio • Nanobe • Greensugar • Pharmasea • Polymode • Remeb • Susy • Bioconcepts 	<ul style="list-style-type: none"> • Biocore • Biorefine-2G • Enlight • Sector 	BUSINESS
POLICY	<ul style="list-style-type: none"> • Europruning • Fertiplus • Greenlife • Agforward • Ib2market • Infres • Logistec • Miracles • Polymode • Prospare 	<ul style="list-style-type: none"> • Bioconcepts • Biocore • Sector 				LOBBY

3 Matching of projects and regions

3.1.1 Projects and regions

As mentioned above, the matching of projects and regions on a very specific level has proven to be impossible. The BioLinX project has thus performed the analysis in a more general way. The approach used was thus to use the interviews to suggest one or more key targets or cooperation industry types that would be suitable for the project/innovation owner to foster further development, for instance as potential customers. See Table 5 in Appendix 1. Then, for each project several regions with matching industry types were suggested. See Table 3. The possibility of building a successful cooperation is dependent on specific properties of the project and actors and/or infrastructure of a specific region.

On the other hand it is possible to make a project/region match with a good possibility of success, based on more general criteria, such as has been done here using industry types. Depending on which criteria that are used, it is thus possible to match the project with (actors in) several regions. We can not expect to make a complete analysis, or to find the “best” region for a project, but with that said, we are able to point at some potentially fruitful matches.

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	Flanders, Belgium	Košice region, Slovakia	Saxony-Anhalt & Saxony, Germany	Scotland, UK	South West Netherlands	Tipperary County, Ireland	Botnic	Central Finland	West Sweden chemical and material cluster	Northern Italy chemical and material cluster	Piedmont, Northern Italy	Sardinia, Italy
AgForward				For			B	For			For	B
BioConSepT	C	C	C				For			For	B	
BIOCORE	A	C				A	B			C	B	
BIOREFINE-2G			C		C				C			
BISIGODOS		C		C					C			C
COMPAC			C		C	A				C		
D-Factory			C				B				B	
EggPlant	Fd			Fd	A			Fd	A			A
Enlight												
EuroPruning				For		A	B	For				A
FertiPlus	A			A					A			A
GreenLIFE		A			C		B		A	C		B
HOTZYME	C		C	C			B				B	
IB2MARKET		C						P		C		B
INFRES				For			For	For		For	For	
Inbiosoil	Fd			Fd	Fd							
LOGISTEC	A				A	A		For	A			
MIRACLES			C		C					C		
NANO3BIO		C	C						C		B	B
NANOBE	C		C				B				B	B
NEMO		C		C							B	
POLYMODE		C	C		C		B					B
PROSPARE	Fd			Fd	C			Fd	Fd			B
Sector	B				B		B				B	B
SPLASH	C		C		C		B					
Suzy	Fd			Fd	Fd							

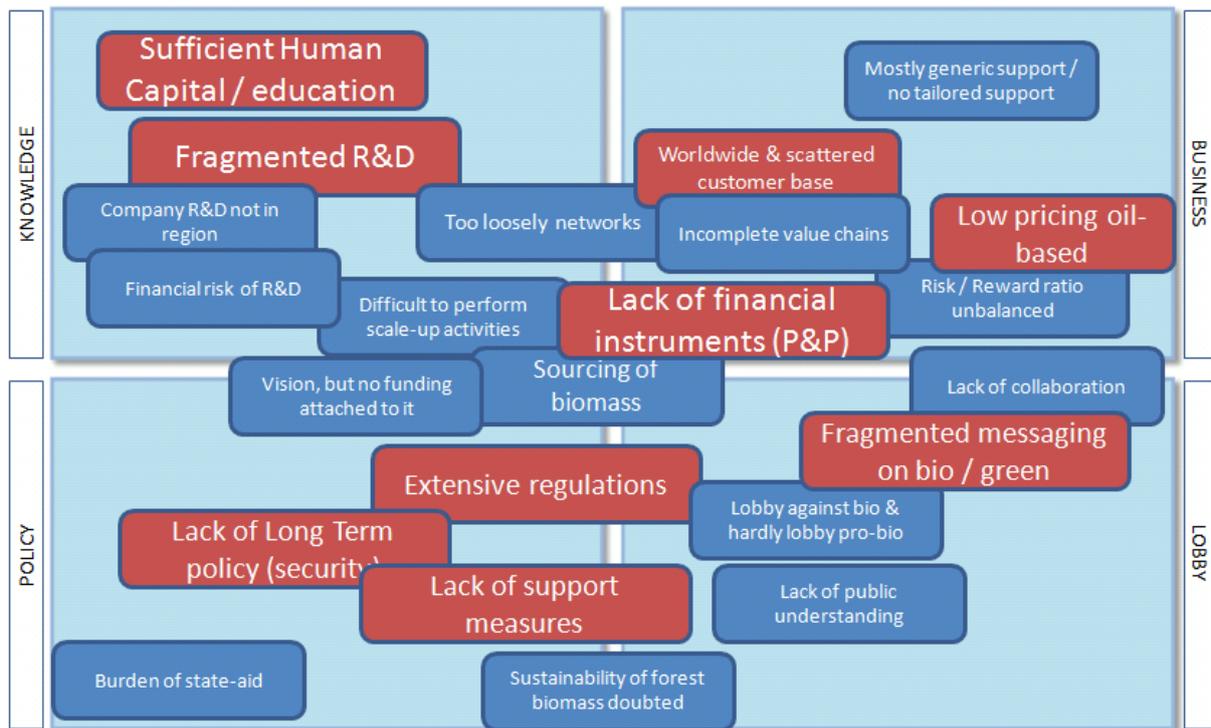
Table 3: Matching of projects with regions, based on target industry types.

A: agro. B: biorefinery. C: chemical. Fd: food ; For: forestry. P: pulp/paper.

3.1.2 Matching regions to Key Innovation Activities

In order to further support the BioLinX brokerage and Linking & Support activities also the regional analyses have been mapped to the Key Innovation Activities. As with the projects, the specific regional input has been ‘translated’ to a higher level, to enable clustering. The clustering has been performed (only) on the regional challenges as the challenges often give a better opportunity to identify support activities from BioLinX. The following overview can be abstracted from the regional analysis





Comparable to the Key Innovation Activities analysis of the projects, the most dominant topics are identified in the red boxes. Also here, most of the challenges are intertwined. The BioLinX team comes to the following insights:

1. 'Lobby': from the project analysis it is clear that the projects are hardly involved in 'Lobby', whilst from the regional analysis it becomes clear that there are challenges related to 'Lobby'. Moreover, these challenges are not in favour of the development of the biobased economy. On the one side the 'traditional oil-based parties' are apparently able to organize a lobby 'against' the biobased developments, whilst the biobased parties are currently less able of providing a 'single message' (in other words the messaging is fragmented). The fact that the projects are not involved in Lobby and that there is no single message is weakening the introduction of biobased products, policies and instruments.
2. 'Policy': regions are signalling that there seems to be a 'lack of long term policy'. A long term commitment from governmental parties to keep biobased on the policy framework would provide trust to parties that want to invest in developments and R&D. These investments are needed to overcome the challenges that have been identified on project level (scale-up, R&D, ...).
3. 'Business': in most of the regional analyses it has been signalled that the financial incentives are not available (vision without funding). Taking the challenges from the projects, where 'Funding / Finance' is one of the most dominant challenges, it is clear that there is a mismatch between what is needed in the field and what is available in the regions. Projects are in need for finance / funding for further development, and the funding issue is not tackled by the regions analysed. The problem is being self-sustained. Regions should address the issues of lack of finance (e.g. Vanguard Initiative is discussing the cross border funding aspects with Interreg).

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4. 'Knowledge': most regions recognize that the R&D is scattered and that there is a longer term issue with the Human Capital Agenda. Education and training of the future work staff is essential.

4 Advice to following work packages

For the remainder of the BioLinX project the following suggestions are made for the brokerage and Linking & Support services (in random order):

1. Emphasis on sessions that bring together market demand (customers) and offerings from the projects;
2. Emphasis on sessions that could enable the search for funding (public) and finance (private);
3. Foster and build on linking BioLinX and parties like Biobased Industries Consortium, Vanguard Initiative and EuropaBio. Clarify the 'gap on Lobby' as a Key Innovation Activity;
4. Use a session to assemble an outline agenda for Lobby activities and offer this to relevant parties.

5 Conclusions

Based on selections done in Task 2.1, twenty-nine interviews have been performed. Of these, twenty-three have led to recommendations for the BioLinX WP 3-6 for services. Building on this, and the analysis of regions in Task 2.2, it was found that a detailed match between projects and regions was found impossible to do in a perfect way, for several reasons. However, we have made a suggestion for a reasonable match matrix. This should be seen as one of many possible match matrices. In the continuation of the BioLinX project, this could be a starting point for the individual projects' attempts to find partners and customers in the regions, on a case-to-case basis.

Based on the analyses and comments presented in this report, we consider the Tasks 2.3 and 2.4 successfully accomplished.

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Annex 1

Projects for which interviews resulted in recommendation for support by BioLinX	Projects for which interviews did NOT result in recommendation for support by BioLinX
AgForward	BACHBERRY
BioConSepT	BIOSURFING
BIOCORE	Drive4EU
BIOREFINE-2G	MULTIHEMP
BISIGODOS	SMARTCELL
COMPAC	SYSINBIO
D-Factory	Splash
EggPlant	
Enlight	
EuroPruning	
FertiPlus	
GreenLIFE	
HOTZYME	
IB2MARKET	
Inbiosoil	
INFRES	
LOGISTEC	
MIRACLES	
NANO3BIO	
NANOBE	
NEMO	
POLYMODE	
PROSPARE	
Sector	
SPLASH	
Susy	

Table 4: Projects in which innovation owners were interviewed.



Project	Key Innovation and Recommendation of support from BioLinX	Partners sought
AgForward	Idea: Solution for predictable, homogenous, sustainable biomass supply, including poplar/oak. Development needed: further project funding and partners needed	For, B
BioConSepT	Idea: demonstration of processes that convert 2nd generation biomass feedstocks into valuable platform chemicals Development needed: relevant markets, launching customers and project funding	For, B, C
BIOCORE	Idea: feedstock conversion to chemicals Development needed: varying, depending on partner. Find feedstock source partner (agro), biorefinery, chemical plant	A, B, C
BIOREFINE-2G	Idea: Bio-based polymers (from dicarboxylic acids), new poly lactic acid (PLA) co-polymers with improved properties. Development needed: find customers and/or industrial partners for upscaling	C
BISIGODOS	Idea: optimise production of algae strains, and produce products that the end users need Development needed: find companies that would like to implement this production	C
COMPAC	Idea: Production of a plasticized fibre composite Development needed: Information on suitable public funding, support in finding investors	A, C
D-Factory	Idea: Whole biorefinery value chain for algae to intermediary products. Development needed: further development, long-term, beyond the project	B, C
EggPlant	Idea: Bacterial production of polyhydroxyalkanoates (PHA) from carbon-rich concentrates from waste streams. Development needed: further project funding and partners needed	A, Food
Enlight	Idea: need for a feasibility study Development need: Grant scan & development SME instrument proposal	C
EuroPruning**	Idea: Harvesting, logistics, storage. Development needed: find customers to purchase harvesting equipment, end users of biomass.	A, For, B
FertiPlus	Idea: safe products for agriculture (fertilizer, soil improvement) Development needed: find composting companies (often regional players, and often public institutes).	A
GreenLIFE	Idea: technologies for the recovery of organic waste from tanneries as a fertilizer Development needed: market intro of biostimulants (commercial bottleneck). Funding is needed to scale up	A, B, C
HOTZYME	Idea: more efficient enzymes for hydrolysis of cellulose at high temperature Development needed: find partners for a follow-up study	B, C
IB2MARKET	Idea: Production of biosurfactants at a competitive price Development needed: find potential partners for future projects for further development of biosurfactants	B, C
INFRES***	Idea: forestry equipment Development needed: find more lead customers	F
Inbiosoil	Idea: improvement of throughput capacity of separation technology (drum sieve), adaptations of harvest machine Development needed: SME instrument phase 2 proposal	F
LOGISTEC	Idea: growing protocols for energy crops, harvesting machines, logistics tools, pre-treatment Development needed: find interested users	A, F
MIRACLES	Idea: Food products Aqua culture products (e.g. fish food). Selected non-food products Development needed: support is ongoing	C
NANO3BIO	Idea: Development of biotechnological production systems for nanoformulated chitosans. Development needed: funding and partners for upscaling.	C, B
NANOBE	Idea: compact, flexible analysis tool for reaction monitoring in biotech industry Development needed: find users	B, C
NEMO	Idea: high purity sugar hydrolysates for further processing Development needed: financing for a demo. Is receiving support	B, C
POLYMODE	Idea: Production of hydrocolloids from modified polysaccharides Development needed: funding for new project and proof of concept, finding project partner (enzymes etc).	B, C
PROSPARE	Idea: animal feed, biodiesel, high quality food additives such as poultry bouillon, all from poultry by-products Development needed: find other meat waste streams, enzyme hydrolysis expertise, biodiesel producers	F, B, C
Sector	Idea: overcome obstacle of insufficient stability and link to customers Development need: Advice LIFE proposal, exploitation support, linking	B

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Project	Key Innovation and Recommendation of support from BioLinX	Partners sought
SPLASH	Idea: polysaccharides from algae, continuous production Development needed: funding	B, C
Suzy	Idea: identification of the right target carbohydrate and to allocate development resources on the right target carbohydrate. Development need: Market analysis	Fd

Table 5: Some technical details about the project, taken from interviews.