

Advanced BIObased polyurethanes and fibres
for the autoMOTIVE industry with increased
environmental sustainability



Assessment of acceptance of the biobased products in the public transport sector

WP 7 Dissemination & Exploitation Deliverable 7.11

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REVISION TABLE			
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Executive Summary

This document is the deliverable of the Biomotive project, whose full name is Advanced BIObased polyurethanes and fibres for the autoMOTIVE industry with increased environmental sustainability.

The present report constitutes deliverable 7.11 “Assessment of acceptance of biobased products in the public transport sector”. The following activities refer to WP7 and specifically to Task 7.3 External Stakeholders Engagement implemented by UITP from the start to the end of the project.

The present report, therefore, builds on the interim analysis deliverable 7.9 “Intermediate report on the round table with external stakeholders” submitted on 30 September 2019 and successfully approved by the BBI JU.

The goal of the BioMotive stakeholders group is to exchange of feedback and expertise on the acceptance of biobased materials, that are developed within the project, by the interested stakeholders, in particular from the public transport manufacturing industry but also transport research and development organisations, EU-level associations and media stakeholders.

In this sense, based on UITP’s stakeholder engagement activities in the form of physical workshops, meetings, technical visits or lately web meetings due to COVID-19 disruptions of physical events, the current report contains a summary of the main findings by the stakeholder group discussions throughout the BioMotive project.

Within the frame of stakeholder group meetings, significant conclusions were drawn against the main benefits and barriers of the use of biobased materials in public transport sector. Although many benefits were identified such as the biobased materials contribution to global CO₂ reductions, light weighting of the vehicles, circular economy principles thanks to ‘cradle to grave approach’ adopted by the life cycle assessment studies of the project; in today’s market barriers of introducing biobased materials outweigh the benefits due to the facts related to high pricing of such biobased materials, missing regulatory impetus by the EU member states towards using biobased materials in public transport sector, a sector which is heavily cost-benefit oriented due to ties with public budget and local or national administrations.

Against this background and findings about the barriers impede the acceptance of biobased materials in today’s public transport sector, this present report recommends that further research should be undertaken in medium-to-long term as public transport sector is fast moving towards CO₂ reductions and achieving circularity from the production of public transport vehicles to the end of life principles. In the years to come, public transport sector could be one of the main sectors in which the use of biobased materials increased as the prices of such biobased materials go down and necessary regulatory incentives are implemented by the national governments or at the EU level for more use of biobased materials in the interior parts of public transport vehicles.

The current report is structured as follows:

1. Section 1: provides introduction to the BioMotive stakeholders group and general overview.



2. Section 2: provides main findings and key takeaways from the BioMotive stakeholders group meetings which provide content for the subject of the present report: the assessment of the use of biobased materials in public transport sector
3. Section 3: provides BioMotive stakeholders meetings/workshops reports
4. Section 4: provides BioMotive stakeholders meetings/workshops all presentation materials used in respective meetings, and D7.9 as materials for the present report as annex.



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1. BioMotive Stakeholders Group Purpose and Overview of Activities

1.1. The Stakeholders Group Objective and the Group Set-up

The BioMotive Stakeholder Group Objective:

The objective of the Task 7.3 was to establish a stakeholders group involving public transport stakeholders, crucial to the project, which are specifically public transport supplying industry; road transport research and development bodies at the EU level; transport and materials associations at the EU and national levels; public transport media bodies; technology providers and research and technology organisations.

Stakeholders were involved to the project in order to discuss on the results which were demonstrated during the project and exchange important feedback and comments on the expected biomaterials performances and costs that consist the main factors of the acceptance of biobased materials in the public transport sector.

This group, successfully managed by UITP, provided support to define new scenarios for enlarging the market opportunities for the biobased materials paving the grounds towards the achievement of consistent impacts at EU level. Stakeholders were contacted and involved with dedicated interviews and meetings. Contacts with the stakeholders group took in the form of a workshops, meetings and webinars set up by the project.

UITP will collected the view of the public transport stakeholders on the project objectives through stakeholders' category dedicated workshops and seminars. In total five workshops/meetings were organised by UITP to discuss the project findings with the stakeholders of the project. In such meetings, the interest towards the use of biomaterials in the public transport vehicles; views and strategies of OEMs and Public Transport suppliers vis-à-vis the use of biomaterials in modern public transport vehicles were explored.

In addition, the BioMotive stakeholders were also invited in the project final event took place as hybrid meeting in Brussels and online on 29 November 2021. Such stakeholder group meetings and final event were successfully organized by UITP as well as moderated. All meetings were supported by the relevant BioMotive partners that fit with the meeting theme such as SELENA, GREENNOVENTION, RINA, INTAP, CARTIF and other relevant partners.

In view of this activity, hereby UITP produces a summary report that includes qualitative assessment of the biobased products focusing on the impact of the new biomaterials on the public transport sector.

The BioMotive Stakeholder Group: Selection of Experts and Group-Set Up Process

In the beginning of the project, UITP conducted a series of interviews with each WP leader to ensure that their expectations were in line with the approach proposed about the External Stakeholders Group task. The approach is extensively reported in D7.9 “Intermediate report on the round table with external stakeholders” annexed to this deliverable, please refer to D7.9 for more information about the internal discussions among the consortium members.

After the internal strategy agreement among the consortium, UITP representing BioMotive has sent an invitation to join the BioMotive Stakeholder Group at the beginning of the project. The invitation is presented below.



Figure 1: Invitation to Biomotive Stakeholder Group

BioMotive Stakeholder Group Composition:

The following companies in the first 18 months of the project were contacted:

1	ACEA	16	LBF Fraunhofer – ERTRAC chairman of the working group Global Competitiveness – Accepted
2	UNIFE (and its members)	17	Treves Group
3	Karsan (from Turkey)	18	Faurecia
4	Bozankaya (from Turkey)	19	EARPA
5	Otokar (from Turkey)	20	Gianfranco Burzio – Independent expert
6	Temsa Global (from Turkey)	21	Tofas (from turkey)
7	Isuzu (from Turkey)	22	Plasticomium
8	Railgrup – Accepted participation to the BioMotive Stakeholder Group	23	IMADE
9	CLEPA	24	Tecniberia
10	Colway 08	25	Tecnalia

11	Diab group	26	Daimler (and also Daimler china)
12	VDL bus coach – Accepted the participation	27	TEMSA
13	Renfe	28	Ursus buses
14	Iziar e-mobility	29	Tribus
15	CRF – ERTRAC chairman of the working group Global Competitiveness – Accepted participation	30	Groupe Atlantic

Table 1: Companies

The UITP Vehicles and Equipment Industry (VEI), that includes different members:

1	EVOBUS GmbH	13	SIEMENS AG
2	Alstom Belgium	14	HESS AG
3	Man truck & Bus	15	TEMSA ULA Ş IM ARAÇLARI SANAYI VE TİCARET A. Ş
4	Toshiba Infrastructure Systems & Solutions corporation (TISS)	16	KNORR-BREMSE SYSTEME FÜR SCHIENENFAHRZEUGE GmbH
5	VOITH Turbbo GmbH	17	NEWTL
6	Bombardier	18	SKODA TRANSPORTATION a.s
7	GROENEVELD TRANSPORT EFFICIENCY B.V. (GTE BV)	19	AB VOLVO
8	GERFLOR – Accepted participation	20	MASATS SA
9	HÜBNER GmbH & Co.	21	ARCONIC WHEEL & TRANSPORTATION PRODUCTS - ALCOA WHEELS
10	CONSTRUCCIONES Y AUXILIAR DE FERROCARRILES SA (CAF)	22	ALEXANDER DENNIS LIMITED
11	ZF FRIEDRICHSHAFEN AG	23	TRANSDEV GROUP
12	SCANIA CV AB	24	IRISBUS IVECO

Table 2: UITP Vehicles and Equipment Industry members

The invitation was also published on social accounts, BioMotive website and UITP website, it was also disseminated by GREENNOVENTION at the motor show in Poland and at Transport Research Arena 2018 in Vienna by UITP.

As stated in the DoA UITP as BioMotive stakeholders engagement task leader focused on public transport stakeholders as this stakeholder category is the only scope of UITP. For this reason, in order to generate more interest towards BioMotive stakeholder group UITP participated into different events, trade fairs, presentations to promote BioMotive project and therefore to gain new members to its stakeholder group (please see below sections for information about these events, publications etc to promote BioMotive project and its stakeholders group among public transport stakeholders network).

After many efforts, ACEA association as stated in DoA did not accept to become a member of BioMotive stakeholder group because of its priorities and resources focused on other topics and



research areas. However, UITP continued its efforts throughout the project in stakeholder engagement by participating in trade fairs and important events in the public transport sector to meet and enable transport industry and other relevant organisations to participate BioMotive stakeholder group.

To this end, after the submission of the last dissemination plan, the BioMotive stakeholder group membership has been improved and widened significantly.

1.2 BioMotive Stakeholder Group Final Membership List

Key stakeholders can have a positive or negative effect on the project, so their profiling and commitment is a key element for the further success of the results of BioMOTIVE after the project's life/. They may have information from the "external world", the potential users of the technologies developed, or any further information necessary to solve other (maybe yet undetected) issues. According to the expected outcomes of BioMOTIVE and the segment of the sector that should be considered "potential users", the profiles (and the specific names of the stakeholders) selected are shown in the following table:

Contact Person	Company	Country
Thilo Bein	LBF Franhofer	Germany
Gianfranco Burzio	Independent expert in regulation	Italy
Francois Tissier & Geoffray Mellet (Proxy)	Gerflor	France
Ignasi Gómez-Belinchón	Rail-Grup	Spain
David Storer	CRF	Italy
Noshin Omar	EARPA	Belgium
Ruud Winters & Peter Cremers	VDL Bus and Coaches	Netherlands
Constance Ißbrücker	European BioPlastic	Germany
Jean di Martino & Emmanuel Bidaine (Proxy)	Luxembourg Insitute of Technology	Luxembourg
Fabio Zammaretti & Riccardo Schiavo (Proxy)	SBY	Italy
Tomasz Chociszewski	ARPEV (RAFAKO Buses)	Poland
Patryk Kresa	PIMOT	Poland

Table 3. BioMotive Stakeholders Member Companies and Countries Represented

Stakeholders are from EU transport research organisations, Bus and Rail Manufacturers, Zero Emission Bus Technologies Media Outlet, Materials research and development organisations, EU level bio-based plastics association.

The membership to the group was kept dynamic meaning that if ever a company was interested to become a stakeholder to the project this was made possible. Thanks to this approach, four stakeholders were recruited to the group after the submission of interim analysis D7.9 which are Luxembourg Institute of Technology, Sustainable Bus Magazine (SBY), ARPEV (RAFAKO Buses) and PIMOT.

Such new stakeholders gave the opportunity for the BioMotive project to seek new collaborations and possibilities to host stakeholder group meetings in different places with



different projects. For example, the third meeting was hosted by PIMOT which is Automotive Research Institute of Poland in Warsaw and the fourth meeting was held in collaboration with other Horizon 2020 funded project [DOMUS Project](#) that Luxembourg Institute of Technology is participating as full consortium member.

1.3 BioMotive Stakeholder Group Meetings

The below table provides the BioMotive stakeholder group meeting schedule, selected discussion themes per meeting as well as project partners involved in supporting UITP organisation of the meeting by providing relevant presentation content. In total five in-depth workshops were organized by UITP, three in physical format and the last two meetings held online due to COVID-19 restrictions.

	Date	Focus	Guest(s)/Host(s)	Led by
1	28 June 2018	Focus: Market interest on the products ✓ Expectations and requirements ✓ Main barriers	UITP Brussels	SELENA Maier UITP
2	12 June 2019	Focus: Industry interest on the processes ✓ (Social) Life Cycle Analysis ✓ (Potential) economic profitability	UITP GPTS 2019 Stockholm	SELENA CARTIF UITP
3	28 January 2020	Focus: Regulation impact ✓ Standardization and certification ✓ On-going legislation	PIMOT	SELENA RINA UITP
4	23 February 2021	Focus: Eco-design, novel components and user acceptance ✓ New vehicles from the scratch: Reflecting the new nature in vehicles design	DOMUS Project via Luxembourg Institute of Science and Technology	SELENA INTAP UITP
5	16 November 2021	Final results –Demo videos Conclusions from the project	BIOMOTIVE DEMO PARTNERS	SELENA INTAP GREENNOVENTION UITP

Table 4. BioMotive Stakeholders Group Meeting Schedule and Topics

UITP organized five BioMotive stakeholders group workshops and many stakeholders engagement activities at the important events in the automotive and transport industry to gain the interest of authorities and operators towards the use of biomaterials in the transport



infrastructure; views and strategies of OEMs and Public Transport suppliers vis-à-vis the use of biomaterials in modern public transport vehicles. Where possible, UITP aligned the BioMotive stakeholder group workshop to the key events in the sector in order to maximise the knowledge and views exchange with more participation from the public transport industry to these workshops.

For BioMotive Stakeholder Group workshop reports please **see Annex Section** as all reports are included along D7.9.

The first workshop took place in June 2018 in Brussels, Belgium and focused on the market interest on the bio-based products. In this first workshop, the expectations and requirements towards bio-based products and main barriers of bio-based products' penetration into transport industry were discussed.

In the second workshop, which was organised in June 2019 linked to UITP Global Public Transport Summit in Stockholm Sweden, the main global event that gathers all public transport stakeholders with conference and trade fair, focused on the industry interest on the processes. BioMotive social and environmental life cycle analysis results and potential economic profitability were presented and a dedicated LCA workshop with participants was organised.

The third workshop took place in January 2020 in Warsaw Poland at the premises of the BioMotive Stakeholder Group member PIMOT. The meeting was focused on the regulation impact towards the penetration and roll-out of bio-based materials and studied the factors that hinder the uptake of bio-based materials from transport industry and R&DI stakeholders point of view. A dedicated workshop was organised to collect additional views of the stakeholders in terms of standardisation and certification impact towards bio-based materials.

The forth workshop was supposed to take place in May 2020 in Luxembourg by focusing on eco-design and customers' acceptance. However, due to the outbreak of COVID-19 the organisation of the workshop took place online on 23rd February via GoToMeeting platform organized by UITP. The meeting focused on eco-design aspects as well as novel components and end-user acceptance of such biobased materials. The fourth Stakeholder Group meeting took place jointly with the Horizon 2020 funded **DOMUS project** which is working on Design Optimisation for efficient electric vehicles based on a User-centric approach to reduce the overall energy consumption of future Electric Vehicles on 23 February 2021 in order to increase 25% of the electric range for different ambient conditions. As BioMotive target sector is Automotive and DOMUS' main application area is novel materials of light weighting and design optimisation, UITP took this opportunity to hold a joint discussion in eco-design and user acceptance topics.

The final Stakeholder Group Meeting took place online and focused on presenting main findings of the project. In addition, a video was prepared by GREENNOVENTION about the demonstrations in SELINA Labs and INTAP seats to show the real demonstration results to the stakeholders. In view of the final results presented to stakeholders, main discussions took place around the pricing of biobased materials as well as regulatory needs as extensively discussed in below Section 2 of this report as well as meeting reports annexed to this report.



All in all, the BioMotive Stakeholder Group workshops are also a good opportunity to present the BioMotive project results to the transport and automotive industry as the group is consisted of this target group professionals. Each workshop also gave opportunity to collaborate with different project partners, therefore enable them to promote their organisations and roles in the BioMotive project towards external experts and stakeholders.



Figure 2. BioMotive 1st Stakeholder Group Meeting



Figure 3. BioMotive 2nd Stakeholder Group Meeting at the UITP Global Public Transport Summit



Figure 4. BioMotive 2nd Stakeholder Group Meeting LCA Workshop at the UITP Global Public Transport Summit



Figure 5. BioMotive 3rd Stakeholder Group Meeting Opening in Warsaw at PIMOT



Figure 6. BioMotive 3rd Stakeholder Group Meeting Standardisation and Certification Workshop



Figure 7. BioMotive 3rd Stakeholder Meeting, Technical Visit @ PIMOT Facilities



Figure 8. BioMotive 3rd Stakeholder Meeting, Members Photo @ PIMOT Facilities

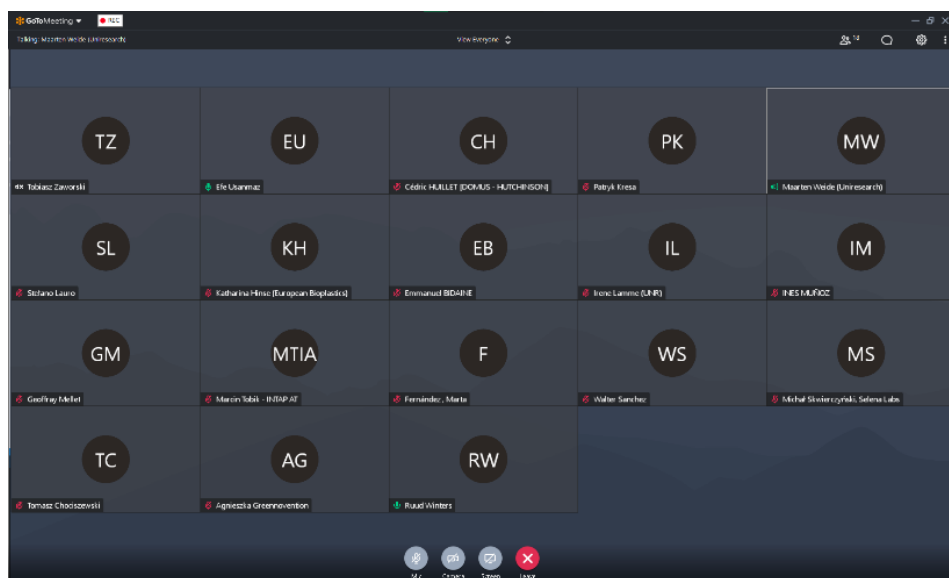
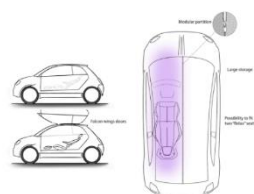


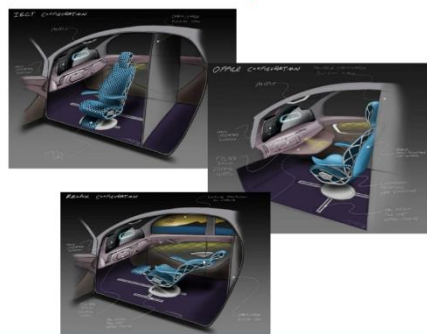
Figure 9. Online 4th BioMotive Stakeholder Group Meeting organised Jointly with DOMUS Project

DOMUS

Design ideas



Implementation



6 23 February 2021 Topic: A virtual user-centric approach to design radically new cabin designs and assess them in terms of optimal energy efficiency use



Figure 10. Online 4th BioMotive Stakeholder Group Meeting organised Jointly with DOMUS Project

DOMUS

Implementation



9 23 February 2021 Topic: Thermal insulation solutions / body panels (including PCMs)



Figure 11. Online 4th BioMotive Stakeholder Group Meeting organised Jointly with DOMUS Project



Figure 12. Online Final (5th) BioMotive Stakeholder Group Meeting, showing project demonstrations and results



1.4. UITP Dissemination to Promote BioMotive Stakeholders Group

UITP, throughout the project, engaged in utmost efforts for WP7 Dissemination activities by promoting the project and its stakeholders group through UITP publications, articles, social media accounts as well as in key sectoral events on public transportation either organised by UITP or attended. Below provides summary of UITP dissemination efforts which were integral to the success of stakeholders group activities as some of the workshops were aligned to key sectorial events in transport sector and by these opportunities new stakeholders were appointed to the group and new collaborations were created.

Flyers and Brochures to Promote BioMotive Stakeholder Group

Dedicated flyers and brochures were created by UITP

UITP produced dedicated dissemination materials to improve BioMotive visual dissemination in events in particular in reaching potential new transport stakeholders.

1) Invitation to Join BioMotive Stakeholder Group

UITP created a dedicated flyer to disseminate at UITP stands in participation to relevant events, conferences and trade fairs (e.g. UITP Global Public Transport Summit 2019, UITP International Bus Conference and BusWorld Exhibition). With the help of such events, BioMotive Stakeholder Group gained new members (e.g. RAFAKO SA, PIMOT).

The flyer includes information about the BioMotive project, goals and benefits of the external stakeholders group. The flyer is being handed out to the visitors of UITP stands in relevant events.



Figure 13. BioMotive Invitation to Stakeholder Group Flyer



2) UITP Research and Innovation Projects Brochure

UITP has a dedicated brochure to inform UITP network and automotive and transport stakeholders about its EU funded research and innovation projects. The new edition of this brochure was published in May 2019 to disseminate in relevant events.



Figure 14. BioMotive in UITP R&I Projects Brochure

UITP Social Media Promotion Examples

UITP regularly promoted the BioMotive project and its latest news and results at the UITP twitter accounts. The aim is to regularly reach UITP network and public transport industry with BioMotive results and its contribution to the green/circular economy from transport domain.





Figure 15. UITP BioMotive promotion at Twitter



Figure 16. UITP Promotion of the BIOMOTIVE final event

UITP External Events Participation to Promote the Project and Stakeholders Group

Examples:

Examples of Participation to Events

1) UITP Global Public Transport Summit, 9 – 12 June 2019, Stockholm Sweden

UITP organised BioMotive participation to UITP Global Public Transport Summit which took place between 9 – 12 June 2019 in Stockholm, Sweden. In addition to the dissemination efforts at the UITP stand including handing out the BioMotive project leaflet and Efe Usanmaz, UITP BioMotive project manager, provided relevant information about the project to the interested visitors of the UITP stand.

In addition, as explained above, BioMotive second stakeholders group workshop took place at the UITP Global Public Transport Summit venue which gave the opportunity to pay dedicated visits to the exhibition area. The BioMotive stakeholder group members and project partners who joined the meeting like SELENA and CARTIF had the opportunity to see the innovations



exhibited at the conference and have bilateral exchanges with the industry stakeholders about the BioMotive project.



Figure 14. BioMotive dissemination and stakeholders visit to the exhibition area at the UITP Global Public Transport Summit

2) UITP International Bus Conference in conjunction with BusWorld 2019 Exhibition, 20-22 October 2020, Brussels Belgium

UITP organised the BioMotive dissemination at the UITP International Bus Conference. The dissemination event called as “BioMotive Immersion Experience” where the project was presented at the UITP stand by project coordinator Michal Skwierczynski, SELENA. The presentation lasted around half an hour and included project objectives, project progress achieved to date and future activities of the BioMotive project. The presentation was well received by attendees of about 30 participants from transport manufacturing and supplying industry, consultants and public transport operator companies.

After the presentation, the BioMotive project met industry stakeholders at the BusWorld Exhibition area. The bilateral meetings were organised with companies before the event by UITP. The bilateral meetings provided an opportunity for BioMotive to engage with industry stakeholders, explain its objectives and future replication potential. The event leveraged significantly the project and industry relations. As outcome of the immersion experience, RAFAKO SA, Polish bus manufacturing company and Gerflor flooring company became a member of the BioMotive stakeholder group as interested automotive industry stakeholders.



Figure 15. BioMotive Immersion Experience at the UITP International Bus Conference

3) UITP Bus Committee Meeting, 22-24 November 2021, Gothenburg, Sweden

UITP's structural working body, Bus Committee, meets biannually. The working body consists of public transport operators, authorities and bus manufacturing industry. Throughout the project, where the bus committee has a relevant agenda topic on research and development activities in the bus transport systems, UITP presented BioMotive project and its latest news and upcoming events.

Finally, the BioMotive project presented in UITP 111th Bus Committee meeting hosted by Volvo buses in Gothenburg, Sweden. The project was presented by UITP Bus Unit members, Arno Kerkhof, UITP Bus Division Leader; Sarah Langenakens, UITP Bus Unit Officer; and Efe Usanmaz, UITP BioMotive project manager. The presentation included the BioMotive project in a nutshell and promotion of the final event on 29th November to key public transport stakeholders.



Figure 16. BIOMOTIVE Project at UITP 111th Bus Committee Meeting Hosted by Volvo Buses, Gothenburg Sweden



2. Assessment of Acceptance of the Biobased Products in the Public Transport Sector: Main Findings and Key Takeaways from the BioMotive Stakeholders Group Meetings and Workshops

This section provides the assessment of acceptance of the Biobased Products in the public transport sector by utilizing from the discussions took place over the five stakeholder group meetings and workshops. As explained in above section about the purpose of the BioMotive Stakeholder Group, these meetings were key to provide necessary content for the qualitative assessment of acceptance of the biobased products in the public sector with reference to Task 7.3 in the BioMotive DoA.

The five stakeholder group meetings covered discussions on the key topics for future marketability of biobased products such as market interest on the products developed by BioMotive project: main barriers and expectations; industry interest on the processes: life cycle analysis and cost issues; regulation impact: standardization and certification issues and impact of regulation and policies on biobased materials towards future market uptake; eco-design and novel components user acceptance; and project final results and demonstrations.

All discussion included in this section are based on the Stakeholder Group meetings. The reports and minutes of five stakeholder group meetings can be found for reference in Section 3 of the present report.

2.1. Summary of Key Drivers for the Acceptance of Biobased Materials in Public Transport Sector

This subsection provides summary of key drivers for the acceptance of biobased materials in public transport sector as extensively discussed in BioMotive stakeholder group meetings.

1) Regulation and Policy Impact

Regulation impact is very high for the introduction of bio-based materials in the public transport sector. Issues like sustainability, recyclability and circularity are becoming core topics in public transport manufacturing industry and bus and train manufacturers are working on including these aspects in their production processes.

From public transport authorities and operators point of view, CO₂ reductions and circular economy principles are becoming key when planning public transport operations such as life-cycle of a bus operation in a city. Public transport authorities publish tenders for public transport services in European cities and operators are bidding for such service contracts. Bus or rail OEMs manufacture buses or trains that comply the requirements by public transport authorities or operators.



To this end, a new regulatory framework, among other actions, could facilitate market uptake and customer awareness hence entailing this looking-forward innovation realised in various industries, essentially in city bus & coach manufacturing. For instance, a requirement on the use of biobased materials in bus or rail tenders could be added and therefore create an incentive for the public transport manufacturing industry to use such biobased materials developed by the BioMotive project.

Such vehicle tendering policies by the city or public transport authorities or national policies favoring biobased parts for the transport sector could stimulate the use of biobased materials and reinforce the acceptance of those materials in the public transport sector.

2) CO2 Reduction Potential in Public Transport Manufacturing

Within the BioMotive stakeholder group workshops, it was discussed and identified that the use of such biobased materials developed in the BioMotive project could significantly reduce the public transport vehicles total carbon footprint.

Moreover, improving end-of-life principles of public transport vehicles are becoming important for the public transport service providers. In this sense, the use of such biobased materials developed in the BioMotive project will contribute to the circularity and life cycle assessment of the public transport industry in a positive way.

3) Eco-design and Light weighting Improvements

End-user and customer acceptance of public transport vehicles are at the core of the public transport industry. In this sense, the use of biobased materials developed by the BioMotive project has the potential to contribute to eco-design of the public transport vehicles as well as light weighting the vehicles. The former will contribute to the end-user appreciation as the vehicles will be more appealing for the citizens and service providers. The latter will potentially contribute to CO2 reductions as light weighting would improve the energy efficiency of the vehicles.

2.2 Summary of the Main Barriers for the Acceptance of Biobased Materials in Public Transport Sector

This subsection provides summary of key barriers for the acceptance of biobased materials in public transport sector as extensively discussed in BioMotive stakeholder group meetings.

1) Higher costs vis-à-vis fossil based materials

The main barrier in today's market is that such biobased materials developed by the BioMotive projects cost significantly higher than the materials currently used for the public transport manufacturing industry. Since the public transport industry is cost benefit driven and operated in limited economic profitability circumstances, pricing of the materials used in the public transport sector is key for the sector.

To this end, higher prices of biobased materials are a key challenge for the acceptance of such materials by the public transport sector. Therefore, higher costs prevent the acceptance and



use of such materials in the public transport sector. However, if BioMotive materials continue to be produced at the larger scale, prices could go down and therefore further uptake by the public transport sector could be achieved.

2) Inexistence relevant certification and standards for the use of biobased materials in the public transport sector

At the moment there are no obligatory standards for the use of such biobased materials developed in the BioMotive project in the public transport sector. Such certification and standardization for the introduction of biobased materials in the public transport vehicles could reinforce the acceptance of such materials. A new standardization and certification framework, among other actions, could facilitate market uptake and customer awareness hence entailing this looking-forward innovation realised in various industries, essentially in city bus & coach manufacturing.

2.3 Summary of the Main Takeaways and Suggestions by Stakeholders for Improving the Acceptance of BioBased Materials in Public Transport Sector

This subsection provides key takeaways and recommendations by the BioMotive stakeholders for improving the acceptance of BioBased Materials in Public Transport Sector.

- Customer perspective: increase of awareness on bio-based materials is very important to ensure acceptance on the bio-based content. Right marketing strategy is also very important to convince end users why they would purchase bio-based materials;
- In terms of expectations on bio-based products there is a need on further efforts for marketing and communications, stronger incentives from European level in terms of new regulation on taxes for bio-content;
- Regulation impact is very high for the introduction of bio-based materials in the industries. A new regulatory framework, among other actions, could facilitate market uptake and customer awareness hence entailing this looking-forward innovation realised in various industries, essentially in city bus & coach manufacturing;
- Cost issue is very important. Since the industry seeks economic profitability, bio-based materials should be price competitive. This can be incentivized at the national (governmental) level or European level through volume (economics of scale);
- Performance parameters (e.g. biobased materials performance against fire) and longevity of such biobased materials should be studied for automotive industry;
- The necessary national or EU level regulation and technical specifications should be in place to foster the use of bio-based materials in the transport industry;
- Partners like INTAP, MAIER they will be producing the end products. Apart from the standards in such end products, standards on semi products like the ones SELENA producing can be included;



- Some recommendations and best practices of the use of biobased materials for the public transport manufacturing or equipment supplying industry can be included;
- Clear value of the bio percentage, level of bio-content in regulations must be included (bio-labels are there by we can work on the labelling on bio-content);
- Labelling about the bio-content of the products can also help the customer acceptance/accreditation towards the products therefore to increase the customer feeling about the bio-based materials.

2.4. Main Conclusions and Recommendations For Future Research

This subsection provides key conclusions drawn by the discussions with the stakeholders on the future use of biobased materials in the automotive sector. In addition, the main conclusions also cover the acceptance of biobased materials in the public transport sector. The conclusions included are a non-exhaustive summary of all discussions took place with the BioMotive stakeholders.

Main Conclusions from the discussions with BioMotive Stakeholders:

- The automotive industry is not secretive and has a great inertia towards new materials. The potentials of bio-based materials should be more transparent towards the transport industry to fulfill the customer needs;
- Additional tests of biomaterials should be performed to facilitate the entrance of these materials into the market. These additional tests should include: ageing tests, comfort tests, fire safety tests and the potentials of light weighting the vehicles with interior biomaterials;
- For the uptake of bio-based materials compared to fossil based it should be price-competitive and market competitive;
- Automotive industry is getting more interested in circularity. For this reason, the industry will be interested the use of bio-based materials, plastics for the interior parts or for the recycling of materials in the years to come
- There might be penalties for the use of fossil-based materials in automotive sector in the years to come
- There are some developments on the policy framework for bio-based materials and sustainability criteria which might be important to impact the sector in the years to come
- At the EU level research agenda, in Horizon Europe there are many research project calls on LCA (Life Cycle Assessment), sustainability, recyclability, circularity, new materials which could help the continuation of BioMotive project and its key results as a key level of know-how is achieved in the project.

Main conclusions from Public Transport Acceptance point of view:

Public transport buses - as specific application case (vehicles category) in the Automotive industry - are specified, tendered and traded typically as a public capital good in compliance with EU public procurement regulations.

As such and as a public good, the needs and requirements put on the bus product reflect those of a combination of stakeholder groups (city authority, Public Transport Authorities (PTA), citizens, passengers, bus operators, environmental agencies) and biobased materials could potentially in the future enter in the scope because the principles on Life Cycle Assessment of vehicles for public transport are evolving rapidly:

- New strategies have been observed to reduce environmental impact: to minimise harmful effects caused by the bus products, in a lifecycle perspective, and to guide and advise PTAs, operators and other stakeholders in decisions concerning migration to more sustainable transport solutions;
- An emerging trend is observed of PTA's in the public transport sector to include and give heavier weight to LCA evaluation criteria in their bid evaluation process, which is seen as a door opener for incentives for including bio-based materials usage in the future;
- Main areas to consider in an LCA application for the bus business over the life cycle are Production, Usage, End of Life;
- LCA and sustainability criteria already in place and that were reported by some stakeholders include for example material composition and its documentation, recyclability rate, lightweight, energy and emission, as requirements;

From technical point of view, the material scope of bus product: Material composition and recycling and buses traditionally consist of materials which can be recycled to a large extent:

- The scoped substitution products and applications assessed in BioMotive project are, as mentioned above, the materials used for interior facias, door handles, foams in seats and textiles where the recycling yield is fully investigated. Substitution of plastics, reinforced plastic, textiles

A crosscutting analysis of all ideas and possibilities discussed in the BioMotive Stakeholder Group helped to outline priority studies to be conducted both at manufacturer and operator level. These priority studies, which are in fact to a large extent echoing the guidelines from the UITP "European Bus of the Future" Group, fall into two categories:

- 1) Technologies / knowledge transfer.
- 2) Regulations.

1) Technological development, knowhow or technology transfer studies that could be carried out in future research

A. Materials and equipment



- Weight:

Lighten bodyshell structures: honeycomb structures, composite materials, or any material derived from technology transfer. It is important to work on the weight of materials and not only their recyclability

- Recyclability

Extend the use of recyclable materials with the ultimate aim of a 100 % use of recyclable materials and / or components.

- Noise control

Seek manufacturing and assembly methods as well as materials minimizing noise increase resulting from vehicle ageing

- Fire / smoke resistance

Fire / smoke characterization of materials. Extinction techniques. Inspection of hot areas caused by the concentration of equipment likely to cause a fire risk.

B. Cleanliness

- Clean image

Seek coverings (especially fabric) that project an image of cleanliness and freshness while offering a high level of adhesion (seats, floor covering).

- Facilitate cleaning

Develop self-cleaning materials resistant to tags, impact, films etc.

- Cleaning products

Seek cleaning products that are toxic to neither employees nor the environment

C. New concepts

Several issues are transversal and could be studied as concepts in their own right:

- Recyclability
- Weight
- Seats and lumbar supports
- Reserved spaces dedicated to new technologies

2) Regulatory aspects to study in future research

Some topics pose recurrent certification problems. Many areas were identified and should be carefully examined within the framework of the studies to be carried out: - layout / seats, - dashboards / facias, biobased labialization: need to simplify approval, - fire / smoke characterization, - compatibility of biobased concepts used with the local ecosystem.



2.5. Lessons Learned by Task 7.3 Stakeholder Group Engagement

This subsection provides the main summary by UITP on the Task 7.3 External Stakeholder Engagement activities of the BioMotive Project.

- UITP believes it was a good added value for the project to receive external stakeholders views, thoughts and inputs to the project;
- As a structural activity it gave a good dissemination opportunity to a focused group of experts active in the automotive sector ;
- Due to COVID, some disruptions happened in terms of physical meetings and events as such physical meetings are better for stakeholders interactions;
- The stakeholders group activity also gave the chance to present the BioMotive project in key UITP events such as the UITP International Bus Conference in 2019 and UITP Global Public Transport Summit as well as the UITP Bus and Industry Committee meetings;
- UITP thanks to all BioMotive Stakeholders and Project Partners supporting the successful implementation of the Task 7.3. External Stakeholders Engagement activities.



3. BioMotive Project Stakeholders Group Meetings/Workshops Reports

This section provides BioMotive stakeholders meetings/workshops reports. These meetings/workshops reports consist the basis of arguments for the acceptance of biobased materials by the public transport sector, as in-depth discussions took place in the meetings/workshops.

BIOMOTIVE Stakeholder Group #1

28th June 2018. Brussels (Belgium)

Meeting organiser: Ms. Cristina Hernández, UITP (+32-2-788 01 12)

List of participantst

NAME	COMPANY	STATUS ¹
Bein Thilo (TB)	LBF Fraunhofer	A
Burzio Gianfranco (GB)	Independent expert in regulation	A (online)
Gabikaetxebarria Iker (IG)	Maier	A
Gómez-Belinchón Ignasi	Rail-Grup	E
Castillo Cristina (CC)	Rail-Grup substitute	A (online)
Hernández Cristina (CH)	UITP	A
Ißbrücker Constance	European BioPlastic	E
Koźlecki Tomasz (TK)	SELENA	A
Omar Noshin	EARPA	E
Restivo Pénélope (PR)	UITP	A
Storer David Mark (DS)	CRF	A (online)
Tissier Francois	Gerflor	E

¹ A = Attended; E = Excused.



NAME	COMPANY	STATUS ¹
Winters Ruud (RW)	VDL Bus and Coaches	A



Minutes

10:30 – 10:40	Opening of the meeting
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CH (UITP) made the opening remarks and thanked the participants for joining the meeting.

10:40 – 11:00	Stakeholder Group Guidelines
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CH explained the guidelines of the stakeholder group including the expectations about its objectives, the travel reimbursement cost rules and the confidentiality issues.

Please refer to the presentation **BIOMOTIVE 01_Stakeholder Group Guidelines** attached to these meeting minutes.

The following aspects were stressed:

- The need of having the 3 copies of the contract to reimburse their travel cost;
- The need of keeping the original tickets for the reimbursement;
- The need of requesting the approval of the projects partners so to have access to specific information.

11:00 – 11:05	Get to know each other
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A 'tour de table' followed in order for all meeting participants to present themselves, including their expectations related to the project. Main ones were:

- To better understand the performance of the products produced (RW –VDL Bus and Coaches-, TB - LBF Fraunhofer-, DS –CRF-) including:
 - o Mechanical characteristics;
 - o Fire resistance level;
 - o Associated costs/;
- To understand the level of the acceptance of these products for the whole vehicle industry – cars, coaches, trams, trains and others (CH);
- To identify the business opportunities linked to these products for the whole vehicle industry – cars, coaches, trams, trains and others (GB – independent expert).

11:05 – 11:45	BIOMOTIVE: Main goals
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TK (SELENA) introduced the project to the participants, including the chemical activities and halfway products and all the aside aspects related to the project, e.g. the CO₂ emission.



Please refer to the presentation **BIOMOTIVE 02_Main goals** attached to these meeting minutes.

The following aspects were stressed:

- The goal of BIOMOTIVE is triple: the production at industrial scale of bio-based materials consisting of thermoplastic polyurethanes, made of:
 - o **thermoset polyurethanes** (onwards TPU);
 - o **thermoset polyurethanes foams** (onwards TP foams); and
 - o **regenerated fibres**;
- The production of these bio-materials is based on weeds;
- The purity is essential to ensure the quality of the products. Otherwise their degradation and deterioration will be very quick and so their attractiveness will decrease in an exponential way;
- The halfway products of the biomaterials that could create any risk of allergy are produced in less quantity than in the traditional fossil-based counterparts processes;
- Currently the technique allows:
 - o A maximum of 80 % of TPU bio-components in the products targeted by the project. This limit is based on the production of di-isocyanates, that can't be completely reduce to zero. The current status of the project (1 year on-going) is around 70% of bio-components in the products targeted;
 - o A maximum of 30% of regenerated fibres;
- Technology use on each of the steps is considered safe and smell-less;
- Until now the mid-term results confirms that:
 - o Most promising materials are the rigid pre-polymers into the formulation of foams with a renewable based content varying from 60 to 80%;
 - o Less promising materials are the soft pre-polymers;
 - o IG (Maier): their primary focus is the production of fascia;
 - o The production time of polyurethane prepolymer will be reduced from 2 h down to 20 min;
 - o First estimations confirmed that 1.500 tonnes per year could be produced;
 - o Characteristics such as fire resistance are very promising, as these biomaterials could decrease the flame generation and even the smoke;
 - o Mechanical characteristics such as the strength and flexibility are very promising, as they seem to be higher than the traditional fossil-based counterparts;
 - o It was also confirmed that the biomaterials could also offer high inflexibility if necessary;
 - o Hydro-repellent/water repulsion needs to be further analysed.
- Some primary prices were shared involving the raw materials:
 - o **1.550-1.750 €/ton of regenerated fibres**;
 - o **2.500-2.750 €/ton of bio-based PU foams**;
 - o **3.000 €/ton of bio-based TPUs**.



Main comments addressed the following points:

- The economic figures are interesting, but the specific prices of the bio-based products (e.g. the dash board and, in the main, the bio-based products to be sold to the product maker and the vehicle assembler) would be welcomed;
- There were some comments about the final quality of the products. The participants convey that more information would be appreciated;
- TB requested about the convenience of having these materials in other markets, e.g. the shipping building market. None of the partners in the meeting room (CH, TK and IG) confirmed any kind of professional relation with the shipping building industry.

11:45 – 12:30	Maier case study: Bio-Materials in the automotive industry
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IG introduced the experience of Maier as a manufacturer of the automotive industry and a case study based on Maier's latest activities. It was confirmed that Maier's interest on the biomaterials are based on a company strategy that includes both a less petrol-dependence industry and the development of a greener company's image;

Please refer to the presentation **BIOMOTIVE 03_Maier_Case study** attached to these meeting minutes.

Main comments addressed the following points:

- TB: It is important to consider the geographic area involved in the case study: e.g. soy-foam is highly linked to the EEUU. The bio-materials targeted in BIOMOTIVE are based on wood pulp, cardoon roots and vegetable oils. These sources are easily found in Europe;
- TB: The automotive industry, thanks to the appearance of new EU Directives pushing for more degradable materials, is becoming more and more focused on recycling activities. Biomaterials are expected to be easier recyclables. This characteristic should be included in the analysis;
- TB and RW: A "*cradle to grave*" approach (whole cycle approach) should be considered when discussing about the recyclability of the materials;
- RW: The processes to product the bio-base parts for private cars and coaches may differ. When facilitating the analysis of the bio-materials, it should be considered;
- TB: It could be interesting to check if the processing of building the different biomaterials (e.g. TPUs and fibres) is suitable for any technology;
- TK: As the chemistry process is a tailored based solution, it is necessary to get the final products to do this checking;
- TB: It would be convenient to compare the final products in a broader context. The inclusion of the materials in free and paid data bases such as "[Mat Match](#)" could be convenient for the entrance into the market;
- RW stressed that, even if these data based are consulted, a final comparison will be undertaken by the vehicle assembler;



- TK confirmed that the general inertia of any market is “not trusting any new materials”, so any efforts to get them entering in the market are necessary.

13:30 – 14:30	Main challenges and expectations
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CH introduced the main challenges and expectations discussion based on the partners’ input during the preparation of the meeting, and some desk research.

Please refer to the presentation **BIOMOTIVE 04_Main challenges and expectations** attached to these meeting minutes.

During the discussion, Faurecia was pointed out as a company to follow in the bio-based materials exercise. Other EU projects were named. TB has facilitated an article where more information could be found. Please refer to the presentation **BIOMOTIVE 05_Deloitte Japan CNF composites** attached to these meeting minutes.

Main comments addressed the following points:

- TB confirmed that doors and dashboards are the easier areas to implement the bio-based materials, so it should be normal to find other bio-based materials proposed for the same parts of the vehicle;
- All agreed that a joint session with other bio-materials focused EU projects could be of interest, including a 20 minutes presentation about the outcomes of each project. Considering the nature of the activities normally developed in these projects (involving laboratory activities), this joint-session could be welcomed at the end of the project.

When discussing about the drivers (please check the presentation BIOMOTIVE 04_Main challenges and expectations, slide 6) it was agreed that:

- RW: Bio-based products’ weight should not highly differ from the weight of the traditional part. It is not a driver;
- RW: There is no good information about the energy consumed in the project, but it could be interesting to know it. TB agreed with this opinion: it is very difficult to get any trustful information about the energy consumption/Life Cycle Analysis (onwards LCA) due to all the confidentiality issues and assumptions (hypothesis) done during the analysis. CH confirmed there will be a meeting session (the 2nd meeting) where this topic will be addressed, as it is part of the projects’ results;
- TB: Suggested to add acoustic and noise vibration features;
- IG: Confirmed that the points presented in the drivers are in line with the manufacturer’s view;
- RW: Main concern is to confirm if all the drivers proposed could be trusted;
- TK: Regarding BIOMOTIVE’s developments, some feedback could be provided about:
 - o Regulatory drivers:
 - **Recyclability – To check;**



- Economic drivers:
 - Cost-competitive (or price-neutral) – To check at the end of the project;
- Company-policy related drivers (« soft drivers »):
 - Sustainability policies – To check within the WP6 activities (Cartif)
 - Total carbon footprint reduced – To check;
 - Total transport cost reduced if produced « locally » - Not necessary, even if the products are not produced in other continent, such as America, there are transport cost associated;
 - Less energy consumed during the manufacturing processes – To check “from the cradle to the grave” (LCA);
- Product specific benefits drivers:
 - Light weighting – To check.

When discussing about the blockers (please check the presentation BIOMOTIVE 04_Main challenges and expectations, slide 8) it was agreed that:

- RW could agree with the suppliers trap concern;
- TK discussed some of the contras detected, based on the mid-term projects' outcomes:
 - It is considered to improve the moisture resistance of the bio-based products, to make them “moisture insensitive”
 - They could be considered already “heat insensitive” and “flame-retardant” (the previously presented feature of “reducing of the flame and the smoke generation” are in line with this conclusion). The University of Vester could be further involved in this activity if more test are necessary;
- IG added that Maier normally tests the resistance of the bio-based materials to the regular manipulation of the materials, e.g. hand cream, human manipulation, etc...
- TB agreed with the odour-less necessity. However it is not a particular concern of the bio-based materials, so it could be removed from the blockers list;
- RW included the aesthetic performance of the bio-materials in the blockers' list.

In addition, it was agreed that:

- The higher thermal efficiency of the bio-based materials in seat, in particular during winter period, should be demonstrated (please check the presentation BIOMOTIVE 04_Main challenges and expectations, slide 13);
- The list of technical features proposed by a participant (please check the presentation BIOMOTIVE 04_Main challenges and expectations, slide 14) is very specific and correspond to a company's test. These tests are performed once an official interest/contract is concluded. If necessary, the following features could be demonstrated:
 - Heat: Already covered by the flame/smoke test;
 - Temperature cycling and effects at damp heat: Both could be considered in further steps;
 - Flammability: Already covered by the flame/smoke test;



- Accelerated weathering: Could be covered with a basic test, not the specific one proposed: a irradiation test;
- Resistance to chemicals: Could be covered in further steps by Maier with a generic test.

It was commented that the test proposed depends on the country where the assembler is based, so they will be exactly covered when a potential client shows its interest in the bio-based products. However when possible, generic test will be performed/shared so to ensure the good features of the bio-based materials.

14:30 – 14:45	Next steps
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It was agreed that the next meeting will take place in Berlin (Germany) during [InnoTrans](#) (18-21 September 2018). A doodle will circulate to select the final date.

Main conclusions:

- Prices should be presented by product unit;
- The market has a great inertia against new materials. The materials performance needs to be demonstrated in order to attract the interest of the market on them;
- A list of the materials features could be added in different materials data bases, such as Mat Match, so to facilitate the entrance into the market;
- The BIOMOTIVE target profiles should be the products manufactures such as Maier and the vehicles assemblers, as the sectors normally works as follow:
 - The assemblers detect the materials features in the free/paid data bases;
 - If interesting, the assemblers perform their own test in the selected materials;
 - If passing the test, the assemblers ask the manufacturers to check the convenience of producing a product based on this new material;
 - The manufacturers performs their own test to the biomaterials.

Action points:

ACTION		RESPONSIBLE	DEADLINE
1	Sending the 3 signed contract + Travel cost to the UITP	Stakeholders	ASAP
2	Demonstrating the performance of the bio-based materials	SELENA	First feedback to be presented during the 2 nd SG meeting
3	Ensure an interesting LFA approach	UITP + Cartif	First approach to be presented during the 2 nd SG meeting

ACTION		RESPONSIBLE	DEADLINE
4	Checking the convenience of uploading the data in the Mat-Match data base, as well as others	UITP + SELENA	First feedback to be presented during the 2 nd SG meeting
5	Adding acoustic and noise vibration features in the performance test/analysis	MAIER + SELENA	First feedback to be presented during the 2 nd SG meeting
6	Improving BIOMOTIVE dissemination activities/plan based on the targeted profiles identified	UITP + GREENOVENTION	First feedback to be presented during the 2 nd SG meeting
7	Studding the possibility of a bio-based joint event	UITP + SELENA	First feedback to be presented during the 2 nd SG meeting

--- End of Minutes --

BIOMOTIVE Stakeholder Group #2

12nd June 2019, Stockholm (Sweden)

Meeting organiser: Efe Usanmaz, UITP (+32-2-663 66 30)

List of participantst

NAME	COMPANY	STATUS ²
Bein Thilo (TB)	LBF Fraunhofer	A
Burzio Gianfranco (GB)	Independent expert in regulation	E
Burgoa Fernando (FB)	CARTIF	A
Gómez-Belinchón Ignasi (IG)	Rail-Grup	A
Usanmaz Efe (EU)	UITP	A
Ißbrücker Constance (CI)	European BioPlastic	A
Koźlecki Tomasz (TK)	SELENA	A
Skwierczyński Michał (MS)	SELENA	A
Omar Noshin (NO)	EARPA	E
Sitarz Agnieszka (AS)	GREENOVENTION	E
Storer David Mark (DS)	CRF	E
Tissier Francois (FT)	Gerflor	E
Winters Ruud (RW)	VDL Bus and Coaches	E
Cremers Peter (PC)	VDL Bus and Coaches (Substitute of Ruud Winters)	A
Lauro Stefano (SL)	RINA Consulting	A (via Skype)

² A = Attended; E = Excused.



Minutes

10:00 – 10:30	Opening of the meeting and Actions from the 1st SG Meeting (UITP)
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EU (UITP) made the opening remarks and presented a brief recap about the BIOMOTIVE Stakeholder Group, interests, key project partners responsible in contributing to the Stakeholder Group Meetings. In addition, EU also presented key takeaways from the 1st SG Meeting and presented the progress achieved from the main action points noted in the first meeting to be fulfilled. It has been agreed that:

- Demonstrating the performance of the bio-based materials, ensuring an interesting LFA approach and adding acoustic and noise vibration features in the performance test/analysis can be covered in the next (3rd) Stakeholder Group Meeting since the project will perform these R&D results in industrial and semi-industrial scale after July 2019;
- UITP had couple of teleconferences and contacts to check the feasibility of adding the BIOMOTIVE data to the online data bases (e.g. Mat-Match), as suggested by stakeholders in the first meeting. UITP will proceed on this point in the coming months on the possibility to add BIOMOTIVE project profile and some trials after checking the confidentiality issue with the project coordinator to the “[Mat Match](#)” to facilitate the BIOMOTIVE solution’s entrance into the market;
- In the first meeting it was noted that there is a high interest about project’s approach on life-cycle analysis. For this reason the 2nd meeting focused on BIOMOTIVE Approach on Processes (LCA (environmental) approach, LCA (social) approach, LCC (economic assessment) approach or economic profitability);
- As suggested project partners (UITP, GREENOVENTION, SELENA) will work on organising a joint event with other bio-materials focused EU projects to showcase the BIOMOTIVE results by the end of the project.

As a project level development to improve BIOMOTIVE project’s stakeholder engagement, a dedicated section on Stakeholders Group will be made available by project dissemination leader, GREENOVENTION. This section will be used to share useful documents, news on the developments in the bio-based sector and BIOMOTIVE project and will be a reference information base to interest new members to join BIOMOTIVE stakeholder group. Project partners will work on this specific section that will be made available in the project website in the coming months. The link will be shared with the Stakeholder Group members when its ready.

EU also explained the guidelines and the travel reimbursement cost rules and confidentiality issues. The following aspects were stressed:

- The need of having the 3 copies of the contract to reimburse their travel cost;
- The need of keeping the original tickets for the reimbursement;
- The need of requesting the approval of the projects partners so to have access to specific information.

Please refer to the presentation **BIOMOTIVE_SG Meeting #2_UITP** attached to these meeting minutes.



10:10 – 10:15	Tour de Table (All)
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A 'tour de table' took place in between opening and actions from the 1st Stakeholder Group Meeting presentations in order for all meeting participants to present themselves.

10:30 – 11:00	Updates on the BIOMOTIVE Progress (SELENA)
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MS and TK (SELENA) introduced the project updates to the participants, including the chemical activities and some results from the first trials of the halfway products.

Please refer to the presentation **BIOMOTIVE_SG Meeting #2_SELENA** attached to these meeting minutes.

Some updates from BIOMOTIVE updates could be summarised as follows:

- The main update on the BIOMOTIVE task "validation and demonstration of automotive interior parts production through biobased TPU" was that first injection trials took place in a simplified geometry (150x100 mm. flat plaque) on the selected part; interior fascia.
- 2K Injection moulding (with standards materials) took place. Minimum material quantity required were between 10-15 Kg. First injections regarding the bio-TPU materials from the project will be available in M25 (after July 2019);
- The main update on the task "validation of biobased 2k PU foams and reinforced 2k PU foams in the production of automotive seats". The main outcome is that first tests have been carried out in April 2019, using polyurethane flexible foam containing 60% of bio components (tests performed on existing foaming machine). It has been acknowledged that it will not be possible to achieve 100% of bio-components due to technical restrictions. Nevertheless, the project is achieving the initial target as maximum 80% of TPU bio-components in the products targeted by the project.

Main comments from the stakeholders addressed the following points:

- IG introduced the latest perception of the rail industry towards bio-based materials. These include that rail industry is not close to automotive industry regarding the accessibility of bio-materials and related projects. For this reason, use of a right branding towards bio-materials in the rail industry is very important. It would be helpful to organise technical days to learn what is the state-of-the art in rail industry regarding the introduction of bio-based materials. For that purpose, publishing a matrix to summarise the state-of-the art on bio-materials in rail industry and preferably compared to automotive industry would be very useful to stimulate marketability and fulfil expectations from customer point of view;
- PC from VDL as one of the largest bus manufacturers in the European market highlighted some of the most important perspectives that could contribute to the BIOMOTIVE project's technical tests/trials from their point of view. These can be summarised as follows:



- VDL requires large amount of seats for their buses every year. For this reason, VDL would prefer to have some practical information on the benefits of bio-based materials that can be applied to their business cases such as:
 - ✓ Ageing tests for bio-materials are very important. On average, people are sitting 4-5 years on the seats of a bus and some seats. Therefore, it is important to know how bio-based seats impact the ageing of the seats;
 - ✓ Secondly, comfort tests are equally important for the bus seats and it is therefore important to learn on how bio-based seats have an impact on seat comfort. It is important to know because some of the buses are travel from Amsterdam to Barcelona (long distances);
 - ✓ Thirdly, fire resistance of the bio-based materials for automotive industry is also very important. Therefore, it is advised to have fire safety/resistance tests on the bio-based materials. Fire safety is also a critical issue for rail and shipping industry since there should be a use of materials that are fire protected in train/ship building;
 - ✓ Last but not least, light weighting buses is a very important issue for automotive industry. This reflects on the importance of bio-based materials since adding weight is additional costs to bus operations and bio-materials are a good opportunity to cut the costs related to weight. A lot of requests on the development of seats are required in automotive industry from legislation point of view and lowering the weight of seats below 22kg will be more viable with bio-materials. For this, an efficient design of seats are recommended.

11:00 – 12:15

BIOMOTIVE Approach on Processes (CARTIF)

FB from CARTIF as the WP6 Sustainability and Standardisation WP Leader shared the BIOMOTIVE LCA (environmental) approach, LCA (social) approach and provided updates on LCC (economic assessment) and economic profitability approach of BIOMOTIVE project. In addition, CARTIF held a workshop with the Stakeholder Group participants on the LCA (social) methodology, particularly BIOMOTIVE product social impact assessment.

Please refer to the presentation **BIOMOTIVE_SG Meeting #2_CARTIF**.

The update started with the Market Analysis and techno-economic evaluations carried out in BIOMOTIVE project. Some key points on BIOMOTIVE Market analysis of bio-based materials and products can be summarised as followings:

- Current market prices of thermoplastic polyurethanes range from 4,000 to 10,000 € per tonne;
- Current market prices for thermosetting polyurethane foams range from 2,300 to 3,000 € per tonne;



- Total potential value of thermoplastic polyurethanes in the automotive industry is estimated to be 720 million € a year and that of thermosetting foams – 398 million € a year.

FB continued his presentation on Task 6.2 Environmental, economic and social sustainability and explained the BIOMOTIVE LCA (environmental) and LCA (social) approach. This included the LCA case studies on Fibre regeneration and Fossil vs bio TPU carried out in BIOMOTIVE project. Please refer to CARTIF slides for more information.

Some conclusions and bottlenecks identified by CARTIF related to S-LCA are as follows:

- Comparative study of the environmental impact of fossil and bio based products is important;
- Apparently, bio-based products shows better scores. Do they have the same properties, durability, biodegradability, recycling potential, etc..?
- There is a lack of information in terms of some environmental flows;
- There is little information and few previous studies in terms of S-LCA.

Stakeholders' expertise was collected during the S-LCA methodology workshop set up by CARTIF. The input was collected with a questionnaire that the stakeholders had to rank their perspective on the importance of the topics from 0-5.

Some comments by the stakeholders on CARTIF's exercise can be noted as follows:

TB: It is important to include "affordability" on the Users' social topics.

Some comments were received by the stakeholders on BIOMOTIVE's sustainability approach. These can be summarised:

- PC: There is a fact that every manufacturer has to issue reports on their sustainability approaches to provide complete overview about their buses to the Public Transport Authorities in the cities.
- PC: In bus tendering, manufacturers need to explain how they recycle the buses in 19-20 years. Therefore, in the coming years operators will need to encourage manufacturers regarding the sustainability of the buses and therefore it is important to include an analysis on the sustainability issues in the tendering processes;
- IG emphasised the importance of branding and marketing principles that is needed to encourage bio-materials and related sustainability measures for the rail industry. He mentions that customer acceptance and is really important to introduce more and more bio-materials to the rail industry;
- TB: Automotive sector is less secretive regarding the bio-materials now. One of the most important issue regarding the LCC and LCA is the compliance issue. To contribute to this, market data is quite interesting. For example, with recent automation technologies use of materials regarding light weighting and comfort issues may change. Therefore, it is good to have the market data on PU – bio-based plastics.



Some input received by the stakeholders on the relevant materials on the sustainability topic done by different projects. Some of them could be put as below:

- CI mentioned that Joint Research Center (European Commission) will publish a paper on ISO-standards evaluating every kind of alternative feedstock including case studies on cars interior goods (e.g. LCA, LCC analyses for doors;
- TB mentioned the ALLIANCE project which looks into a “cradle to grave” approach (whole cycle approach) about the recyclability. He shared the publication of the ALLIANCE project on “Lightweight Automobiles ALLIANCE Project: First Results of Environmental and Economic Assessment from a Life-Cycle Perspective”. Please refer to the publication **Fraunhofer_ALLIANCE_2018**.

12:15 – 12:45	Status of Bio Materials at European Level (European Bioplastics)
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CI, Head of Environmental Affairs at European Bioplastics (EUBP), who is a member of BIOMOTIVE Stakeholders Group introduced the developments of bio-plastics at the EU-level. EUBP represents the interest of the bioplastics industry along the entire value chain in Europe. It has a 70 members and its services include networking on EU & Member State level.

Please refer to the presentation **BIOMOTIVE_SG Meeting #2_European Bioplastics**.

Main points from CI’s presentation and discussions can be noted as follows:

Some of the market drivers of bioplastics are:

- Innovation (advanced technical properties and functionalities);
- Market demand and high consumer acceptance;
- Cost reduction through economy of scale;
- Cost reduction through environmental impacts;
- Recyclability and new recycling options;
- Fossil raw material dependence (and potential increase in prices for oil)

Some of the market barriers of bioplastics are:

- Level playing field needed for all bio-based industries to ensure access to biomass;
- Distorted effectiveness of bio-based market segments;
- Measures, such as subsidies, quotas exist for renewable energy sector, but not for bioplastics industry;
- Missing links between suppliers of raw materials and manufacturers;
- Lack of knowledge

How much do bioplastics cost?

- They can cost up to 5 times higher than conventional plastics as low oil price is the main reason;
- Scaling effects might reduce prices



Ci's presentation also included major converters and car brands that adopt bioplastic solutions and how bioplastics are a crucial pillar of the bio economy in the EU.

12:45 – 13:15	Materiality Analysis with BIOMOTIVE Stakeholders (RINA)
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Stefano Lauro from RINA as BIOMOTIVE project partner remotely connected the meeting to introduce the work carried out relating to certification and standardisation issue. Since the next Stakeholder Group meeting will also focus on standardisation and certification topics, Stefano briefly explained the work carried out on the topic in BIOMOTIVE project and the materiality analysis questionnaire. Please refer to **BIOMOTIVE_SG Meeting #2_Materiality analysis_Stakeholders_RINA**

In order to define certification and standardisation parts in the BIOMOTIVE project, RINA needs to conduct an analysis on the materiality aspects. Therefore, the questionnaire aims to define the level of importance, for the BIOMOTIVE project's stakeholders, of the aspects listed in the questionnaire that have a link to sustainability; the criteria to be used to define the level of significance of each single aspects are: a) the likelihood and severity of economic, environmental or social impacts that may originate from that aspects; b) the influence they may have on the performance of the project; c) the opportunity to gain competitive advantage out of it. Through these criteria, stakeholders were required to give a rating from 1 to 10 (1 being the lowest, 10 the highest) that expresses the level of significance/importance.

Stakeholders filled the questionnaire and WP6 leader CARTIF has collected the filled questionnaires.

13:15 – 13:30	Next Steps
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It was agreed that the next meeting will take place in Autumn (November) 2019. A doodle will be circulated to select the final date.

Main conclusions:

- The automotive industry is not secretive and has a great inertia towards new materials. The potentials of bio-based materials should be more transparent towards the transport industry to fulfill the customer needs;
- Additional tests of biomaterials should be performed to facilitate the entrance of these materials into the market. These additional tests should include: ageing tests, comfort tests, fire safety tests and the potentials of light weighting the vehicles with interior biomaterials;



- A list of the materials features could be added in different materials data bases, such as Mat Match, so to facilitate the entrance into the market;
- There is a large interest towards the standardisation and certification of biomaterials studied within the BIOMOTIVE project. The next (3rd) Stakeholder Group Meeting shall include BIOMOTIVE's work on standardisation and certification.

13:45 – 14:15	Visit to the BIOFUEL EXPRESS booth @ Exhibition Area of UITP Summit (ALL)
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UITP Global Public Transport Summit included a large exhibition area where 300 companies were exhibiting their products, services and solutions.

This was taken as an advantage and participants visited the BIOFUEL EXPRESS which is a Swedish company providing fossil free fuels for bus operations. The company representatives welcomed the BIOMOTIVE stakeholders, explained their product and services and answered stakeholders questions related to costs, standardisation and legal framework.

Action points:

ACTION		RESPONSIBLE	DEADLINE
1	Sending the 3 signed contract + Travel cost to the UITP	Stakeholders	ASAP
2	Demonstrating the performance of the bio-based materials	SELENA	First feedback to be presented when the results are available. Most likely at the 3 rd Stakeholder Group Meeting
3	Checking the convenience of uploading the data in the Mat-Match data base, as well as others	UITP + SELENA	Progress to be presented at the 3 rd Stakeholder Group Meeting
4	Adding acoustic and noise vibration features in the performance test/analysis	MAIER + SELENA	First feedback to be presented when the results are available. Most likely at the 3 rd Stakeholder Group Meeting

ACTION		RESPONSIBLE	DEADLINE
5	Studying the possibility of a bio-based joint event	UITP + SELENA + GREENOVENTION	Progress to be presented at the 3 rd Stakeholder Group Meeting
6	Presenting the standardisation and certification work of BIOMOTIVE project	RINA + SELENA	Most likely to be presented at the 3 rd Stakeholder Group Meeting

Photos from the 2nd BIOMOTIVE Stakeholder Group Meeting:



Figure 17. BIOMOTIVE dissemination at the UITP Summit

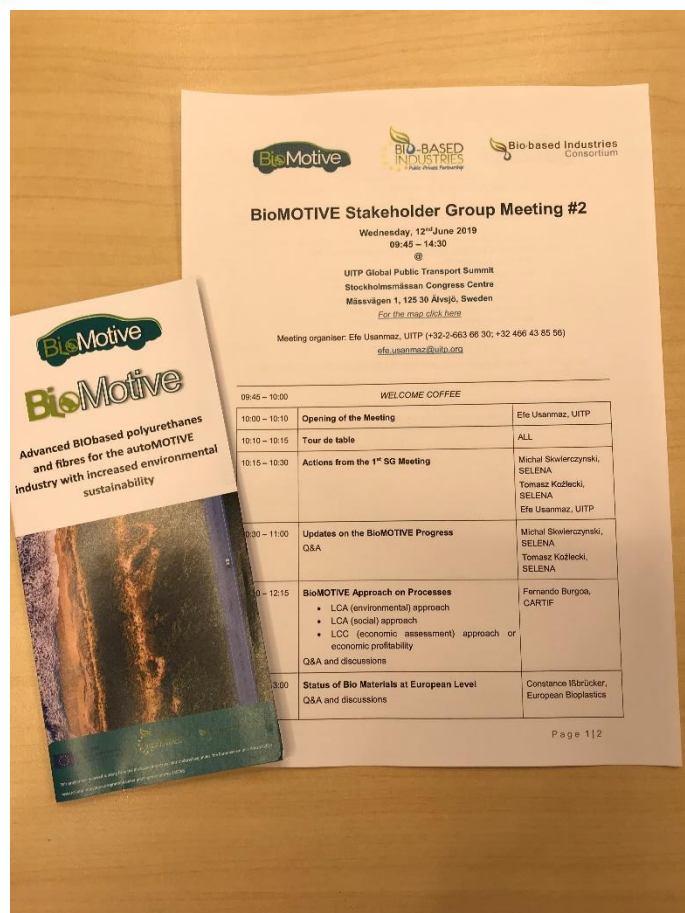


Figure 18. 2nd BIOMOTIVE Stakeholders Group Meeting Agenda





Figure 19. 2nd BIOMOTIVE Stakeholders Group Meeting in Stockholm during UITP Summit



Figure 20. Presentations at the 2nd BIOMOTIVE Stakeholders Group Meeting



Figure 21. Exhibition visit with the 2nd BIOMOTIVE Stakeholders Group Meeting Participants

--- End of Minutes --



BIOMOTIVE Stakeholder Group #3

28 January 2020, Warsaw, Poland

@ PIMOT Research Institute Headquarters

Meeting organiser: Efe Usanmaz, Project Manager, UITP (+32-2-663 66 30)

List of participants

NAME	COMPANY	STATUS ³
Bidaine Emmanuel (EB)	Luxembourg Institute of Science and Technology (LIST) ⁴	A
Bein Thilo (TB)	LBF Fraunhofer	E
Burzio Gianfranco (GB)	Independent expert in regulation	E
Chociszewski Tomasz (TC)	RAFAKO E-BUS	A
Gómez-Belinchón Ignasi (IG)	Rail-Grup	E
Usanmaz Efe (EU)	UITP	A
Hinse Katharina (KH) ⁵	European BioPlastics	A (via Skype)
Koźlecki Tomasz (TK)	SELENA	A
Skwierczyński Michał (MS)	SELENA	A
Omar Noshin (NO)	EARPA	E
Sitarz Agnieszka (AS)	GREENOVENTION	A
Storer David Mark (DS)	CRF	E
Mellet Geoffray (GM) ⁶	Gerflor	A
Winters Ruud (RW)	VDL Bus and Coaches	A
Lauro Stefano (SL)	RINA Consulting	A

³ A = Attended; E = Excused.

⁴ New stakeholder joined BIOMOTIVE Stakeholder Group at the 3rd meeting

⁵ Proxy expert from European BioPlastics replaced Constance Ißbrücker for this meeting

⁶ Proxy expert from Gerflor who will replace Francois Tissier from this meeting onwards

NAME	COMPANY	STATUS ³
Kowalski Kamil (KK)	PIMOT (Local host)	A
Kresa Patryk (PK)	PIMOT (Local Host)	E
Krzyzaniak Michal (MK)	SELENA	A
Pajak Przemyslaw (PP)	PIMOT (Local Host)	A
Posuniak Pawel (PP)	PIMOT (Local Host)	A
Schiavo Riccardo (RS)	VADO E TORNO EDIZIONI SRL ⁷	A
Wrzesiak Jagoda (JW)	PIMOT (Local Host)	E
Ziolkowski Bartosz (BZ)	SELENA	A
Lepkowski Marek (ML)	PIMOT (Local Host)	A
Wieczorek Piotr (PW)	PIMOT (Local Host)	A
Nedvetovsw Romen (RN)	PIMOT (Local Host)	A
Uscinski Mariusz (MU)	PIMOT (Local Host)	A
Ochman Alicja (AO)	GREENNOVENTION	A

⁷ New stakeholder joined BIOMOTIVE Stakeholder Group at the 3rd Meeting



Meeting Agenda

BioMOTIVE Stakeholder Group Meeting #3

28 January, Tuesday 2020

@

PIMOT Research Institute Headquarters

Przemysłowy Instytut Motoryzacji ul. ul. Jagiellońska 55, 03-301

Warsaw, Poland

[For the map click here](#)

Meeting organiser: Efe Usanmaz, UITP (+32-2-663 66 30; +32 466 43 85 56)

efe.usanmaz@uitp.org

09:15 – 10:00	ARRIVAL & WELCOME COFFEE	
10:00 – 10:10	Opening of the Meeting	Efe Usanmaz, UITP
10:10 – 10:15	Tour de table	ALL
10:15 – 10:45	BioMOTIVE Project, Goals and Progress Updates <ul style="list-style-type: none"> • Q&A 	Michał Skwierczyński, SELENA
10:45 – 11:45	PIMOT Organisational Presentation and Technical Visit to PIMOT Facilities <ul style="list-style-type: none"> • Q&A 	PIMOT Representatives & ALL
11:45 – 13:15	Update & Introduction Presentations by BIOMOTIVE Stakeholder Group Members <ul style="list-style-type: none"> • RAFAKO Presentation • VDL Updates and Standpoint on Standards • Luxembourg Institute of Science and Technology (LIST) Activities & DOMUS Research Project • Sustainable Bus Award (Sby): Presentation and discussion on the use of bio-materials in the award evaluation criteria • Q&A – Discussion after each presentation 	Tomasz Chociszewski, RAFAKO Ruud Winters, VDL Emmanuel Bidaine, LIST Riccardo Schiavo, SUSTAINABLE BUS
13:15 – 14:00	LUNCH BREAK	



14:00 – 14:30	European Bio-Plastics Presentation <ul style="list-style-type: none"> • Standardisation and Certification of the bio-based plastics • Q&A Discussion 	Katharina Hinse, European BioPlastics
14:30 – 15:00	BioMOTIVE Approach and Findings on the Measures towards Future Standardisation and Certification <ul style="list-style-type: none"> • Findings and Reports • Materiality Analysis 	Stefano Lauro, RINA
15:00 – 17:00	Workshop & Discussion: Standardisation and Certification <ul style="list-style-type: none"> • Information exchange between BioMOTIVE project's work and best practices offered by PIMOT Institute on standardisation and certification <p>Q&A and Discussions</p>	Moderator: Stefano Lauro, RINA Expertise Exchange: PIMOT Representatives & ALL
17:00	Workshop Wrap-up & Closure of the Meeting	Stefano Lauro, RINA Efe Usanmaz, UITP



Meeting Report

Background of the Meeting

The thematic focus of the 3rd Stakeholder Group meeting was identified as standardisation and certification issues with regards to bio-based materials and to discuss the BIOMOTIVE results and particular work on standardisation and certification by the time of the meeting.

In this view, UITP identified potential stakeholders who are working on the thematic focus of the BIOMOTIVE 3rd Stakeholder Group meeting and how the BIOMOTIVE project leverage potential synergies with a joint meeting. Based on the identification analysis, [PIMOT](#) (Polish Automotive Industry Institute) was identified as a potential entity which BIOMOTIVE project can make some synergies when it comes to standardisation and certification.

After successful collaboration and communication, PIMOT accepted to host the 3rd BIOMOTIVE Stakeholder Group meeting at their premises in Warsaw, Poland on 28 January 2020. The meeting agenda was designed to give enough space to inform all external stakeholders about the BIOMOTIVE project progresses, to learn from the new or existing Stakeholders about their organisational updates and work about the selected topic of the meeting, standardisation and certification, and have fruitful workshop about the certification and standardisation issues related to bio-based materials' application within the automotive industry. Apart from the discussions and presentations, thanks to the local host, BIOMOTIVE project partners and stakeholders had the opportunity to visit PIMOT labs and premises to understand better about how quality tests, applications, measurements are done in automotive industry.

10:00 – 10:30	Opening of the meeting (UITP)
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EU (UITP) made the opening remarks and presented a brief recap about the BIOMOTIVE Stakeholder Group, interests, key project partners responsible in contributing to the Stakeholder Group Meetings. In addition, EU introduced the objectives of the meeting, the planned activities and exercises for the meeting, and the thematic focus of the day. This meeting is organised as a response to the Stakeholders feedback received in previous meetings to organise a joint networking meeting with other institutions or projects. UITP and BIOMOTIVE project partners will continue its efforts to find related projects and/or organisations to hold joint meetings across European entities/projects working on the same topics.

At the opening presentation, EU presented the followings:

- UITP organisational presentation: Since there were new stakeholders in the group, EU presented the UITP, its history, mission and vision, working pillars and activities;
- EU explained the background and rationale of the BIOMOTIVE External Stakeholders Group and Stakeholders Engagement and their benefits for the project outcomes. It has been noted that receiving external stakeholders feedback is essential to bring an



non-biased point of view to the project and get European industry and related stakeholders feedback about the project achievements;

- Based on the analysis made in the beginning of the project, first two meetings were focused on the needs and expectations around the bio-based materials and BIOMOTIVE Approach on Processes (LCA (environmental) approach, LCA (social) approach, LCC (economic assessment) approach or economic profitability) respectively. 3rd Stakeholder Group meeting topic was identified to focus on standardisation and certification issues of bio-based materials in which this meeting had been organised accordingly to maximise the feedback exchange and learnings among stakeholders involved.
- The next meeting will be about eco-design and consumer acceptance which UITP will work on creating synergies with [DOMUS project](#). This Horizon 2020 funded research and innovation project aims to design optimisation for efficient electric vehicles based on User-centric approach and has good synergies with BIOMOTIVE objectives. UITP identified Luxembourg Institute of Science and Technology (LIST) which is a partner of the DOMUS project and LIST kindly accepted to become a member of BIOMOTIVE Stakeholder Group. The 4th BIOMOTIVE Stakeholder Group meeting, about eco-design and consumer acceptance, will seek synergies to organise a joint meeting with DOMUS project partners or involved stakeholders to discuss the topics.

EU also explained the guidelines and the travel reimbursement cost rules and confidentiality issues since there are on-going new Stakeholder members to the group. The following aspects were stressed:

- The need of having the 3 copies of the contract to reimburse their travel cost;
- The need of keeping the original tickets for the reimbursement;
- The need of requesting the approval of the projects partners so to have access to specific information.

Please refer to the presentation **01_BIOMOTIVE_SG Meeting #3_UITP** shared with the OneDrive repository link to the Stakeholders and project partners on 30.01.2020.

10:10 – 10:15	Tour de Table (All)
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A ‘tour de table’ took place in order for all meeting participants to present themselves, including meeting with the new Stakeholder member companies.

10:15 – 10:45	Updates on the BIOMOTIVE Progress (SELENA)
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Michal S. and Bartosz Z. (SELENA) introduced the project identity, goals, achievements updates to the participants, including the technical chemical activities and some results from the lab trials to the latest samples and products.



Please refer to two presentations **03_BIOMOTIVE_3rd Stakeholders Meeting_28.01.2020** and **04_BIOMOTIVE Stakeholder meeting Warszawa 28.01.2020** shared with the OneDrive repository link to the Stakeholders and project partners on 30.01.2020.

Some updates from BIOMOTIVE updates could be summarised as follows:

- Michal S. presented the project details, consortium and project general objectives and concept from project management point of view. The main project objective remains the same as to produce innovative and advanced bio-based materials consisting of thermoplastic polyurethanes, 2-components (2k) thermoset polyurethanes foams and regenerated fibres;
- The project aims to achieve enhanced technical performances of the bio-based materials as well as improved environmental profile and the economic competitiveness by paying attention to cover the entire value chain;
- Regarding the final products the competitiveness will be also one of the main considerations topic as “pricing” remains the main challenge regarding the bio-based materials (fossil based vs non-fossil based materials);
- Bartosz Z. focused on the WP3 – Chemical conversion of raw materials and fibres into biobased TPUs and foams and elaborated on the technical test results achieved so far within the BIOMOTIVE project with showing the real-world samples brought from the SELINA labs;
- The results were received very well and stimulated interests among the BIOMOTIVE Stakeholders about the project results. Some technical results were summarised as follows:
 - ✓ Recently, 3,7 kg of 67% bio carbon content TPU obtained by reactive extrusion;
 - ✓ Regarding polyesters: high bio % carbon usable polyesters for various applications developed; synthesis protocol and technology developed;
 - ✓ Regarding TPU: Radiocarbon confirmed 67% bio carbon content TPU obtained; medium performance recipe developed, improvements ongoing; developed reactive extrusion synthesis protocol;
 - ✓ Regarding 2k foam: 59% bio-carbon foam obtained; processability of recipe underdevelopment;
- The BIOMOTIVE technical future work will focus on the following points:
 - ✓ Regarding TPU: Optimising recipe for processability and increasing softening point;
 - ✓ Regarding 2k foam: Optimise 60% bio foam recipe for processability;
 - ✓ Regarding Recycling/biodegradability: In progress and foam chemical recycling possible.

Some other explorations were presented by Bartosz to the group while carrying out the chemical lab activities. For example, turning foam back into liquid can be used back in the places that one does not need colour, for example in the construction sector.

It was mentioned that from the technical point of view, recycling biodegradability is the focus of 2020 in BIOMOTIVE project. Other partners like TITK, Novamont will be involved in the technical developments.



10:45 – 12:15	PIMOT Organisational Presentation and Technical Visit to PIMOT Facilities (PIMOT)
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Marek Lepkowski (ML), head of PIMOT Development Department, presented the PIMOT – Lukasiewicz Research Network – Automotive Industry Institute. Some points from ML's presentation can be summarised as follows:

- Lukasiewicz consists of 38 research institutes, over 4500 scientists, 6 research groups, ca. 8000 employees, 1,3 bn PLN income in 2018 and business partners from all over the world;
- PIMOT vision and mission were presented together with all R&D offers PIMOT that are linked to UN and EU Regulations ISO and EN Standards such as electromagnetic compatibility, passive safety tests, active safety tests, dynamic tests, vehicles, equipment and parts, simulation, material and certification and inspections tests;
- In addition PIMOT activities together with involved R&D projects including EU-funded FP7 and Horizon 2020 projects were presented.

FB from CARTIF as the WP6 Sustainability and Standardisation WP Leader shared the BIOMOTIVE LCA (environmental) approach, LCA (social) approach and provided updates on LCC (economic assessment) and economic profitability approach of BIOMOTIVE project. In addition, CARTIF held a workshop with the Stakeholder Group participants on the LCA (social) methodology, particularly BIOMOTIVE product social impact assessment.

For more information about PIMOT, Lukasiewicz Research Network please refer to the presentation **02_Prezentacja_BIOMOTIVE_2020.01.28** shared with the OneDrive repository link to the Stakeholders and project partners on 30.01.2020.

After PIMOT's organisational presented a guided technical tour was delivered by PIMOT officials to the meeting participants. Among others meeting participants had the chance to visit the following labs:

- Analytical lab quality analysis of the fuel, lpg and gas;
- Fuel samples tests, explaining the process about getting some samples from the fuel stations and make standards check;
- Visit to electromagnetic compatibility test area and safety tests area.

The technical visit was guided very well and appreciated by the meeting participants. You may find some photos below at the end of this report.

12:15 – 13:15	Update & Introduction Presentations by BIOMOTIVE Stakeholder Group Members (VDL, Sustainable Bus, LIST and RAFAKO)
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One of the objectives of the BIOMOTIVE Stakeholder Group is to receive updates from the European industry involved in the group about their product portfolios, consideration of adopting bio-based materials in their products, primarily bus and rail manufacturing, in order to stimulate an interest towards BIOMOTIVE products and results, hence to study future marketability as a key dissemination and exploitation work within the project. Therefore, periodic updates are encouraged by UITP towards the industry members to follow the potential interest on bio-based materials and BIOMOTIVE results replication.

At least, one hour slot was dedicated to receive such industry updates and learn more about the new members participating to the group. Some presentations were kindly given by the following companies:

1) VDL Bus & Coach

As an active member inside the group, Ruud Winters kindly accepted the request and gave an organisational updates, VDL work and considerations within requirements with regards to materials used in busses and technologies used and challenges within the company. Some key takeaways can be noted as follows:

- Regarding VDL production portfolio two main pillars: Coach and Public Transport City busses. Regarding coaches the main technologies are diesel and hybrid with emphasis given to comfort of passengers. Regarding public transport city buses transition to zero-emission and profit of ownership are considered more within the company. Longevity of the products are essential in public transport domain as well as the pricing of parts are important;
- In the presentation, you can find more information about VDL's requirements with regards to materials used in busses in terms of interior and exterior VDL standards;
- With regards to technologies used and challenge: main materials/technologies with regards to part production is low volume and cheap tooling processes;
- One of the upcoming challenges for VDL Bus & Coach are recyclability/circularity topics will become part of the tender prerequisites imposed by the tendering cities (public transport operators and authorities) and they have to be prepared for this. For example, the prerequisite would be that 20% of your product should demonstrate recyclability/circularity and then VDL should demonstrate that. To get Biomaterial into bus needs collaboration between material suppliers, part suppliers and bus builders, which BIOMMOTIVE can work on positioning itself for future marketability purposes.
- One example by the participants was given that Renault has their standards in recyclability in the cars such as bio-composites and bio-polymers.
- One key take away is that if tender requirements include recyclability/circularity then BIOMOTIVE innovations and products will have critical chances to play an important role in the automotive industry, which will likely take place in the coming years.

For more information please refer to the presentation **05_20200120_VDL_Biomaterials_Challenges** shared with the OneDrive repository link to the Stakeholders and project partners on 30.01.2020.

2) Sustainable Bus Award (Sby)



Sustainable Bus Award (Sby) is a free independent organization that involves a group of European journalists that work together on this specific project. As part of their activities, each year they award three buses categorised “Urban”, “Intercity”, and “Coach”. They developed a special criteria to select the most sustainable bus & coaches of the year including megatrends in the sector such as alternative fuels, digitalization, automation, servitization and electrification. RS represented Sby at this meeting.

They have been approached by UITP following the Busworld 2019 event and UITP International Bus Conference dissemination events where BIOMOTIVE project was present. The main synergy that BIOMOTIVE project seeks with Sby is whether BIOMOTIVE innovations could be linked to “Sustainability” selection criteria of the Sby award. The rationale is to increase the visibility of the BIOMOTIVE project and label it in such a distinguished award in the public transport sector.

The Sby team established Sustainable Bus Award, which is a project that is kind of “open source” which means that Sby share evaluation criteria and guidelines within the selection jury. From this starting point they bring into the evaluation the journalistic experience of each jury member. Regarding the biomaterial, this is something that somehow they already consider in our evaluation, actually we consider the percentage of recyclability of the vehicle at the end of its life. This is an information that they ask to manufacturers, in case they don’t have this kind of information they assume that at least the 50% of the vehicle can be recycled.

In this view, UITP engaged with Sby to work on the potential result where BIOMOTIVE innovations could be linked to Sby award criteria on recyclability. In addition, a link between Sustainable-bus.com and BIOMOTIVE Dissemination Leader GREENOVENTION has been established to work on future dissemination opportunities such as drafting a BIOMOTIVE article at Sustainable-bus.com or Sby media resources.

As a new Stakeholder member to this group, please refer to **06_SBY_Criteria** presentation for more information shared with the OneDrive repository link to the Stakeholders and project partners on 30.01.2020.

3) Luxembourg Institute of Science and Technology (LIST)

LIST is a Research and Technology Organisation (RTO) which develops innovative and competitive solutions in response to key needs of worldwide companies, based in Luxembourg. The organisation employs about 603 persons with an annual budget of EUR 66 millions and in total 283 RDI projects and contacts. EB represented LIST in this meeting.

Industry is a key pillar in Luxembourg economy. 35% of GDP in the country is formed by Industry and 25% of employment is done by industry. Main fields of activities of LIST are ecological, digital and materials innovation. RTO focuses on four main interdisciplinary portfolios: smart cities, spatial sector, Industry 4.0 and FinTech and RegTech.

The main collaboration request between UITP and LIST roots to LIST’s involvement in the European Commission, Horizon 2020 funded DOMUS project as introduced in the beginning of this report and LIST’s involvement within UITP Academic Committee. DOMUS and BIOMOTIVE projects looking into eco-design and sustainability aspects, UITP forged a link with LIST to make synergies primarily between DOMUS and BIOMOTIVE projects. However,



the addition of LIST with set of different activities and topics will bring more added value to the BIOMOTIVE project with high quality inputs to be received by LIST experts.

DOMUS project focuses on how to modify and improve the efficiency of the electric vehicles by working on design and standards aspects, for example working on the new design for the interior parts of the vehicles as a joint conceptual approach for both projects.

The DOMUS project has a specific focus on new concept design with less energy requirements and looking into the interplay between the eco-design and consumer feeling/acceptance with a demonstration at the end of the project.

In this view and since the next (4th) BIOMOTIVE Stakeholder Group meeting will focus on eco-design, the vehicles from scratch and consumer acceptance issues, it is highly likely that UITP will seek synergies with LIST and DOMUS project team to organise a joint projects event.

As a new Stakeholder member to this group, please refer to **07_BIOMOTIVE – LIST Presentation** for more information shared with the OneDrive repository link to the Stakeholders and project partners on 30.01.2020.

4) RAFAKO EBUS

RAFAKO EBUS has been approached by UITP at the dedicated BIOMOTIVE Immersion Experience organised at UITP International Bus Conference by UITP as a key dissemination activity to engage with new industry stakeholders for BIOMOTIVE project. RAFAKO E-BUS representatives hosted BIOMOTIVE project partners and Immersion Experience participants at their stand and explained the company and new e-bus project by showing the exhibited e-bus. There, BIOMOTIVE project was introduced to RAFAKO representatives and their feedback on bio-materials shortly received there.

The main synergy that BIOMOTIVE project seeks with RAFAKO is whether BIOMOTIVE innovations could be linked to RAFAKO E-BUS products. The rationale is to increase the visibility of the BIOMOTIVE project and maximise its existence among European public transport industry stakeholders.

RAFAKO EBUS represented by TC at this meeting, was established in 1949 and approximately for forty years produced boilers for power plants. It belongs to PPG group in the energy market.

As part of products portfolio, the company decided to enter into E-bus market by starting an e-bus project producing an e-bus from scratch. The company introduced a newly built RAFAKO EBUs, the compact design and small size of an e-bus for use in city centres and Old Town buildings – zero emission zones.

At the end of the presentation, TC elaborated on some new materials applications for outside of the bus and some cheap and good looking materials could be adopted for the exterior part of the RAFAKO products.

As a new Stakeholder member to this group, please refer to **08_RAFAKO EBUS SHORT PRESENTATION** for more information shared with the OneDrive repository link to the Stakeholders and project partners on 30.01.2020.

Key takeaway from the discussions with Stakeholders following the new/existing members' presentations:



- Pricing will be very important for industry. Therefore, a special attention should be drawn by the BIOMOTIVE project team on pricing and market analysis topics.

14:00 – 14:30	European Bio-Plastics Presentation on their Standardisation and Certification Activities (European BioPlastics Association)
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European BioPlastics (EUBP) as an active member of the BIOMOTIVE Project Stakeholder Group, has a working group on standardisation and very active in producing fact sheets, policy briefs in standardisation and certification of bio-plastics.

EUBP is a member of the relevant standardisation committees at DIN and CEN level, e.g. CEN/TC 411 on bio-based products and support independent third party certification according to acknowledged standards. EUBP owns the Seedling mark for (industrial) compostability awarded by certifiers DIN CERTCO and Vincotte. EUBP provides comprehensive information on standardisation, e.g. check out their fact sheet on relevant industry standards and labels, please refer to **10_EUBP_FS_Standards** for more information shared with the OneDrive repository link to the Stakeholders and project partners on 30.01.2020.

KH represented EUBP in this meeting connecting via remote system and introduced set of information related to the relevant standards and labels for bio-based plastics, biodegradable plastics. Many of the standards and labels used by EUBP are acknowledged by BIOMOTIVE project partner RINA which is in charge of standardisation and certification work of the project. For more information on EUBP's work on standardisation and certification please refer to **09_BIOMOTIVE_EUBP_CI_200128** shared with the OneDrive repository link to the Stakeholders and project partners on 30.01.2020.

14:30 – 15:00	BIOMOTIVE Approach and Findings on the Measures towards Future Standardisation and Certification (RINA)
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RINA as BIOMOTIVE project partner is in charge of listing the most appropriate standards for standardization and certification of processes and products related to BIOMOTIVE innovations in the end of the project. They support the bio-based processes and products by verifying the productive cycles.

In this slot, SL from RINA described the work carried out so far within the BIOMOTIVE project in terms of standardisation and certification. Two preliminary reports have been produced by RINA so far:

- 1) BIOMOTIVE Deliverable 6.7: "First Report on strategy and measures to be undertaken towards standardisation of the bio-based processes"



- 2) BIOMOTIVE Deliverable 6.8: “First Report on strategy and measures to be undertaken towards certification of the bio-based products”

For more information about which methods and approaches are used to carry out this work within BIOMOTIVE please refer to **11_BIOMOTIVE_STK_Meeting_Presentation** shared with the OneDrive repository link to the Stakeholders and project partners on 30.01.2020.

BIOMOTIVE Materiality Matrix Analysis:

In order to define certification and standardisation parts in the BIOMOTIVE project, RINA needs to conduct an analysis on the material aspects. Therefore, the questionnaire aims to define the level of importance, for the BIOMOTIVE project's stakeholders, of the aspects listed in the questionnaire that have a link to sustainability; the criteria to be used to define the level of significance of each single aspects are: a) the likelihood and severity of economic, environmental or social impacts that may originate from that aspects; b) the influence they may have on the performance of the project; c) the opportunity to gain competitive advantage out of it. Through these criteria, stakeholders were required to give a rating from 1 to 10 (1 being the lowest, 10 the highest) that expresses the level of significance/importance.

Stefano Lauro from RINA as BIOMOTIVE project partner had remotely connected the 2nd Stakeholder Group meeting to introduce the materiality analysis questionnaire and UITP collected the feedback from stakeholders. This feedback was analysed by RINA and the data elaborated and presented as internal and external materiality results. For more information about this analysis please refer to **11_BIOMOTIVE_STK_Meeting_Presentation** shared with the OneDrive repository link to the Stakeholders and project partners on 30.01.2020.

The same materiality questionnaire was distributed and feedback collected since we had new members in the 3rd Stakeholder Group meeting. RINA will refine the data and the information will be shared with the group in due time. Thanks to RINA this feedback was analysed and a summary report was prepared. **You will find the Results of Materiality Analysis attached to this report in the e-mail.**

This slot was used to inform the stakeholders about BIOMOTIVE updates on standardisation and certification and create the background for the following workshop session.

15:00 – 17:00	Workshop & Discussion: Standardisation and Certification
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Prior to the meeting, UITP, RINA and GREENNOVENTION worked on preparing discussion questions around the topic of standardisation and certification and shared with the group before the meeting. For the discussion questions please refer to **11_BIOMOTIVE_SG Meeting #3_Standardisation and Certification Workshop Questions**.

The discussions were moderated by UITP, EU and RINA, SL and gathered useful feedback after lively discussions. Some notes can be put as follows:



Question Set 1:

- 1) What would be your expectation from bio-based products?
- 2) In particular what are your expectations about the environmental aspects?

Discussion Results:

- There is an inconsistency between bio-based products: BIOMOTIVE project refers to *bio-content*; while public opinion is about *products that are fully recyclable*; whereas consumer expectation is about *durability*
- Performance of the bio-based materials should be similar to fossil-based materials if we can talk about real acceptance from the consumers (e.g. in commercial flooring industry bio-content is something important but the performance of the product should be similar to its fossil-based counterparts)
- Health point of view: In the case of the BIOMOTIVE project, product health standards are the same. Molecules are produced based on cardoon oil not from the industrial oil. Therefore, only the CO₂ content is different. So the product is still plastic but not fossil-oil based, thus BIOMOTIVE project is focusing on mainly the bio-content
- If we talk about having more expectations from bio-based materials, there should be an emphasis on proper communication and marketing efforts, e.g. It is an additional push to the industry, also incentive to agriculture market to use cardoon oil, eco-design aspects could be by using the same products with a different design, more bio-content.

Key takeaways are: In terms of expectations on bio-based products there is a need on further efforts for marketing and communications, stronger incentives from European level in terms of new regulation on taxes for bio-content.

- Regulation impact is very high for the introduction of bio-based materials in the industries. A new regulatory framework, among other actions, could facilitate market uptake and customer awareness hence entailing this looking-forward innovation realised in various industries, essentially in city bus & coach manufacturing.

Question Sets 2 and 3:

- 1) What are the main challenges when it comes to the acceptance and application of bio-based materials into your products (e.g. buses)?
- 2) What would be needed to facilitate the use of bio-based materials from your point of view?
- 3) What are the current/future challenges of your company, related to Sustainability and/or Circular Economy?

Key takeaways are:

- Performance parameter;
- Longevity the bio-based materials;
- Cost issue is very important. Since the industry seeks economic profitability, bio-based materials should be price competitive. This can be incentivized at the national (governmental) level or European level through volume (economics of scale);



- Customer perspective: increase of awareness on bio-based materials is very important to ensure acceptance on the bio-based content. Right marketing strategy is also very important to convince end users why they would purchase bio-based materials.
- The necessary regulation and technical specifications should be in place to foster the use of bio-based materials in the transport industry.

Question Set 4:

- 1) Do you have (in your company or a reference) a method to measure or compare circularity of your products? (like McArthur circularity guidelines presented by RINA)
 - SELENA is working on producing such methods for their production processes;
 - Gerflor has someone in charge to develop and apply the circularity method in the company. They have circularity manager who tracks and collects all products and recycle them in production.

Question Set 5:

- 1) What are your expectations/wishes from the Standardisation/Certification Report that will be used at the end of the BIOMOTIVE Project?

Key takeaways are:

- List of certification existing at the literature;
- Partners like INTAP, MAIER they will be producing the end products. Apart from the standards in such end products, standards on semi products like the ones SELENA producing can be included;
- Some recommendations and best practices can be included;
- Clear value of the bio percentage, level of bio-content in regulations must be included (bio-labels are there by we can work on the labelling on bio-content);
- Labelling about the bio-content of the products can also help the customer acceptance/accreditation towards the products therefore to increase the customer feeling about the bio-based materials.

17:00	Workshop Wrap-up & Closure of the Meeting
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BIOMOTIVE project and UITP thank to local host PIMOT and BIOMOTIVE Stakeholders for this fruitful meeting.

It was agreed that the next meeting will take place in spring 2020 before May by making some synergies with DOMUS EU project. A doodle will be circulated to select the final date.

Action points:

ACTION		RESPONSIBLE	DEADLINE
1	Sending Travel cost to the UITP	Stakeholders	ASAP
2	Work with Sby to publish an article about BIOMOTIVE on their media channels and how to link BIOMOTIVE to Sby Bus Awards	GREENOVENTION + UITP + Sby	ASAP
3	Sending the Materiality Analysis Results	RINA	ASAP
4	Working on the pricing determinants of BIOMOTIVE products to study future marketability	SELENA + GREENOVENTION + BIOMOTIVE Industrial partners	Last phase in the project
5	Studying the possibility of a bio-based joint event and align the next Stakeholder Group Meeting	UITP + SELENA + GREENOVENTION + LIST	Set-up the 4 th Stakeholder Group Meeting before June 2020
6	Presenting the eco-design and consumer acceptance work of BIOMOTIVE	RINA + SELENA + CARTIF	Most likely to be presented at at the 4 th Stakeholder Group meeting

Photos from the 3rd BIOMOTIVE Stakeholder Group Meeting:







--- End of Minutes --



BIOMOTIVE Stakeholder Group #4

In Collaboration with DOMUS Project

23 February 2021, Online Web Meeting

@ GotoMeeting Platform

Meeting organiser: Efe Usanmaz, Project Manager, UITP (+32-2-663 66 30)

List of participants

NAME	COMPANY	STATUS ⁸
Bidaine Emmanuel (EB)	Luxembourg Institute of Science and Technology (LIST)	A
Bein Thilo (TB)	LBF Fraunhofer	E
Burzio Gianfranco (GB)	Independent expert in regulation	E
Chociszewski Tomasz (TC)	RAFAKO E-BUS	A
Gómez-Belinchón Ignasi (IG)	Rail-Grup	E
Usanmaz Efe (EU)	UITP	A
Hinse Katharina (KH) ⁹	European BioPlastics	A
Huillet Cedric (CH) ¹⁰	Hutchinson	A
Skwierczyński Michał (MS)	SELENA	A
Omar Noshin (NO)	EARPA	E
Sitarz Agnieszka (AS)	GREENOVENTION	A
Storer David Mark (DS)	CRF	E
Mellet Geoffray (GM) ¹¹	Gerflor	A

⁸ A = Attended; E = Excused.

⁹ Proxy expert from European BioPlastics replaced Constance Ißbrücker for this meeting

¹⁰ DOMUS project partner

¹¹ Proxy expert from Gerflor who will replace Francois Tissier from this meeting onwards

NAME	COMPANY	STATUS ⁸
Munoz Ines (IM) ¹²	CNIO	A
Winters Ruud (RW)	VDL Bus and Coaches	A
Lamme Irene (IL) ¹³	Uniresearch	A
Lauro Stefano (SL)	RINA Consulting	A
Kresa Patryk (PK)	PIMOT	A
Fernandez Marta (MF)	UNEX, Rail-Grup	A
Schiavo Riccardo (RS)	VADO E TORNO EDIZIONI SRL	E
Weide Maarten	Uniresearch ¹⁴	E
Tobik Marcin	INTAP	A
Sanchez Walter	UNEX, Rail-Grup	A

¹² DOMUS project partner

¹³ DOMUS project coordinator assistant

¹⁴ DOMUS project coordinator



Meeting Agenda

BioMOTIVE Stakeholder Group Meeting #4

In collaboration with DOMUS Project

23 February 2021

Online Meeting hosted by UITP @ GotoMeeting Platform

Connection link: <https://global.gotomeeting.com/join/814789285>

10.00 – 12.45 CET

Meeting organiser: Efe Usanmaz, UITP (+32-2-663 66 30; +32 466 43 85 56)

efe.usanmaz@uitp.org

10:00 – 10:10	Opening of the Meeting	Efe Usanmaz, UITP
10:10 – 10:20	Tour de table	ALL
10:20 – 11:00	BioMOTIVE Project, Goals and Progress Updates <ul style="list-style-type: none">• General project findings• Eco-design and recycling end-of-life products findings• Q&A	Michał Skwierczyński, SELENA Marcin Tobik, INTAP
11:00 – 11:45	DOMUS Project, Goals and Progress Updates <ul style="list-style-type: none">• Short introduction to the project• Radical new cabin design• Thermal insulation panels including PCMs• Summary of other components developed in DOMUS• Q&A	DOMUS Project Representatives: IDIADA ViF HUT FHB
11:45 – 12:00	Railgrup EcolInnovation Concept <ul style="list-style-type: none">• Pitch Presentation• Q&A	Railgrup & Unex Marta Fernández Walter Sánchez
12:00 – 12:45	Discussion: Reflecting the nature of eco-design and stakeholders' expectations on new vehicles design	Moderators: SELENA, RINA, UITP

	<ul style="list-style-type: none"> Expert stakeholders' exchange on projects considerations about eco-design, circularity, light weighting, comfort, interior parts and reduction of carbon footprint in design Q&A and Discussions 	Expertise exchange: All Participants
12.45	Wrap-up & Closure of the Meeting	Efe Usanmaz, UITP

The organiser reserves the right to make amendments to the programme or any related activity at its discretion.

Meeting Concept:

This online meeting intends to focus on eco-design and user acceptance of the targeted bio-based materials in [BIOMOTIVE project](#). By doing so, EU funded research and innovation project DOMUS (Design OptiMisation for efficient electric vehicles based on a User-centric approach) has been identified as a collaborator on the selected topic.

The overall objective of the DOMUS project **is to reduce the overall energy consumption of future EVs in order to increase the 25% the electric range for different ambient conditions**. This will be achieved by understanding in depth the comfort perception of EV users before developing reliable methodologies for designing and assessing the full vehicle context from a user-centric perspective, investigating radically new cabin designs and delivering innovative components, systems and control strategies to meet customer expectations. For more details about the project please visit the project website: <https://www.domus-project.eu/introduction/>

Both projects have been generating some results in terms of eco-design approaches and processes as well as the comfort aspects related to the use of targeted materials (e.g. bio-based TPUs and foams) in the interior design of automotive vehicles. With this meeting, BIOMOTIVE consortium intends to discuss eco-design and user acceptance issues with BIOMOTIVE external stakeholders group members consists of public transport supplying industry companies (e.g. bus manufacturers, public transport equipment supplying industry, research and technology organisations) as well as DOMUS project coordinators and interested associates.



Meeting Report

Background of the Meeting

The thematic focus of the 4th Stakeholder Group meeting was identified as eco-design, novel components and user acceptance of such biobased materials and new eco-design and to discuss new vehicles from the scratch by reflecting the new nature in vehicles design. The objective was to present BIOMOTIVE project latest results as well as findings in the eco-design aspects.

In this view, UITP identified a Horizon 2020 funded project called [DOMUS](#) project that aims to reduce the overall energy consumption of future EVs in order to increase 25% of the electric range for different ambient conditions. As cabin heating and cooling represent the highest auxiliary loads drawing on the vehicle's energy resources, DOMUS aims to deliver advanced solutions to lower significantly the energy demand for cabin conditioning while improving the user experience by developing, validating and applying a user-centric approach to EV design. Therefore, it was very relevant and a great opportunity to have collaboration with DOMUS project consortium not only to promote BIOMOTIVE results to different stakeholders; but also to learn from each projects.

The meeting agenda was designed to give enough space to inform all external stakeholders about the BIOMOTIVE project progresses, to learn from DOMUS project and its objectives, innovations and achievements so far as well as to discuss eco-design needs and end-user acceptance to novel concepts in design.

10:00 – 10:10	Opening of the meeting (UITP)
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EU (UITP) made the opening remarks and presented a brief recap about the BIOMOTIVE Stakeholder Group, interests, key project partners responsible in contributing to the Stakeholder Group Meetings. In addition, EU introduced the objectives of the meeting, the planned activities and exercises for the meeting, and the thematic focus of the day. This meeting is organised as a response to the Stakeholders feedback received in previous meetings to organise a joint networking meeting with other EU funded projects. UITP and BIOMOTIVE project partners will continue its efforts to find related projects and/or organisations to hold joint meetings across European entities/projects working on the same topics.

At the opening presentation, EU presented the followings:

- UITP organisational presentation: Since there were new stakeholders and participants in the meeting, EU presented the UITP, its mission and vision, working pillars and activities;
- EU explained the background and rationale of the BIOMOTIVE External Stakeholders Group and Stakeholders Engagement and their benefits for the project outcomes. It has been noted that receiving external stakeholders feedback is essential to bring an



non-biased point of view to the project and get European industry and related stakeholders feedback about the project achievements;

- Based on the analysis made in the beginning of the project, first three meetings were focused on the needs and expectations around the bio-based materials and BIOMOTIVE Approach on Processes (LCA (environmental) approach, LCA (social) approach, LCC (economic assessment) approach or economic profitability) respectively; the regulation impact by having workshop on standardisation and certification. 4th Stakeholder Group meeting topic was identified to focus on design aspects of the bio-based materials in which this meeting had been organised accordingly to maximise the feedback exchange and learnings among stakeholders involved.
- The next meeting will be about final results of the BIOMOTIVE project and open demonstration events. Due to ongoing COVID-19 pandemic, the open demo visits will need to be recorded in a video format and then to be showcased to BIOMOTIVE stakeholders.

EU also explained the guidelines and the travel reimbursement cost rules and confidentiality issues since there are on-going new Stakeholder members to the group. The following aspects were stressed:

- The need of having the 3 copies of the contract to reimburse their travel cost;
- The need of keeping the original tickets for the reimbursement;
- The need of requesting the approval of the projects partners so to have access to specific information.

Please refer to the presentation **01_BIOMOTIVE_SG Meeting #4_UITP** shared with the OneDrive repository link to the Stakeholders and project partners.

10:10 – 10:20	Tour de Table (All)
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A ‘tour de table’ took place in order for all meeting participants to present themselves, including meeting with the new Stakeholder companies, DOMUS project partners and BIOMOTIVE project partners. Sixteen participants attended the meeting.

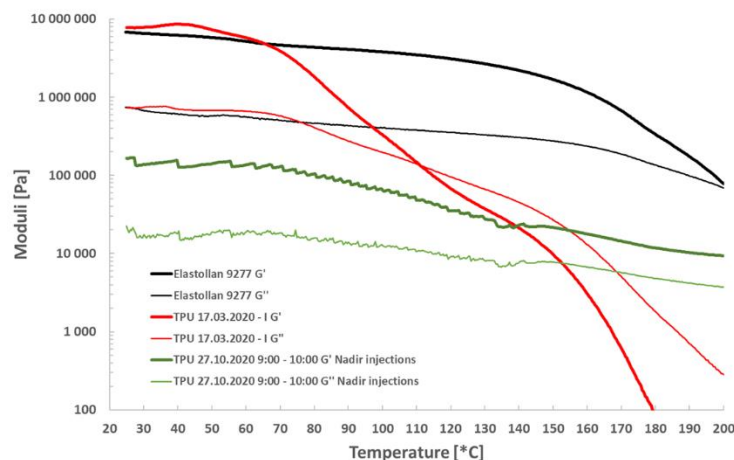
10:20 – 11:00	Updates on the BIOMOTIVE Progress (SELENA)
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Michal S. (SELENA) introduced the project identity, goals, achievements updates, assumptions to the participants, including the technical chemical activities and some results from the lab trials as well as the recycling results as per the theme of the meeting to the latest samples and products.

Please refer to two presentations **02_BIOMOTIVE_4th Stakeholders Meeting_23.02.2021** shared with the OneDrive repository link to the Stakeholders and project partners.

Some updates from BIOMOTIVE updates could be summarised as follows:

- Michal S. presented the project details, consortium and project general objectives and concept from project management point of view. The main project objective remains the same as to produce innovative and advanced bio-based materials consisting of thermoplastic polyurethanes, 2-components (2k) thermoset polyurethanes foams and regenerated fibres;
- The project aims to achieve enhanced technical performances of the bio-based materials as well as improved environmental profile and the economic competitiveness by paying attention to cover the entire value chain;
- Michal also presented the research updates about the Bio TPU:



- Michal then focused on the Eco-design and recycling end-of-life products developed in the BIOMOTIVE project. The updates included followings:
 - ✓ Reinjection of scrap TPU (~80 % recyclate charge)
 - ✓ Glycolysis of foam bio foam waste (~ 50 % recyclate charge)
 - ✓ Scrap TPU as bitumen additive (~ 5 % recyclate charge)
 - ✓ Reinjection of TPU:
 - ✓ Milling of scrap TPU into granulate with liquid N2 cooling
 - ✓ Reinjection of TPU to form plastic sealant applicators
 - ✓ Glycolysis of scrap foams:
 - ✓ Bio car seat foams was cut into pieces and reacted with 1,3-BDO (bio)
 - ✓ The final polyol was a black liquid with the relevant viscosity
 - ✓ Rigid foams have been successfully made
 - ✓ Bitumen modified with scrap TPU
 - ✓ Selena has experience in bitumen and asphalt formulating
 - ✓ We are adding waste TPU as plasticiser into standard asphalt mix
 - ✓ Bitumen formulations with TPU are being characterised for standard road applications



11:00 – 11:45	DOMUS Project, Goals and Progress Updates
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Four presentation materials were used to introduce and share DOMUS project novelties and research outcomes. These included: 1) Introduction to DOMUS project; 2) DOMUS virtual user-centric approach to design radically new cabin designs and assess them in terms of optimal energy efficiency use; 3) Thermal insulations solutions and body panels (including PCMs); 4) DOMUS cabin thermal insulation findings.

- All presentations included in-depth technical insights about the DOMUS project and its findings;
- All presentation materials are available and shared with BIOMOTIVE project and its stakeholders: **04_BIOMOTIVE introduction DOMUS; 05_BIOMOTIVE DOMUS virtual user-centric approach_ViF_v2; 06_DOMUS BIOMOTIVE Thermal insulation solutions body panels including PCMs; 07_BIOMOTIVE DOMUS HW components**

The project has a prototype with Fiat 500 electric. The project are mainly focusing on two research areas: 1) Saving energy in the comfort systems; 2) Shading weight to make the car lighter to increase range. Therefore, the project is working on new prototype dashboard and seats to achieve these objectives.

It has been concluded that DOMUS project focuses on the car's thermal and insulation aspects to improve energy efficiency and range of electric vehicles with new novel design and light weighting aspects. BIOMOTIVE on the other hand is focusing on the bio content of the interior parts.

Both project highly appreciated this knowledge exchange and BIOMOTIVE stakeholders were interested in both projects research findings.

11:45 – 12:00	Rail-Grup EcolInnovation Concept
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Rail-Grup as member of the BIOMOTIVE stakeholder group has been developing an EcolInnovation concept in the rail transportation systems. The purpose of the presentation is to briefly introduce EcolInnovation concept to the group.

The purpose of EcolInnovation concept can be summarised as below:

- define a baseline to foster innovation based on social responsibility (sustainability focus)
- involving all the stakeholders & sharing a vision for the sector
- customer focused
- convert the railway mobility in a referent and the leader of



- the transformation toward a sustainable mobility

Objectives of the EcoInnovation concept can be summarised as below:

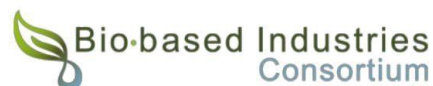
- analysis: identify necessities and opportunities for improvement in the sector
- conceptualization: define clear concepts related to sustainable railway mobility
- vision and strategy: define a shared vision and strategies of the future of the sector for the coming years (vision 2030)
- monitoring: set indicators to validate commitment and progress of the companies
- tools: possibility of creating a sustainable shopping guide - eco innovation handbook

Presentation material is available and shared with participants as **08_2021-02-23 BIOMOTIVE Presentation. Railgrup & UNEX.**

12:00 – 12:45	Discussion: Reflecting the nature of eco-design and stakeholders' expectations on new vehicles design
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The discussion was focused about the eco-design aspects and consumer acceptance of such novel materials produced by both BIOMOTIVE and DOMUS projects. Summary of discussions can be put as below:

- From bus manufacturer point of view, passenger comfort and perception about the comfort is very important; therefore such novel projects should take into consideration the passenger comfort;
- From BIOMOTIVE point of view the challenge is still scale, therefore the economic and pricing issues are very important to facilitate the market uptake of such novel materials. BIOMOTIVE has no challenge from R&D know-how point of view; however pricing of the materials developed by the project is still much higher than fossil based materials therefore has less competitive advantage in the market at larger scale;
- In order to stimulate market penetration of such novel materials, policy and legislation impact is very important. Therefore, there should be EU level or national level incentives towards such novel materials to stimulate their market uptake;
- From DOMUS point of view, the perspective is different. Because for further uptake of electric cars, the range issue is very important and the project is working on increasing the range of electric cars. Therefore, the project would enable better market acceptance;
- From VDL bus and coach, from public transport electric buses, the prices are not the main issue but the lifetime is the key challenge. For the future the public transport buses should have 15 years lifetime at the latest and now the challenge is to select materials which can reach this lifetime. But the challenge is how to prove this, there are ways like UV testing etc. but there is still risky whether new materials could satisfy 15 years of bus service;
- From RAFAKO buses point of view, they look for the new materials for interiors for their e-bus products. Especially in today's buses many materials are plastic. However, in



order to achieve cost effectiveness biobased materials could replace thermo plastic materials. Because lifetime is very important and biobased materials could satisfy this if they can prove good longevity. Because of some interior materials there is huge amount of energy lost, so new materials produced by BIOMOTIVE or DOMUS can replace traditional materials.

- BIOMOTIVE and DOMUS have different scopes. However, both projects are contributing to better CO2 footprints. Therefore, it was interesting to learn from BIOMOTIVE and DOMUS projects and stakeholders appreciated the collaboration.

12:45	Workshop Wrap-up & Closure of the Meeting
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BIOMOTIVE project and UITP thank to DOMUS project partners and BIOMOTIVE project partner and Stakeholders for this fruitful meeting.

It was agreed that the next meeting will take place in autumn 2021 to share the BIOMOTIVE final results and demonstration activities as the project is finishing on 30 November 2021. A doodle will be circulated to select the meeting date.

--- End of Minutes --



BIOMOTIVE Stakeholder Group #5

Final Stakeholders Group Meeting

16 November 2021, Online Web Meeting

@ Microsoft Teams Platform

Meeting organiser: Efe Usanmaz, Project Manager, UITP (+32-2-663 66 30)

List of participants

NAME	COMPANY	STATUS ¹⁵
Bidaine Emmanuel (EB)	Luxembourg Institute of Science and Technology (LIST)	E
Bein Thilo (TB)	LBF Fraunhofer	A
Burzio Gianfranco (GB)	Independent expert in regulation	E
Chociszewski Tomasz (TC)	RAFAKO E-BUS	A
Gómez-Belinchón Ignasi (IG)	Rail-Grup	E
Usanmaz Efe (EU)	UITP	A
Issbruecker Constance	European BioPlastics	A
Riolo Maria Teresa	NOVAMONT	A
Skwierczyński Michał (MS)	SELENA	A
Omar Noshin (NO)	EARPA	E
Sitarz Agnieszka (AS)	GREENOVENTION	A
Storer David Mark (DS)	CRF	E
Mellet Geoffray (GM) ¹⁶	Gerflor	E
Ziolkowski Bartosz (BZ)	SELENA	A

¹⁵ A = Attended; E = Excused.

¹⁶ Proxy expert from Gerflor who will replace Francois Tissier from this meeting onwards



NAME	COMPANY	STATUS ¹⁵
Winters Ruud (RW)	VDL Bus and Coaches	E
Suurnakki Anna	Metsa Group	A
Kielkiewicz Damian (KD)	ICSO	A
Kresa Patryk (PK)	PIMOT	A
Burgoa Fernando	CARTIF	A
Schiavo Riccardo (RS)	VADO E TORNO EDIZIONI SRL	E
Langenakens Sarah (SL)	UITP	A
Tobik Marcin	INTAP	A



BioMOTIVE Stakeholder Group

Final Meeting

Findings and Conclusions by the Project

16 November 2021

Online Meeting hosted by UITP @ Microsoft Teams

15.00 – 17.00 CET

Meeting organiser: Efe Usanmaz, UITP (+32-2-663 66 30; +32 466 43 85 56)

efe.usanmaz@uitp.org

15:00 – 15:05	Opening of the Meeting	Efe Usanmaz, UITP
15:05 – 15:10	Tour de table	ALL
15:10 – 15:40	BioMOTIVE Project Final Results <ul style="list-style-type: none">• Key R&D Findings• Challenges and Opportunities of bio-based materials realised by project coordinator• Lessons learned and looking into the future• Q&A, discussion	SELENA ALL
15:40 – 16:10	BIOMOTIVE Applications <ul style="list-style-type: none">• Bio-based materials application to seats• BIOMOTIVE project open demo visits video• Impressions, Q&A, discussion	INTAP GREENNOVENTION ALL
16:10 – 16:15	Comfort break	ALL
16:15 – 16:45	BIOMOTIVE Techo-economic analysis <ul style="list-style-type: none">• BIOMOTIVE Key techno-economical findings and conclusions• Assumptions and expectations on bio-based materials future pricing• Q&A, discussion	SELENA GREENNOVENTION ALL



16:45– 17:00	BIOMOTIVE Life-cycle Assessment Analysis <ul style="list-style-type: none">• BIOMOTIVE main environmental and social LCA findings and conclusions• Q&A and Discussions	CARTIF ALL
17:00	Wrap-up & Closure of the Meeting	Efe Usanmaz, UITP

The organiser reserves the right to make amendments to the programme or any related activity at its discretion.

Meeting Objective:

This online meeting intends to focus on the key findings and conclusions derived by the BIOMOTIVE project. The meeting will focus on key topics that will be important for the use of bio-based materials in the transport sector and beyond.

We expect an in-depth discussion on the main findings and project conclusions on above mentioned topics. Therefore, an active contribution to the discussions by the stakeholders are expected. We need your views and opinions to build more sustainable future!

Meeting Report



Background of the Meeting

As this was the last BIOMOTIVE project stakeholders group meeting, the meeting thematic focus was to share the final results of the projects, main learnings and conclusions by the project.

In DoA, some open demonstration days were planned as physical events. However, due to COVID-19 pandemic physical site visits were not possible. In this sense, the situation prompted BIOMOTIVE dissemination leader Greennovention, UITP and SELENA to plan video shooting at the BIOMOTIVE demonstration sites such as SELENA labs, Metsa Group, and INTAP.

To this end, after successful demonstration videos, open demonstrations were shared as a twelve-minute video in this final stakeholders group meeting. The video materials gave a great opportunity for the BIOMOTIVE stakeholders to realise visually what has been achieved in the project, visit biobased products production factories such as SELENA and Metsa Group and seat demonstration activities done by INTAP.

The meeting agenda was designed to give enough space to inform all external stakeholders about the BIOMOTIVE project achievements in its final months, main conclusions and learnings as well as inform and invite stakeholders to the BIOMOTIVE project final event on 29 November 2021.

15:00 – 15:10	Opening of the meeting (UITP)
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EU (UITP) made the opening remarks and presented a brief recap about the BIOMOTIVE Stakeholder Group, interests, key project partners responsible in contributing to the Stakeholder Group Meetings. In addition, EU introduced the objectives of the meeting, the planned activities and exercises for the meeting, and the thematic focus of the day. This meeting is organised as a response to the Stakeholders feedback received in previous meetings to organise a joint networking meeting with other EU funded projects. UITP and BIOMOTIVE project partners will continue its efforts to find related projects and/or organisations to hold joint meetings across European entities/projects working on the same topics.

At the opening presentation, EU presented the followings:

- EU reminded the background and rationale of the BIOMOTIVE External Stakeholders Group and Stakeholders Engagement and their benefits for the project outcomes. It has been noted that receiving external stakeholders feedback is essential to bring a non-biased point of view to the project and get European industry and related stakeholders feedback about the project achievements;
- Based on the analysis made in the beginning of the project, first three meetings were focused on the needs and expectations around the bio-based materials and BIOMOTIVE Approach on Processes (LCA (environmental) approach, LCA (social) approach, LCC (economic assessment) approach or economic profitability) respectively; the regulation impact by having workshop on standardisation and certification; and eco-design and novel materials end-user acceptance topics. 5th and



Final Stakeholder Group meeting topic was identified to focus on BIOMOTIVE final results which this meeting had been organised accordingly to maximise the feedback exchange and learnings among stakeholders involved.

- The next meeting will be the project final event organised as hybrid event in Brussels and online and EU announced the final event and invited all BIOMOTIVE stakeholders to the event. Please refer to the presentation **01_BIOMOTIVE_SG Meeting #5_UITP** shared with the OneDrive repository link to the Stakeholders and project partners.

15:10 – 15:20	Tour de Table (All)
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A ‘tour de table’ took place in order for all meeting participants to present themselves, including meeting with the Stakeholder companies and BIOMOTIVE project partners.

15:20 – 15:50	BIOMOTIVE Final Results (SELENA)
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Bartosz Z. (SELENA) presented the final R&D results of the project. The presented covered below updates:

- BioPolyesters developed for bio TPU and bio 2k foam;
- BioPolyesters technology developed and installations built;
- Reactive extrusion technology for bio TPU (max 15 kg) 58 % bio carbon achieved;
- Cockpit parts injected processing issues still to be solved;
- Reactive extrusion technology for bio TPU;
- TPU recipe with >60 % biocarbon;
- Car seat bio (2k) foam recipe with >60 % biocarbon;
- Car seat bio (2k) foam recipe with >60 % biocarbon;
- Recycling of TPU, grout applicator and bitumen;
- Recycling of Bio 2k foam glycolysis;
- Polyesters:
 - ✓ High bio % carbon polyesters for various applications developed
 - ✓ Synthesis protocol and technology developed
- TPU:
 - ✓ C14 confirmed 63 % bio carbon content TPU obtained in a 250 kg/h extruder scale
 - ✓ Processing improvements required
- 2k foam:
 - ✓ 60,5 % bio carbon car seat foam obtained
 - ✓ Fine tuning of recipe for optimal seat comfort required



15:50 – 16:10

BIOMOTIVE Applications

In this agenda point, the open demonstration videos shot by project partners were shown to BIOMOTIVE partners. The video accompanied by INTAP presentation as seat demonstration was included in the project demonstrations video. Main INTAP research conclusions included followings:

- ✓ New moulds for seat foams have been designed and manufactured.
- ✓ Next tests carried out – BIO-based components are improved and allow proper foaming process and desired parameters of end product.
- ✓ The second test for compliance with the ECE 118 regulation gave a positive result.
- ✓ End of life foam – new velcro system solution for recycling

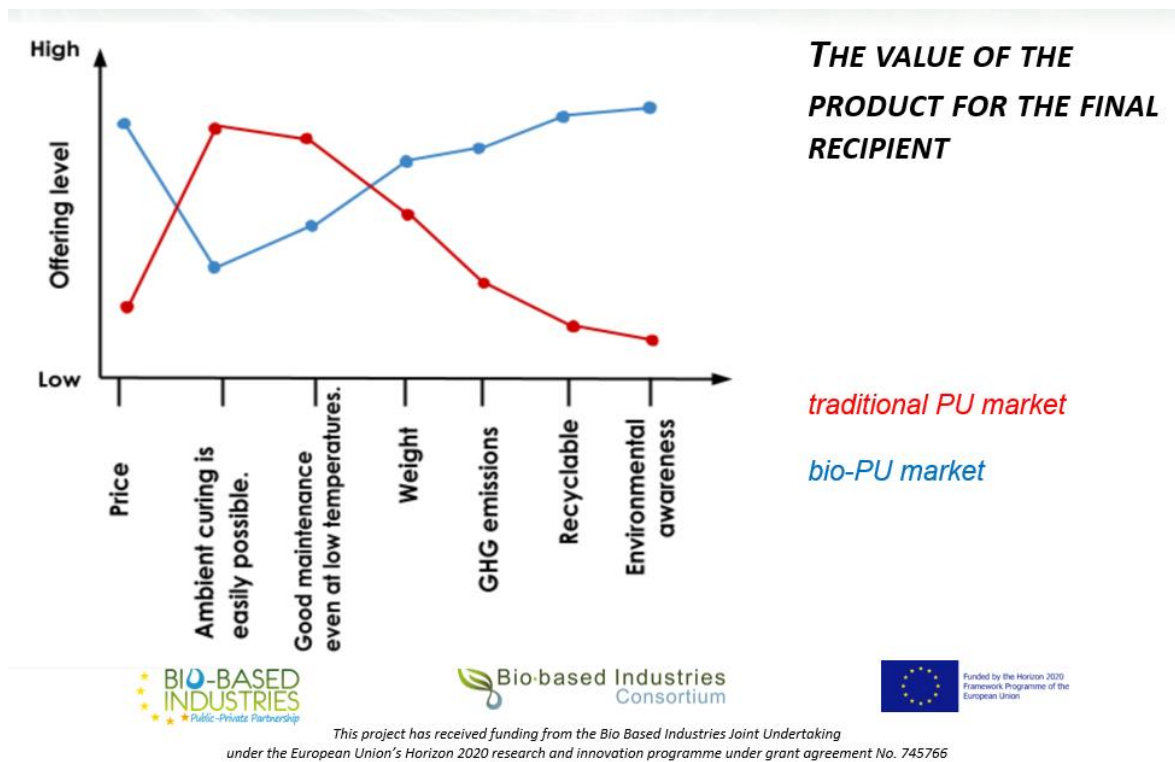
16:15 – 16:45

BIOMOTIVE Techo-economic analysis

Agnieszka S. (GREENNOVENTION) presented the main findings about techno-economic analysis. Summary can be put as follows:

- ✓ One of the key obstacles for the biobased polyurethanes to boom on the market is their manufacturing costs which clearly exceeds the costs of petrochemical-based products
- ✓ Price of biobased polyurethane foams is almost twice as high
- ✓ The main difference in component pricing refers to polyester triols where input price of component is 173% more expensive than polyester triols for traditional foams. Smaller difference applies to prepolymers which are 50% more expensive
- ✓ Similar difference exists for thermoplastic polyurethane (due to the price of its crucial component – azelaic acid)
- ✓ biobased products are not comparable for they contain uneven share of bio components, contracts on the market are business-to-business ones with little information shared in public sources
- ✓ the products tested are innovative and rarely found on the market to the extent, that they are not widely produced and legally fully regulated yet
- ✓ after fulfilling the requirements of general standards and directives, the quality and production requirements of the various manufacturers at which bio-components would be introduced are another important condition
- ✓ Components made of bioplastics must comply with all the standards and directives currently applied on the market for plastic products on top of complying with the ecological standards while maintaining the business rationale
- ✓ Bio polyurethane foams are the most developed segment of bio based products utilised in the automotive industry. Due to the fact that car seats are the market where polyurethane foams are most utilized, entering it with a bio based alternative would be the best chance of acquiring clients
- ✓ Furniture and home decor industry, construction, fashion and medical sectors products designed for those industries can slowly pave the way for bioplastics to appear more

commonly in more challenging car industry by researching and developing new solutions in a friendlier environment.



16:45 – 17:00	BIOMOTIVE Life-cycle Assessment Analysis
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Fernando B. (CARTIF) presented the main BIOMOTIVE LCA findings. Summary can be provided as follows:

- ✓ Lower environmental impact for BioMotive's products for the impact categories under study (cradle-to-gate and cradle-to-grave).
- ✓ Relevance of the use stage. Importance of the weight of the part to minimize the life-cycle impact.
- ✓ Data from partners has not revealed negative social impacts. Positive impacts appear at every stage of the process.

17:00	Discussion & Closure of the Meeting
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BIOMOTIVE project, UITP thanked BIOMOTIVE stakeholders for their commitment and support to the project throughout the project duration. Five meetings and workshops were organized by UITP during the BIOMOTIVE project lifetime. Efe Usanmaz thanked all



participants and invited all stakeholders to the hybrid final event in Brussels on 29 November 2021.

Some suggestion and discussions on the above presented topics by the stakeholders as follows:

- ✓ From stakeholders and public transport sector acceptance point of view, pricing of biobased materials are key factor for its market acceptance. Therefore, biobased materials should be price competitive vis-à-vis traditional automotive interior materials for market uptake;
- ✓ Automotive industry are getting more sensitive on achieving circular economy goals. In this sense, if price competitive, such biobased materials and interior parts has great potential to contribute circular economy goals of the automotive industry;
- ✓ In years to come, in view of the European Green Deal, a new policy framework promoting such biobased plastics and materials can facilitate the uptake of such materials. Therefore, monitoring the policy framework in years to come is key to take the opportunity in making market penetration;
- ✓ From bus public transport point of view, national or EU policies make some incentives to include such biobased materials by public transport authorities. Therefore, bus manufacturers could use in such biobased materials in the interior parts of buses.

--- End of Minutes --



4. ANNEX: All Materials produced by Task 7.3

This section provides D7.9 as the basis of information provided in Sections 1 and 2 of the present report and all presentations materials used in respective BioMotive stakeholders meetings. The Annex is provided as a separate document to the present report.