ANALYSIS AND REPORT: MISSION INNOVATION BIOREFINERIES WEBINAR JANUARY 2024

INTRODUCTION

1. Launched in November 2021 as part of Mission Innovation 2.0, **the Mission Innovation Integrated Biorefineries Mission** offers the opportunity to leverage international expertise and collaboration to support the development of bio-based Sustainable Fuels, Chemicals, and Materials (SFCM) which will be essential to reduce greenhouse gas emissions, improve supply chain resiliency and diversification, and support the global transition to a net-zero economy.
2. The Mission will advance this work simultaneously through three pillars:

- Pillar 1: Research, development and demonstration (RD&D) that focuses on technologies and processes that improve both the cost competitiveness of bio-based SFCMs and the sustainability of their production.

- Pillar 2: Pilot scale demonstrations that support new and novel technologies and facilitate cost-competitive manufacturing of bio-based SFCMs.

- Pillar 3: Regulatory and policy support through coordination and collaboration with government, academia, industry and other stakeholders to identify challenges in biorefining and develop supportive policy and regulatory environments for bio-based SFCM production.

3. This particular webinar was focused on Pillar 1 and specifically underpinning the objective *to Support research, development and demonstration that focuses on technologies and processes that improves both the cost competitiveness of sustainable bio-based SFCMs and the sustainability of their production.*

4. Preparation for the webinar began in 2023 and was hosted by the Innovate UK Knowledge Transfer Network (KTN) on behalf of the Mission Innovation stakeholders. The webinar was promoted internationally through the principal stakeholders and in the UK, throughout Innovate UK KTN's network and other national networks,

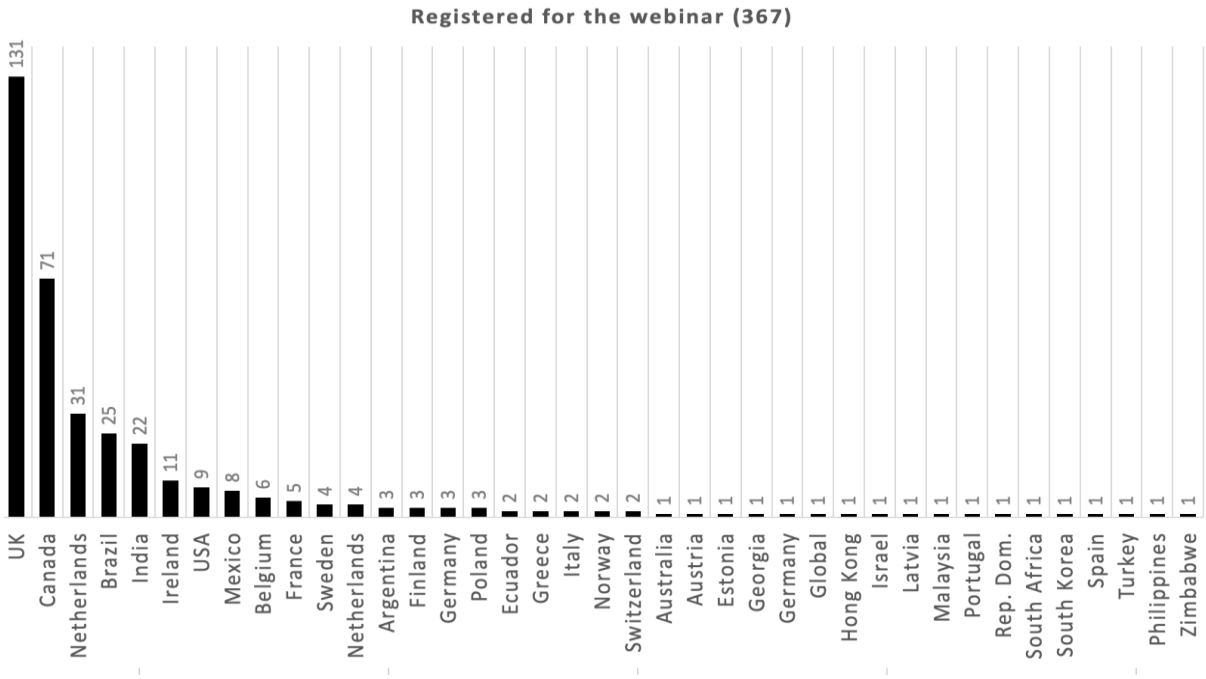
5. The webinar focused on disseminating Mission Innovation activities including exemplars of technologies and processes to improve cost competitiveness of biorefineries given by representatives from the stakeholders and how cross-border collaborations covering both monetary and non-monetary support could be deployed to encourage international collaborations.

Date of webinar: 22.01.2024

Time of webinar: 12:00 – 14:00 GMT

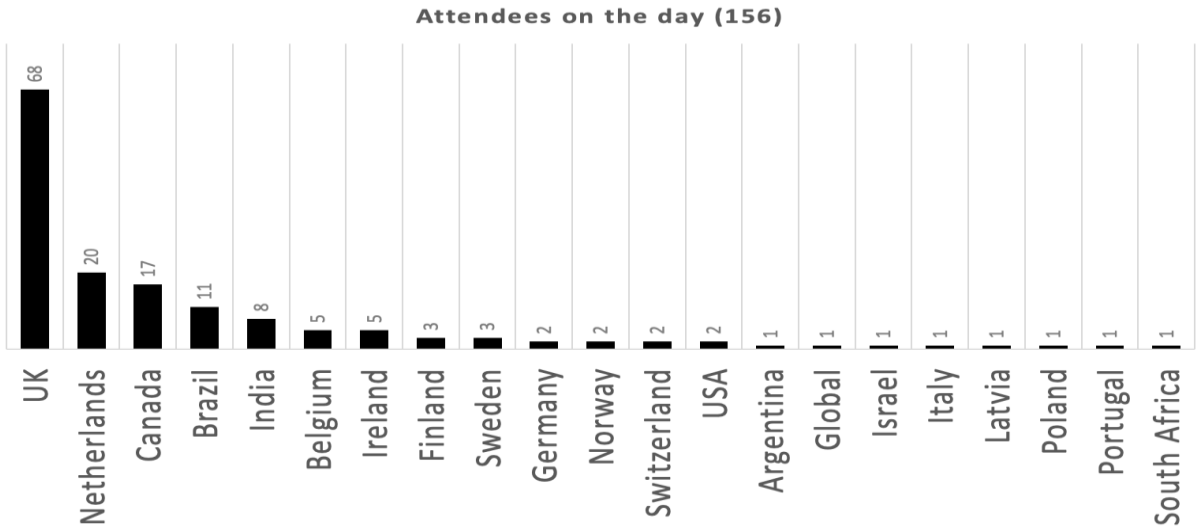
Recording and further details can be found here.

WHO REGISTERED FOR THE EVENT?



6. The above data was created from registration data captured from our events platform. There was a total of 367 registrants from across the world with notable peaks in the stakeholder nations (UK/Canada/Netherlands/Brazil/India).

WHO ATTENDED THE WEBINAR?



7. A total of 156 attendees were recorded at the peak of attendance during the webinar. Stakeholder nations are well represented as expected from the registration data. There was a notable representation from Canada and Brazil despite the differences

in time-zones. There is strong representation from EC member states which bodes well for future EC relevant programmes.

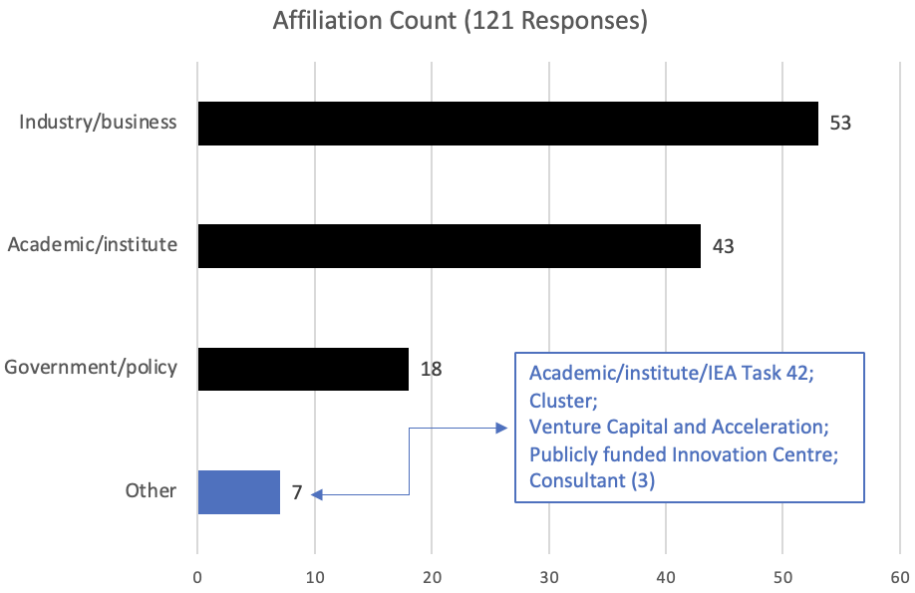
8. As part of the webinar, a series of questions were posed to the audience to capture information. The following sections provide the results of those polls.

POLL RESULT (AFFILIATIONS)

9. The first poll was to ascertain the affiliation of the audience. The categories to select from were provided by BBSRC:

    - Academic/institute.
    - Industry/business.
    - Government/policy.
    - 3rd sector/ charity and
    - Other – a free text option whereby the attendee can provide a self-identified affiliation.

AFFILIATION OF ATTENDEES

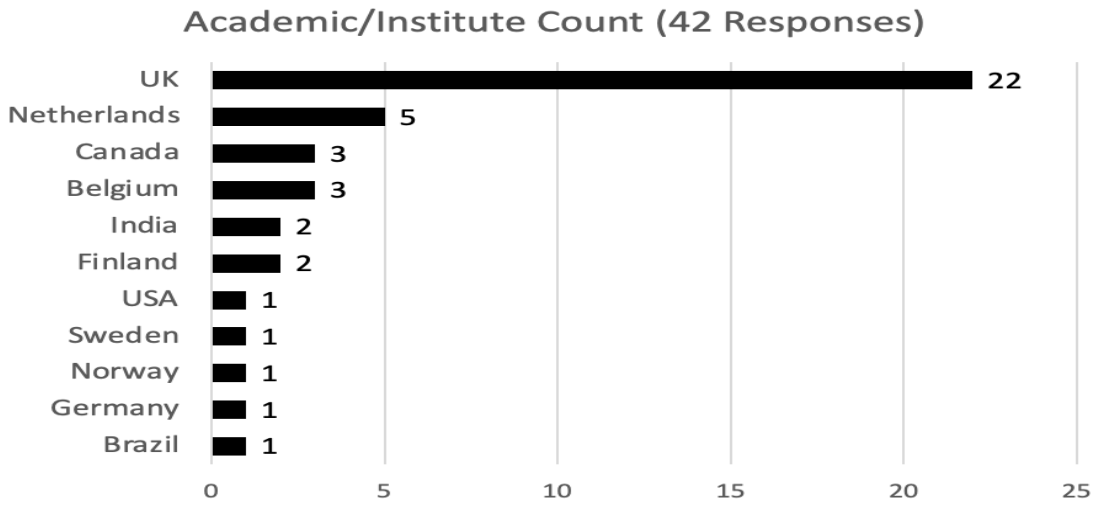


10. The chart depicts the overall affiliation with industry, academia and government forming the majority of attendees. It is notable that the numbers from business are greater than those from academia, with a number of representatives from government in attendance too.

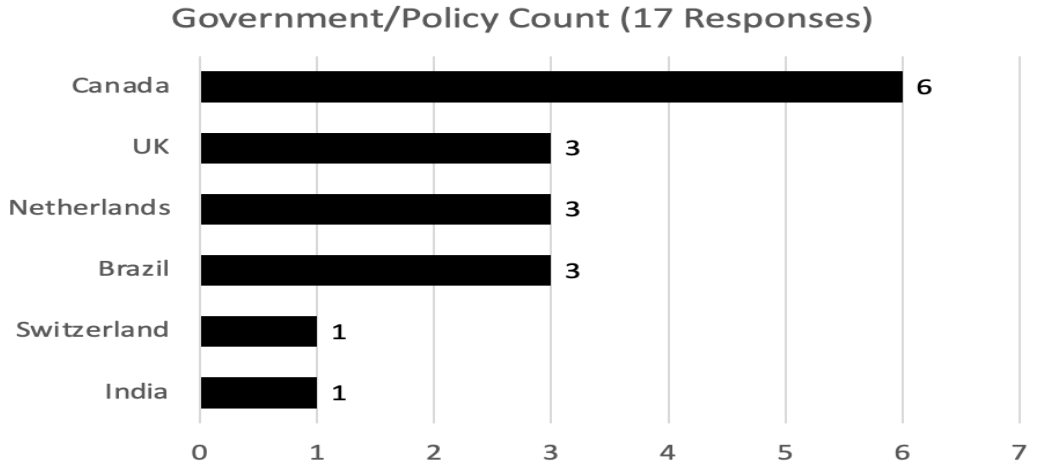
11. The ‘Other’ category was a free text option, and the responses are expanded in a blue box for ease of reference. The number in brackets, *e.g.* Consultant (3), denotes that there were 3 delegates who self-identified as consultants.

COUNTRY SPECIFIC AFFILIATIONS

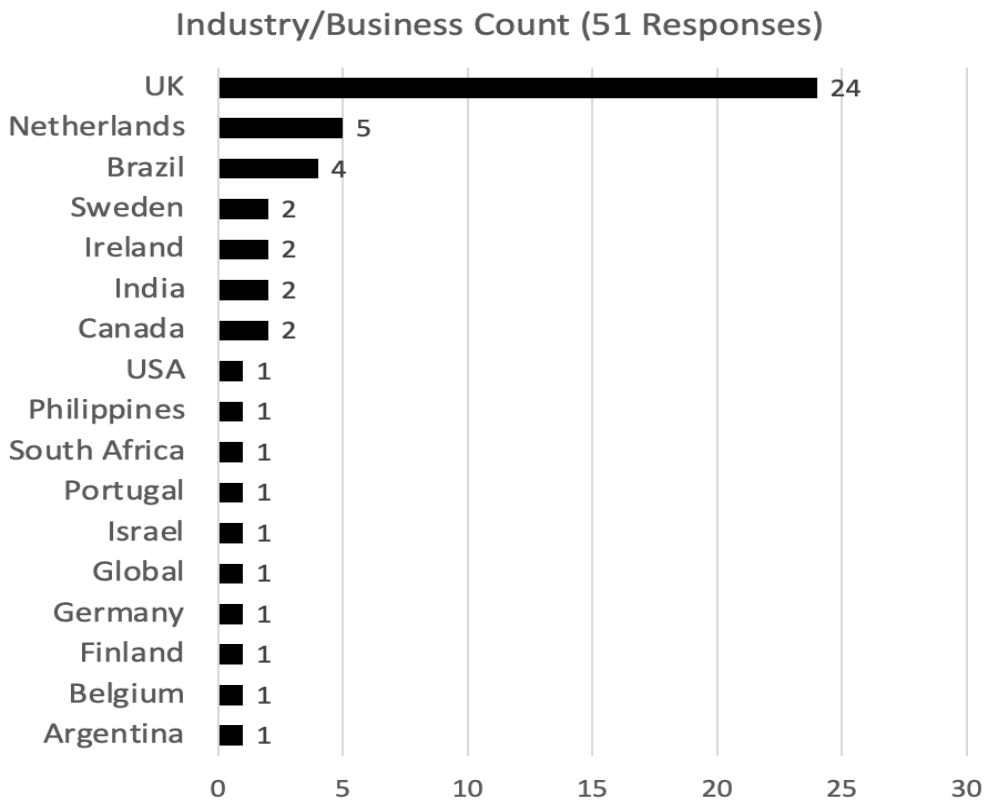
12. The following charts provide a further breakdown of affiliation type by country.



13. The UK had the strongest academic attendance with Netherlands, Canada and Belgium next in the sequence.



14. Canada provided the strongest representation from national governments.



15. The UK provided the highest level of business attendance in the webinar followed by Netherlands and Brazil.

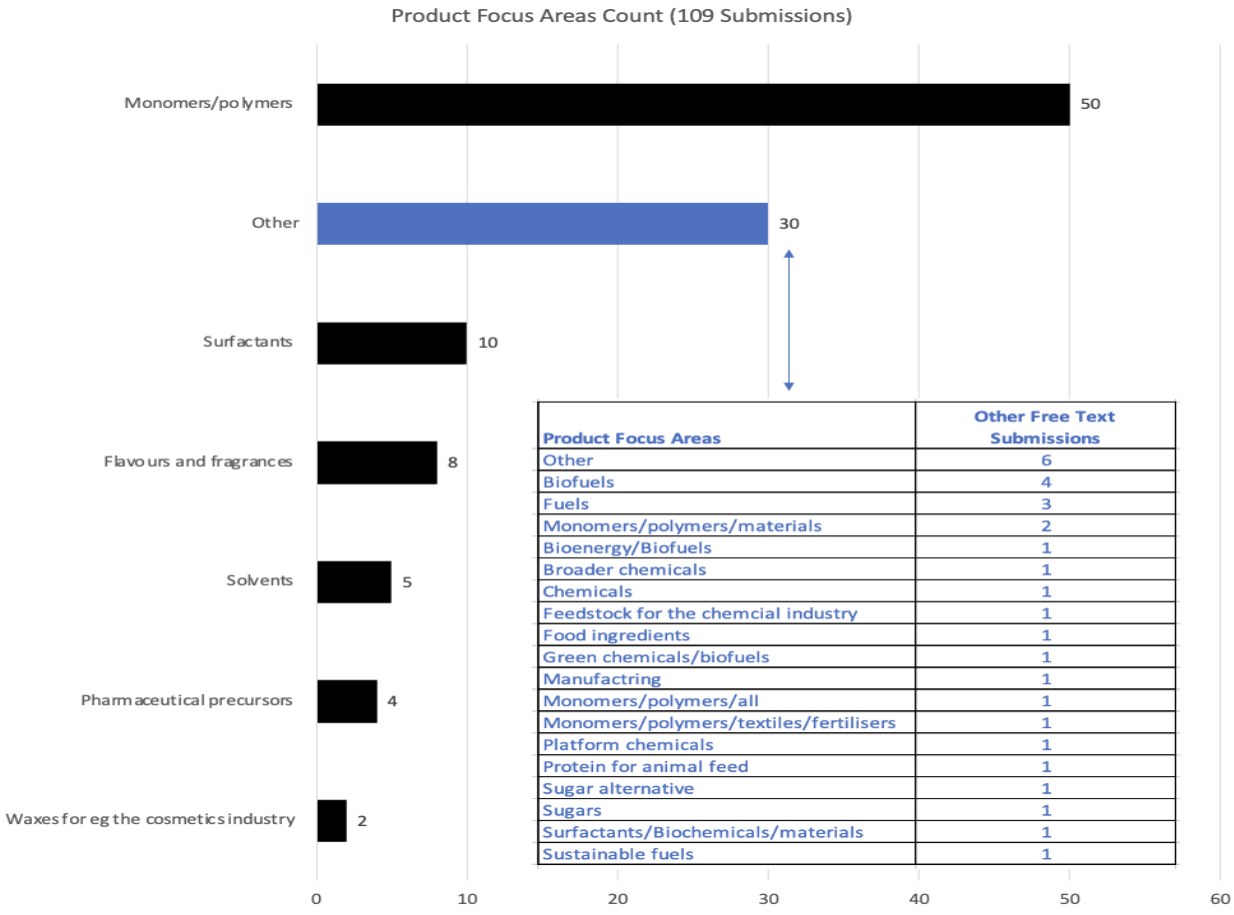
POLL RESULT (PRODUCTS)

Product Focus Areas Consolidated Response (What product areas should the Mission focus on?).

The options for delegates to select were provided by BBSRC and included the following:

- monomers/polymers
- surfactants
- waxes for e.g. the cosmetics industry
- flavours and fragrances
- pharmaceutical precursors
- solvents
- other – allowing attendees to provide their own categories.

16. You will notice ‘other’ in the following charts indicated with a blue bar. These have been left in purposely to indicate a ‘free text response’. The details of which have been expanded in an embedded table for ease of reference.

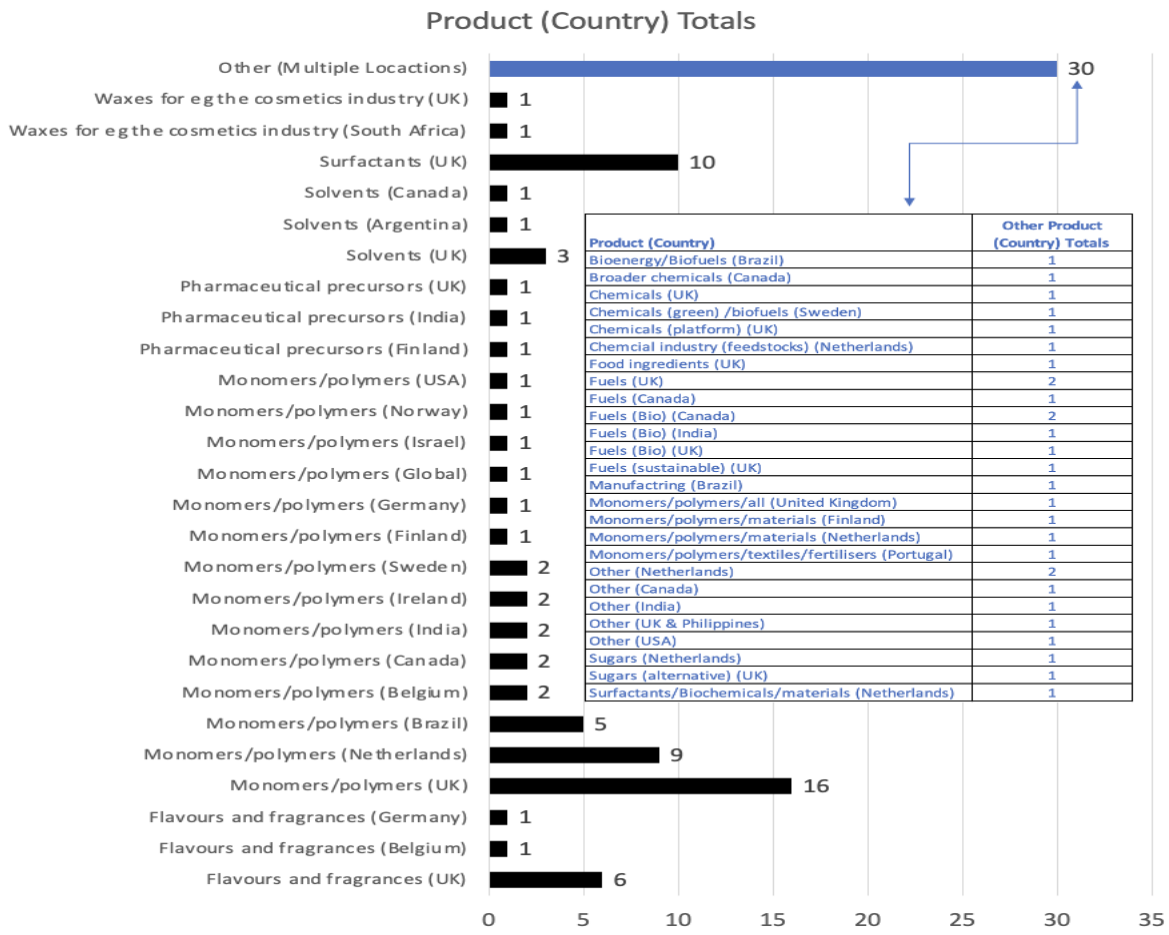


Product Focus Areas	Other Free Text Submissions
Other	6
Biofuels	4
Fuels	3
Monomers/polymers/materials	2
Bioenergy/Biofuels	1
Broader chemicals	1
Chemicals	1
Feedstock for the chemcial industry	1
Food ingredients	1
Green chemicals/biofuels	1
Manufactring	1
Monomers/polymers/all	1
Monomers/polymers/textiles/fertilisers	1
Platform chemicals	1
Protein for animal feed	1
Sugar alternative	1
Sugars	1
Surfactants/Biochemicals/materials	1
Sustainable fuels	1

17. The strongest levels of interest were shown for the production of monomer/polymers followed by a range of other chemical types.

Product Focus Areas Country Specific Response (What product areas should the Mission focus on?)

18. The following chart expands on that presented above allowing you to see which countries the responses are coming from. Again, there is an expanded view in blue for those responses that were captured by free text. Please note that unlike the previous chart, the following chart is unconsolidated but similar responses have been aggregated next to each other for comparison purposes.



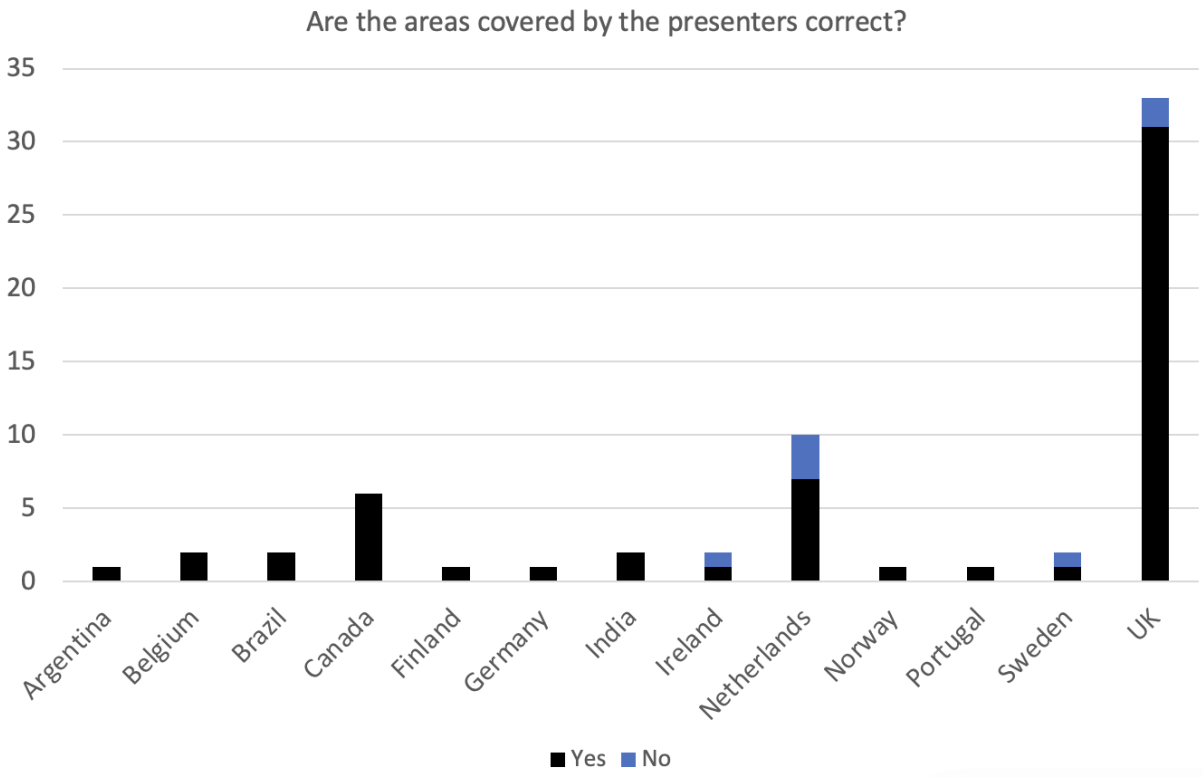
Product (Country)	Other Product (Country) Totals
Bioenergy/Biofuels (Brazil)	1
Broader chemicals (Canada)	1
Chemicals (UK)	1
Chemicals (green) /biofuels (Sweden)	1
Chemicals (platform) (UK)	1
Chemcial industry (feedstocks) (Netherlands)	1
Food ingredients (UK)	1
Fuels (UK)	2
Fuels (Canada)	1
Fuels (Bio) (Canada)	2
Fuels (Bio) (India)	1
Fuels (Bio) (UK)	1
Fuels (sustainable) (UK)	1
Manufactring (Brazil)	1
Monomers/polymers/all (United Kingdom)	1
Monomers/polymers/materials (Finland)	1
Monomers/polymers/materials (Netherlands)	1
Monomers/polymers/textiles/fertilisers (Portugal)	1
Other (Netherlands)	2
Other (Canada)	1
Other (India)	1
Other (UK & Philippines)	1
Other (USA)	1
Sugars (Netherlands)	1
Sugars (alternative) (UK)	1
Surfactants/Biochemicals/materials (Netherlands)	1

19. There was strong interest in monomers/polymers from UK, Netherlands, Brazil and a range of other nations, while only the UK appeared interested in surfactants and solvents. Some interest was expressed in flavours and fragrance, although this was largely from the UK.

POLL RESULT (SCIENCE AREAS)

Are the areas covered by the presenters, correct?

20. For ease of navigation the blue bars indicate a ‘No’ response to the aforementioned question.



21. On the whole, the presentations given during the webinar on the separation of lignocellulose, the utilisation of cellulose and lignin in high value applications along with the production of monomers, was regarded as being correct.

What other science areas should be included? (Free text responses)

Country	If other please specify
Canada	Broader chemicals
Canada	Drop in alternatives to fossil fuels or petroleum products
Finland	Definitely materials! Unlike fuels, materials are not immediately burned back into the air.
Netherlands	Sugars
Netherlands	What saves the most fossile C-atoms with the least money invested
Portugal	Mostly polymers for textile applications but a zero-waste approach using our own chemicals for all - including the production of fertilizers
Sweden	Green chemicals and biofuels
UK	A biorefinery vs petrochem refinery id uniquely positioned to also produce food ingredients
UK	Look at the chemical supply chains which feed into all of the above
UK	Platform chemicals. If you de-fossilize the upstream then you also de-fossilise the downstream
UK	Sugar alternative - xylitol
UK	Sustainable fuels
UK	Very difficult to answer - initially for volume go for monomers and polymers but all are of interest
Philippines	No idea
USA	There are too many demands and needs to focus on any one sector. Mission needs to support innovation and allow companies to select product areas

22. As expected, there was a range of different views expressed by the attendees on alterative science areas. As a potential sponsor of the area, the recommendation appears to be not to over-specify what a biorefinery should be producing and to leave that to the ingenuity of the investigators and business partners and what their technoeconomic analysis guides them to do.

Poll Result (Support & Collaborations)

What are the top three ways that the Mission could support important collaborative work in this area covering both monetary and non-monetary areas? (Free text responses)

Country of delegate	Q1. What are the top three ways that the Mission could support important collaborative work in this area covering both monetary and non-monetary areas?
Belgium	1. More dedicated Horizon Europe topics 2. Live workshops 3. Webinars such as this one
Canada	Align common research areas
Canada	Biochemical policy development
Canada	Bioenergy
Canada	Database of contacts
Germany	Finding potential partners and collaborators and industrial insights in terms of business cases
India	1. G2G collaboration and effective policy making aligning both sides. 2. More funding instruments covering a wider aspect of Bioenergy including but not limited to energy as outcome. 3. Multihelix approach may be adopted for all upcoming projects
India	Exchanging ideas, technology, and materials
Ireland	1. Building or use of a pilot biorefinery 2. Dedicated land for growing biomass. 3. Industry partners for off take agreements
Netherlands	1) cooperation partner 2) support collaboration project 3) regulations in different countries
Netherlands	A matchmaking platform to link investors to projects
Netherlands	Facilitating and stimulating consortia in research, development, and implementation projects.
Netherlands	Matching platform Incentives for collaboration Maybe a fair for people to meet and exchange ideas
Netherlands	R&D, funding support, matching strategic partners for upscaling
Netherlands	Have more (EU) project calls specifically for biorefinery development.
Portugal	- Net platform with main technologies available for the partners - Detailed information about funding opportunities - Support into the consortium creation for European projects
UK	Access to scale up capability; directory of pilot plants; database of bioarisings
UK	Breakdown in barriers to international collaborations, bringing in support from RTOs with piloting capabilities
UK	Direct funding, support for funding, workshops to make sure we cover all needed aspects of bringing these biorefineries to a reality (TEA, LCA, ChemEng, etc.)

UK	International conference, overseas visits to meet collaborators, ministerial policy roundtable
UK	Keeping us all informed, stopping duplication, encouraging other Funders to add to existing pots of cash
UK	Match-making between stakeholders, funding, internationalisation
UK	Subsidised analysis facilities
UK	Identify three projects either in end markets or technologies which we could build a project around - green ammonia and green urea?
USA	Developing consortia of complementary technologies Legislation to promote uptake of sustainable materials

23. Overall, not a great deal of consensus about the ways in which the Mission could support collaborative work beyond the general benefits expressed about collaborative working. Matchmaking activities and a mechanism to facilitate matchmaking would probably benefit in initiating and clarifying some of these opportunities and allowing some of the emergent ideas to progress.

Which nations would you find the most useful to collaborate immediately with? (Free text responses)

24. The following table shows the responses of delegates to the above question. You will notice a bracketed number next to some countries. This denotes the number of delegate responses. Take for example **UK** from the first column and the first entry in the second column **Canada (4)**. The (4) indicates that 4 delegates from the UK have expressed an interest to collaborate with Canada.

25. You will also notice examples where a country say for example Canada, wishes to collaborate with Canada. Although not deemed as an international collaboration we could assume there is a requirement for some domestic collaborations.

Country of delegate(s)	**Q2. Which nations would you find the most useful to collaborate immediately with?**
Belgium	Canada, UK
Canada	Canada, Sweden, India, Belgium, UK
Germany	Germany, Netherlands, UK
India	Europe, Brazil (2), India (2)
Ireland	Netherlands, Brazil, India
Netherlands	EU, Brazil (2), Canada (2), UK, India (3)
Portugal	Canada, Europe, Africa
UK	Canada (4), India (4), EU (2), France, Germany, Spain, Brazil (2), South Africa, Netherlands (3), Norway, Poland, UK (3)

26. It would appear that there is a general view that collaborative activities between nations and particularly stakeholder nations would be desirable with prioritisation of national requirements being the most difficult thing to undertake.

CONCLUSIONS

Attendance

27. In conclusion, we had 367 registered and 156 in attendance on the day. Delegates from Europe, UK, and Canada had the greatest presence. In terms of affiliation, industry, academia, and government were well represented. This can be described as a respectable level of community involvement, although could not be considered representative of the stakeholders' communities.

Scientific coverage

28. Most of the audience found that the areas covered in the presentations were correct. Of the scientific areas covered in the webinar, the monomers and polymers proved to be the most popular overall with limited interest expressed (mainly from the UK) in surfactants, flavours, and fragrances as the products of choice for biorefineries.

Mechanisms for collaboration

29. Workshops, webinars, matchmaking, missions for consortium building, funding and policy making were some of the ways Mission Innovation could support the audience attending the webinar.

With whom would you like to collaborate?

30. When asked **which nations would you find the most useful to collaborate immediately with?** there were clear indicators suggesting countries were willing to work in collaborations. Matchmaking and brokerage events could help facilitate those but the priority order of implementation for individual stakeholders remains to be determined.

WHERE TO NEXT?

31. It would appear there is a strong appetite for further international collaborative research on integrated biorefineries. A number of nations have indicated their desire to work together on key science areas in order to help reduce carbon emissions resulting from manufacturing by changing feedstocks and processes, towards helping meet the Mission's goals by 2030. The stakeholders will need to prioritise the nations and mechanisms they wish to work with.

32. In seeking to support the development of collaborative work, stakeholders would do well to recognise that over-specifying on products and processes is unlikely to prove popular and more open calls where a framework of support is described that can be filled out in more detail through the prospective partnerships is more likely to prove to be successful. The forthcoming EC programme *Development of smart concepts of integrated energy driven bio-refineries for co-production of advanced biofuels, bio-*

chemicals and biomaterials[1] represents an opportunity in this area for eligible nations. Mechanisms that facilitate cross national interactions between now and the closing date of the EC programme would be highly desirable.

33. For the stakeholders, identifying how to link together businesses and academic expertise across national boundaries will be critical and ways to explore collaborative partnerships through missions and international workshops are likely to be the most productive activities. An on-line partnering tool would also help national representatives navigate the international community although this may take several months to establish and test before becoming fully effective. In the meantime, Mission stakeholders should continue their activities to facilitate further collaborative interactions.

[1] Funding & tenders (europa.eu)