

# Interreg



## North-West Europe

## BioBase4SME

European Regional Development Fund



**Thematic priority: innovation**

Needs and challenges of companies in the  
bioeconomy in NW Europe

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## Summary

Lack of policies related to investment and demand in the bio-based products remain large barriers to small and medium-sized enterprises working in the bioeconomy in North-West Europe. This is the conclusion of a survey carried out as part of the BioBase4SME project in 2018. The project, co-financed by InterregNWE, aimed to support SMEs in the bioeconomy with funded technical and business services, as well as training.

For the survey, bioeconomy SMEs in six countries of North-West Europe were presented with a list of barriers and asked to rate them on how they impact their business development. The SMEs were asked to rate the barrier from 1 to 5, with 5 being a barrier actively preventing business development. The questions were the same as in a survey carried out in 2014 as part of a previous project, Bio Base NWE, also co-financed by InterregNWE. This allows the two surveys to be compared and offers an insight into the progress of the bioeconomy as well as the impact of bioeconomy policy in NW Europe.

The 43 barriers that SMEs were questioned on fell into 9 categories and are listed below, along with the average (mean) barrier score. 'All' represents the mean scores of SMEs from all countries, while IE represents the mean scores of SMEs from Ireland, NL Netherlands, FR France, DE Germany, UK United Kingdom and BE Belgium. For each country, dark red fill represents the most important barrier, and light red represents the 2nd and 3rd most important barriers. The change in score since the previous survey in 2014 is shown in the grey bars. The mean barrier score in 2018 is shown in dark grey while the mean barrier score in 2014 is shown in light grey.

		All	IE	NL	FR	DE	UK	BE
All barriers		2.9	3.1	2.9	3.0	2.8	2.5	2.9
Demand-side policy barriers		3.3	3.5	3.0	3.5	3.3	2.6	4.2
Stakeholder perception barriers		3.2	3.3	3.2	3.2	3.5	3.1	3.0
Investment barriers		3.1	3.4	3.3	3.0	3.0	3.2	2.7
Regulatory barriers		3.1	3.3	3.0	3.2	3.4	2.1	3.6
Intellectual property related hurdles		2.9	3.0	2.7	2.8	2.8	2.7	3.3
Human resource barriers		2.7	2.3	3.0	2.7	2.7	3.4	2.3
Policy barriers		2.7	2.9	3.0	2.6	3.2	1.9	2.8
Hurdles for efficient collaboration		2.7	2.7	2.6	2.6	3.1	2.7	2.1
Feedstock related barriers		2.3	2.8	2.6	2.8	1.5	1.8	2.8

Overall, SMEs reported an improvement in the bioeconomy since 2014, as seen by a decreasing average barrier score across all the participating countries. As in 2014, Ireland remains the country reporting the highest barriers and the UK remains the country reporting the lowest barriers in the bioeconomy.

The areas of feedstock and intellectual property have seen the largest improvements, with their barriers scoring at least 0.5 less than in 2014. However, demand-side policy barriers have become a larger priority for SMEs, followed by stakeholder perception barriers and human resource barriers. The top barriers in 2018 were demand-side policy barriers, poor stakeholder/public perception, and investment barriers.

#### *Demand-side policy barriers*

Demand-side policy barriers scored an average of 3.3/5, with over 80% of respondents scoring them as at least a considerable barrier. Over 50% found “lack of market support / commercial frameworks” to be a large barrier, while over 30% found “lack of public procurement policy” to be a large barrier. Several SMEs stated they had difficulty competing with existing products and value chains, with one SME commenting, “[Policy] framework currently supports fossil resources”.

#### *Stakeholder perception barriers*

Stakeholder perception barriers scored an average of 3.2/5, with over 80% of respondents rating them as at least a considerable barrier. Over 50% found “poor stakeholder knowledge of the sector” and “the benefits of biobased products are not well-enough communicated” to be large barriers. Negative media messages were seen as actively preventing business development. Some SMEs also criticised existing labelling schemes, with one SME commenting, “Labels and certifications need to be more efficient”.

#### *Investment barriers*

Investment barriers scored 3.1/5, with 73% of respondents viewing investment barriers as at least a considerable barrier. Concerns were primarily in relation to the sector being perceived as high risk by investors; more than half of respondents reported a “lack of visible products” and a “long time for return on investment” as large barriers. Overall, SMEs rated public investment as easier to access, although some SMEs mentioned that scale-up was still an issue, with one SME commenting, “Public support for scale up activities very limited, difficult to access and not very flexible”.

It is important to note that the number of SMEs interviewed was small (43) and most were not the same SMEs as interviewed in 2014. Nonetheless, when talking to the SMEs (qualitative) and analysing their barrier scores (quantitative), some trends were clear. Although SMEs in the bioeconomy in North-West Europe felt that barriers to business in the bioeconomy decreased over the last 4 years, demand and investment barriers remained large concerns. In addition, issues related to stakeholder or public perception are now seen as major barriers.

The barriers are recognised by policy makers and are reflected in the 2018 EU Bioeconomy Strategy, adopted by the European Commission last October. Although the new strategy does not include hard measures to stimulate demand for biobased products (like the USDA BioPreferred scheme), it does aim to scale up Europe’s biobased markets by facilitating access to investment, both from the private and public sector, as well as by identifying regulatory barriers to biobased development, and promoting biobased standards. Better biobased standards could improve stakeholder perception of the bioeconomy, making consumers better informed and allowing them to have confidence in what they are buying. There is also significant focus on promoting the bioeconomy at the local scale, aimed primarily at agriculture and forestry, both of which underpin the bioeconomy through provision of feedstocks.

## 1. Introduction

Europe is facing a number of challenges such as climate change and the need to remain competitive in a global economy. To tackle these challenges, we must improve the way we produce and consume to stay within the boundaries of a healthy ecosystem. A sustainable bioeconomy can help deliver this. The bioeconomy covers all sectors and systems that rely on biological resources or technologies, from primary production and waste treatment through to high-value biotechnology products. With a turnover of €2.3 trillion, accounting for 8.2% of the EU's workforce, the bioeconomy is a central element to the functioning and success of the EU economy.<sup>1</sup>

Although the advantages of a biobased economy are clear, there are many barriers to the successful transition from a fossil-based to a biobased economy. While large companies are often very successful at understanding the barriers to their business and typically have channels to influence policy, SMEs have fewer resources and are less well represented. This is important because small and medium-sized enterprises (SMEs) are the backbone of Europe's economy. The European Commission considers SMEs and entrepreneurship as key to ensuring economic growth, innovation, job creation, and social integration in the EU.<sup>2</sup>

In order to help SMEs succeed in the bioeconomy, the BioBase4SME project aimed to advise SMEs from across North-West (NW) Europe on how to develop new ideas in the bioeconomy into marketable products. A further aim of the BioBase4SME project was to improve policy engagement and regional support for bioeconomy SMEs in NW Europe. To do this, evidence was gathered on the current needs and bottlenecks for bioeconomy SMEs in the different regions. This was done in the form of an SME survey, the results of which are presented herein. This survey was a repeat of the survey carried out during the Bio Base NWE project, partially funded by Interreg NWE. The aim of Bio Base NWE was to support the development of NWE as a leading European region in the bio-based economy by facilitating innovation and business development by SMEs in NWE and improving professional training and education for the bioeconomy.

BioBase4SME was funded by InterregNWE (under the project number NWE142) with co-financing from partners Bio Base Europe Pilot Plant (BE), NNFCC (UK), CLIB2021 Cluster Industrielle Biotechnologie (DE), Flanders Biobased Valley (BE), Materia Nova (BE), tcbb RESOURCE (IE), AC3A Association des Chambres d'Agriculture de l'Arc Atlantique (FR) and the University of York (UK), as well as regional supporters Wallonia (BE), Flanders (BE), Zeeland (NL) and North Brabant (NL) and research institutes Ryan Institute at NUI Galway (IE) and the University of Limerick (IE).<sup>3</sup>

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<sup>1</sup> European Commission (2018) *A sustainable Bioeconomy for Europe: Strengthening the connection between economy, society and the environment*. COM/2018/673 final, doi:10.2777/792130  
[https://ec.europa.eu/research/bioeconomy/pdf/ec\\_bioeconomy\\_strategy\\_2018.pdf](https://ec.europa.eu/research/bioeconomy/pdf/ec_bioeconomy_strategy_2018.pdf)

<sup>2</sup> European Commission (2019) *Entrepreneurship and Small and medium-sized enterprises (SMEs)*.  
[https://ec.europa.eu/growth/smes\\_en](https://ec.europa.eu/growth/smes_en)

<sup>3</sup> Read more about BioBase4SME on the project website <http://www.nweurope.eu/BioBase4SME>

## 2. Method

Bioeconomy SMEs from the NWE region (Figure 1) were interviewed in 2018 about the barriers they faced. Interviews were conducted by phone and/or e-mail. The SMEs were presented with 43 potential barriers to their business and asked to rate each barrier out of 5, where 5 represented the highest barrier score. The full questionnaire can be found in appendix A. The SMEs were encouraged to comment on their barrier scores, and comments were recorded where given. In total, responses were collected from 50 SMEs: 8 from the Netherlands, 8 from Belgium (4 from Flanders and 4 from Wallonia), 9 from Germany, 7 from France, 8 from Ireland and 10 from the UK. No SMEs were interviewed from the NWE countries Switzerland and Luxembourg.

The same survey was carried out in 2014 as part of a previous project, Bio Base NWE, part financed by InterregNWE<sup>4</sup>. Where possible, the same SMEs were interviewed in 2018. Some SMEs contacted in 2014 were no longer operational, some had changed direction, some had been bought out, and others did not respond. There was no French partner in the previous project, so no 2014 information was available. In total, 14 SMEs were interviewed in 2018 who had also been interviewed in 2014.

The SMEs were from various sectors, from developers of biobased materials, chemicals and fuels to providers of biotech tools and services. The companies were also a range of ages (Figure 2).

The 43 barriers suggested to SMEs fell into 9 broad categories:

- demand-side policy barriers,
- stakeholder perception barriers,
- investment barriers,
- regulatory barriers,
- intellectual property-related hurdles,
- human resources barriers,
- policy barriers,
- hurdles for efficient collaboration and
- feedstock-related barrier

To facilitate interpretation of the results, average scores were calculated for each category by taking the mean across all answers in that category. Means were also calculated for each country within each category. Results from 2014 were compared to results from 2018. The SME responses were used to grade the barriers as “not applicable”, “low”, “medium” or “high” (Table 1: Grading of barriers to bioeconomy SMEs based on the score given by the SMEs.

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Out of the 43 barriers, those rated as “high” by more than half of respondents were considered as the top barriers. Barriers considered as “high” by more than a third of respondents were also considered as important.

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<sup>4</sup> Clever Consult BVBA (2015) Bio Base NWE analysis report on the bottlenecks SMEs encounter in the bio-economy, available at [http://www.biobasenwe.org/media/96429/BBNWE-analysis-report-on-bottlenecks-SMEs-encounter-in-bioeconomy\\_final.pdf](http://www.biobasenwe.org/media/96429/BBNWE-analysis-report-on-bottlenecks-SMEs-encounter-in-bioeconomy_final.pdf)



Figure 1: North West Europe (NWE) region, as defined by InterregNWE, is shown in green. The region covers all of Ireland, the UK, Belgium, Luxembourg and Switzerland, and parts of France, Germany and the Netherlands.

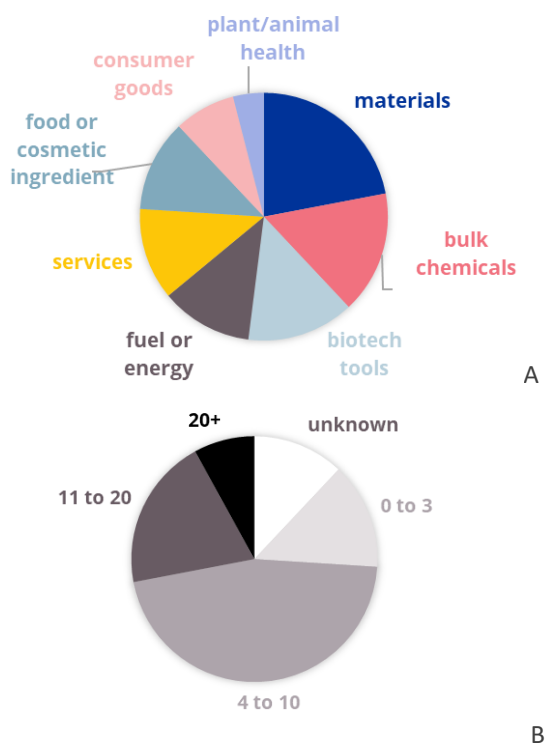


Figure 2: The 50 SMEs interviewed were developing or producing products from a range of different categories (A). The SMEs had also been operational for different numbers of years (B).

Table 1: Grading of barriers to bioeconomy SMEs based on the score given by the SMEs.











Score given by SME	Interpretation
NA or 0	Not applicable
1-1.9	LOW – Low level barrier to business
2-3.9	MEDIUM – Considerable impact on business
4-5	HIGH – Actively prevents business development



### 3. Top barriers

Only 5 out of the 43 barriers were rated as “high” by more than half of SMEs. These barriers were in the categories of demand, stakeholder perception and investment, which are also the categories with the highest mean barrier score, as visible in Table 2. Regulatory barriers also had a high mean score.

*Table 2: List of categories of barrier from questionnaire, along with the average (mean) barrier score for SMEs from all countries, as well as for SMEs from each country surveyed. All represents the mean scores for all countries, IE represents Ireland, NL Netherlands, FR France, DE Germany, UK United Kingdom and BE Belgium. For each country, dark red fill represents the most important barrier, and light red represents the 2<sup>nd</sup> and 3<sup>rd</sup> most important barriers. Grey bars represent the mean score in 2018 (dark grey) compared with 2014 (light grey)*

		All	IE	NL	FR	DE	UK	BE
All barriers		2.9	3.1	2.9	3.0	2.8	2.5	2.9
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Regulatory barriers		3.1	3.3	3.0	3.2	3.4	2.1	3.6
Intellectual property related hurdles		2.9	3.0	2.7	2.8	2.8	2.7	3.3
Human resource barriers		2.7	2.3	3.0	2.7	2.7	3.4	2.3
Policy barriers		2.7	2.9	3.0	2.6	3.2	1.9	2.8
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Feedstock related barriers		2.3	2.8	2.6	2.8	1.5	1.8	2.8

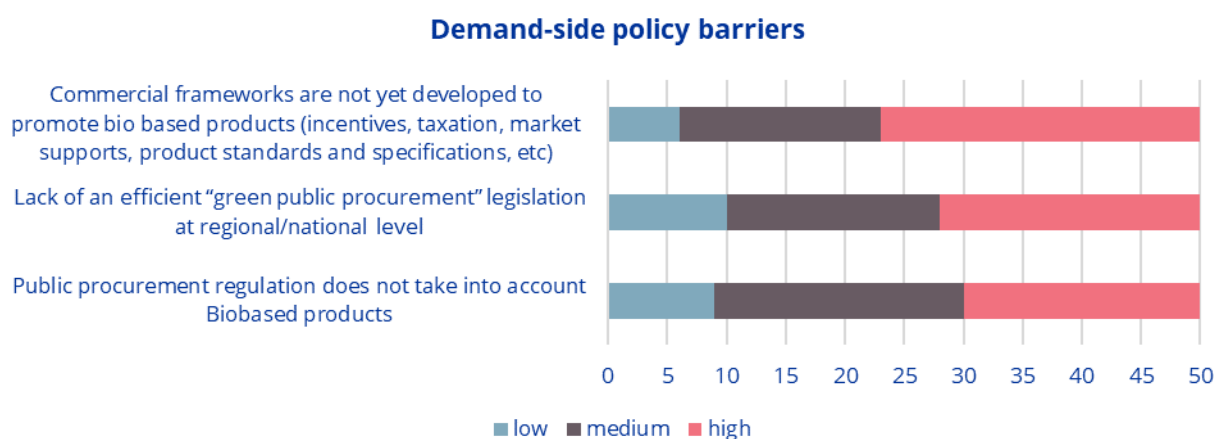
#### 3.1. Demand-side policy barriers

- Over half of SMEs found a lack of incentives, taxations, market support etc, to be a high barrier
- The barriers were perceived as highest for Belgian SMEs and the lowest for UK SMEs
- Demand-side policy barriers have become more important, ranking 1<sup>st</sup> in 2018 and 6<sup>th</sup> in 2014

One of the challenges with bioeconomy innovation is that manufacturers wait until there is a clear market demand before they commercialise technologies, but buyers wait till the product is on the market before they buy it. Demand-side policies aim to address this issue. Sometimes called lead market initiatives, they can include involving users (e.g. through public-private partnerships), improving the articulation of demand, and promoting adoption and diffusion of innovations (e.g. through improved visibility).<sup>5</sup>

<sup>5</sup> European Commission (2009) *Economic analysis of eco-innovation*. Available at [http://ec.europa.eu/environment/enveco/innovation\\_technology/index.htm](http://ec.europa.eu/environment/enveco/innovation_technology/index.htm)

Lack of demand-side policy was the top barrier category and was seen as actively preventing business development. The questionnaire suggested three barriers in this category: lack of commercial frameworks (e.g. incentives, taxation, market supports and product standards), lack of green public procurement and lack of biobased public procurement (see Figure 3). One barrier, lack of commercial frameworks, was reported as a high barrier by more than half of SMEs, making it the most important barrier in this category (and indeed the highest barrier across the whole survey). The other barriers in this category were also important, with more than a third of respondents reporting that a lack of public procurement policy for green and biobased products were large barriers.



*Figure 3: Suggested barriers in the category of demand side policy barriers with the number of SMEs that scored the barriers as low, medium or high.*

Several SMEs commented that they found it difficult to compete with existing products (partly in terms of price) and with existing networks and supply chains. Other SMEs said that, while they thought demand-side policies were not essential, they would be very beneficial. Several SMEs mentioned the USDA BioPreferred Program<sup>6</sup> and wished for something similar in Europe. One SME disagreed, and said demand side policy would not be that helpful and felt that biobased products should not have to rely on demand-side policy. Finally, several SMEs felt that demand-side policies were not applicable to them as they were not producing a product [yet].

Demand-side policy was the top barrier category for Belgian, French and Irish SMEs, with Belgian SMEs giving it the highest average score (4.2) from all the participating countries, and the UK SMEs giving it the lowest average score (2.6). The SMEs from the Netherlands showed the largest barrier reduction (with a mean score of 3.9 in 2014 and 3.0 in 2018) and SMEs from Germany showed the largest barrier increase (with a mean score of 2.3 in 2014 and 3.3 in 2018).

In terms of sector, SMEs developing or producing materials rated demand as a particularly high barrier category, while SMEs developing or producing bulk chemicals and fuel or energy rated it much lower. Demand-side barriers grew in significance between 2014 and 2018. Demand side barriers were ranked as only 6<sup>th</sup> out of 9 in the 2014 survey, while in 2018 they were the top barrier. The mean barrier score also increased from 3.0 to 3.3.

Demand-side policy is recognised as a major barrier by various policy instruments on a regional and European level. In 2008, biobased products were recognised as one of 6 important sectors facing particular barriers to market access and, to address these barriers, the European Commission launched demand-side policy instruments called Lead

<sup>6</sup> For more information, see the US Department of Agriculture website on the BioPreferred Program, <https://www.biopreferred.gov/>

Market Initiatives<sup>7</sup>. This included the creation of an Advisory Group on Bio-based Products to advise the European Commission on the development of the bio-based sector and, in 2011, the group made several recommendations to the Commission. However, these were largely unimplemented<sup>8</sup>. In 2017, the group made more recommendations, including three that are very relevant to demand-side policy: (a) to “implement market stimulation measures”, (b) to “invest in the development of tools (standards and labels) enabling bio-based products to be better evaluated by purchasers” and (c) to “use mandates and bans to create environmentally friendly innovation”. The 2018 European Bioeconomy Strategy<sup>9</sup> also recognises the importance of demand-side policy, and one of its three main action areas “aims to strengthen and scale-up the biobased sectors and unlock investments and markets”. However, the bioeconomy strategy does not include hard measures to stimulate demand for biobased products (in contrast to the USDA BioPreferred scheme). Nonetheless, there is now guidance for procurement of biobased products from the European Commission<sup>10</sup>, and there is also a dedicated website ([biobasedprocurement.eu](http://biobasedprocurement.eu)). Some projects also addressed public procurement for the bioeconomy, such as the H2020 funded InnProBio project, which aimed to develop a community of public procurement practitioners interested in innovative bio-based products and services.

### 3.2. Stakeholder perception

- Over half of SMEs found lack of stakeholder knowledge to be a high barrier
- Over half of SMEs found lack of communication of benefits of biobased products to be a high barrier
- Stakeholder perception barriers were perceived as important across countries and years

Awareness and a positive perception of the bioeconomy by stakeholders from the value chain and in the general public are important to enable market uptake of innovation, while stakeholder interaction is important to enable innovations to better align with societal needs.<sup>11</sup>

Stakeholder perception was seen as actively preventing business development. There were five suggested barriers in this category, as is visible in Figure 4. Two barriers, lack of stakeholder knowledge and lack of communication of biobased benefits, were rated as high barriers by over half of respondents. The other barriers were also important; more than a third of respondents found lack of labelling, lack of understanding of industrial biotechnology, and negative media messages as actively preventing business development.

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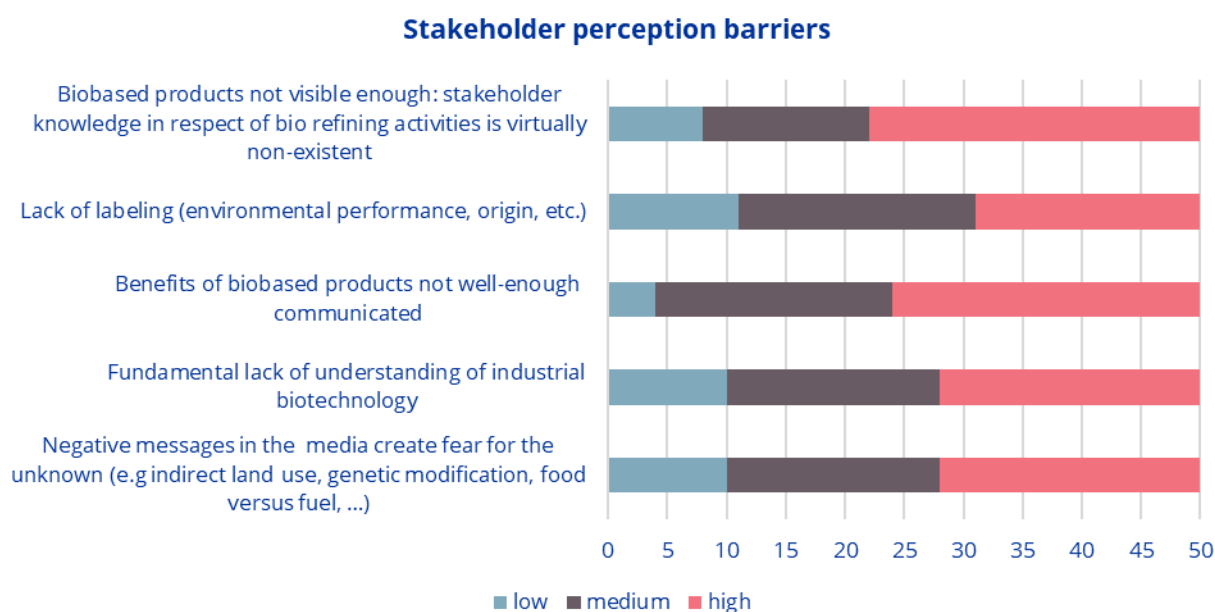
<sup>7</sup> European Commission (2011) *Lead Market Initiative – speed up time-to-market of innovations and pilot new innovation policy in Europe*. European Commission website [http://ec.europa.eu/growth/content/lead-market-initiative-%E2%80%93-speed-time-market-innovations-and-pilot-new-innovation-policy-0\\_en](http://ec.europa.eu/growth/content/lead-market-initiative-%E2%80%93-speed-time-market-innovations-and-pilot-new-innovation-policy-0_en)

<sup>8</sup> Commission Expert Group on Bio-based Products (2017) *Final Report*. [https://ec.europa.eu/knowledge4policy/news/report-commission-expert-group-bio-based-products-includes-recommendations-jobs-growth-through\\_en](https://ec.europa.eu/knowledge4policy/news/report-commission-expert-group-bio-based-products-includes-recommendations-jobs-growth-through_en)

<sup>9</sup> European Commission (2018) *A sustainable Bioeconomy for Europe: Strengthening the connection between economy, society and the environment*. COM/2018/673 final, doi:10.2777/792130 [https://ec.europa.eu/research/bioeconomy/pdf/ec\\_bioeconomy\\_strategy\\_2018.pdf](https://ec.europa.eu/research/bioeconomy/pdf/ec_bioeconomy_strategy_2018.pdf)

<sup>10</sup> Royal Haskoning DHV (2017) *Guidance for bio-based products in procurement*. European Commission website [https://ec.europa.eu/growth/content/guidance-bio-based-products-procurement\\_en](https://ec.europa.eu/growth/content/guidance-bio-based-products-procurement_en)

<sup>11</sup> Gerdes H. et al (2018) Promoting stakeholder engagement and public awareness for a participative governance of the European bioeconomy. BioSTEP project report, available at [http://www.bio-step.eu/fileadmin/BioSTEP/Bio\\_documents/BioSTEP\\_D4.2\\_Lessons\\_learned\\_from\\_BioSTEP.pdf](http://www.bio-step.eu/fileadmin/BioSTEP/Bio_documents/BioSTEP_D4.2_Lessons_learned_from_BioSTEP.pdf)



*Figure 4: Suggested barriers in the category of stakeholder perception barriers with the number of SMEs that scored the barriers as low, medium or high.*

On the topic of the top barriers, stakeholder knowledge and communication of biobased benefits, some SMEs stressed that their fields were particularly bad for lack of stakeholder knowledge, for example bioplastics (consumers don't know the difference between biobased and biodegradable), construction materials (architects, engineers and builders not aware of alternative materials) and agriculture/horticulture (farmers often unaware of plant biostimulants). Some SMEs commented that greenwashing from larger companies has damaged the whole green industry. One SME was critical of the bioeconomy (both small and large companies), saying that if the bioeconomy products and processes were more "stand out", communication would be easy and public perception would follow.

On the topic of labelling, several SMEs said that the labels commonly used in their sector did not consider biobased products; examples included EU and national organic agriculture labels and the Oeko-Tex fabric label. Other SMEs said that labels did exist, but that they were not recognised with consumers. Some SMEs felt that this was not relevant to them as it was an issue further down the supply chain, while other SMEs selling to businesses recognised that a certification of their product would help the whole supply chain. On the issues of negative media, several SMEs highlighted the food-versus-fuel debate negatively affecting the whole industry, while one SME mentioned they felt that poor public acceptance was a uniquely European problem.

Stakeholder perception issues were high in all countries and were important for all SME categories, although they were particularly more important for SMEs developing food or cosmetics ingredients, and less important for SMEs producing bulk chemicals. Stakeholder perception barriers grew slightly in significance between 2014 and 2018, having been previously ranked in 4<sup>th</sup> out of 9.

Stakeholder perception is recognised as a barrier by the European Bioeconomy Strategy, which says that "to realise its potential, the bio-based sector needs to be further promoted for its positive impacts, and to be on equal footing with market and regulatory conditions vis-à-vis fossil-based industries". Its Action 1.3 "will identify bottlenecks... with a view to promoting existing standards and labels and assessing the need for developing new ones, particularly for bio-based products". There have been efforts into this, and many agencies and organisations promote the European Ecolabel, but this label does not have any specifications on biobased content.

The European Bioeconomy Strategy also addresses the issue of connecting stakeholders in the value chain; its Action 2.1 ‘Strategic Deployment Agenda’ aims to link actors, territories and value chains. Projects like BioCannDo with its website [AllThings.Bio](#) aim to “increase awareness of bio-based products” and “develop and distribute communication and educational materials about the bioeconomy and bio-based products”.

### 3.3. Investment barriers

- Over half of SMEs saw a high barrier in the sector’s perception by investors as high risk
- The barriers were perceived as high for all countries, though Belgium rated them lowest
- Investment barriers have become less important, ranking 3<sup>rd</sup> in 2018 and 1<sup>st</sup> in 2014

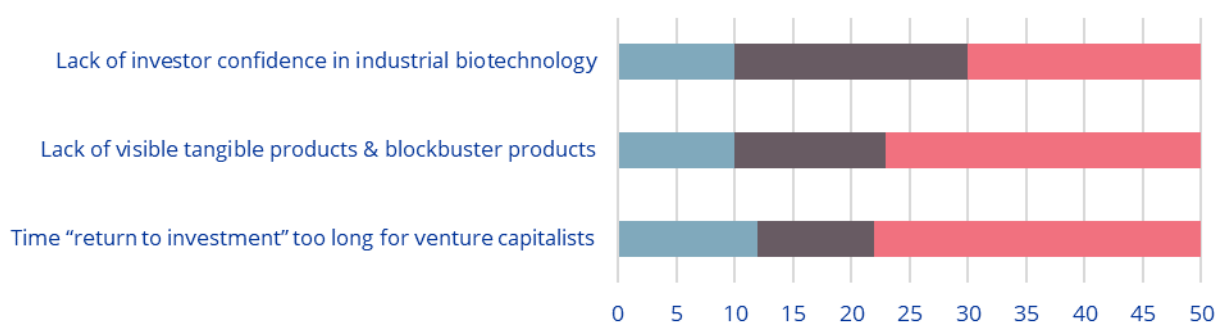
Investment is needed in innovative SMEs to bring innovations to market (e.g. for demonstration plants, market outreach activities and application testing) as well as to fund further innovation. The European commission recognises that SMEs face particular challenges accessing investment.<sup>12</sup>

Investment barriers were seen as actively preventing business development, primarily because the sector is perceived as high risk by investors. Investment barriers were divided into two subcategories. The subcategory of capital requirements had 3 barriers and the subcategory of investment risk (i.e. that investors view the sector as too risky) had 5 barriers (Figure 5). The issue of the biobased sector being perceived as high-risk for investors was particularly important; more than half of respondents reported a lack of visible products and the long time needed for return on investment as high barriers. The other investment-risk barrier, lack of investor confidence, was also important, with more than a third of respondents reporting it as a high barrier. Of the 5 capital-requirement barriers, two were particularly important, public support for scale-up and financial support for new production facilities, followed by access to finance; more than a third of SMEs rated these 3 as high barriers. Access to SME finance and availability of public funding for research and development (R&D) were rated as medium barriers.

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<sup>12</sup>European Commission (2019) Access to finance for SMEs, available at [https://ec.europa.eu/growth/access-to-finance\\_en](https://ec.europa.eu/growth/access-to-finance_en)

### Investment barriers: investment risk



### Investment barriers: capital requirement

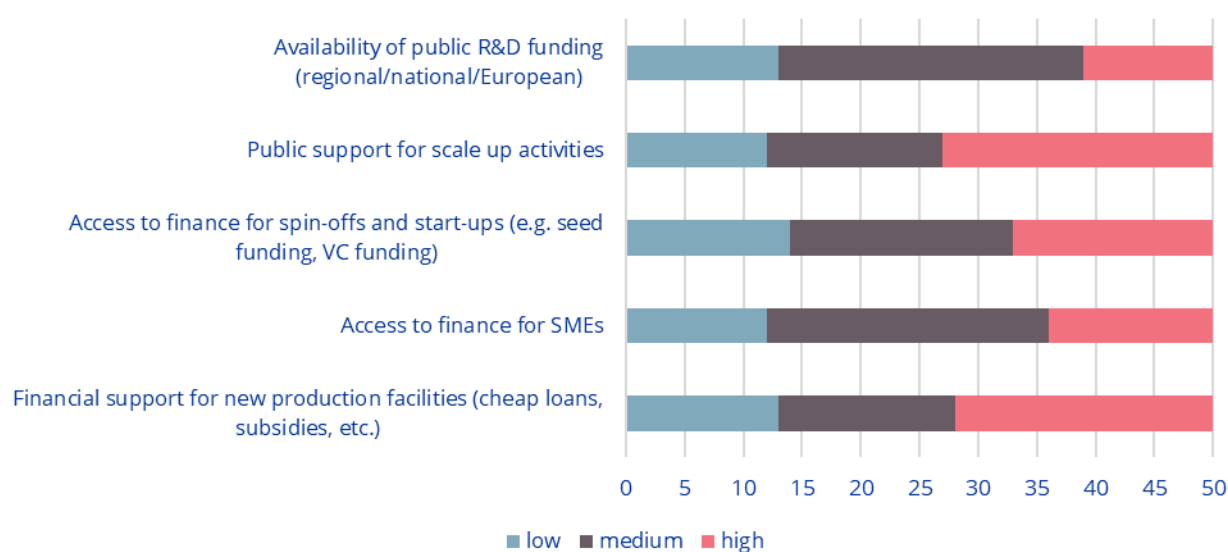


Figure 5: Suggested barriers in the category of investment barriers (divided into 2 subcategories) with the number of SMEs that scored the barriers as low, medium or high.

Some SMEs mentioned they found it difficult to explain their business to investors, and others highlighted the difficulty that investors want return on investment sooner than their sector can deliver, or that investors (which for some SMEs included large chemical companies) were risk averse. Several SMEs mentioned the fact that there have been some well-publicised failures that have affected investor confidence in the whole industry. It was also highlighted that often bioeconomy SMEs are developing a process for which the market is not obvious. However, there were reasons to be hopeful, with many SMEs reporting that they had found at least one very suitable investor who understood the sector, with its limitations and opportunities.

In the sub-category of barriers related to capital requirements, the biggest barriers were public support for scale-up activities and financial support for new production facilities. Although some funding is available to help companies use scale-up facilities (such as BioBase4SME), some SMEs found that existing pilot facilities did not have all the necessary equipment under one roof (or had restrictions on what could be done). In addition, some SMEs were seeking funding for demonstration facilities. In contrast, availability of research and development funding at regional national and EU level was not seen as being a large barrier, with most SMEs rating it below 3 (average score, 2.42). Access to finance for spin-offs and start-ups (e.g. through seed funding or venture capital firms) received very mixed responses, with many SMEs saying they did not use venture capital funds, with some SMEs saying they had no access

to VC or seed funding, and others saying they did not think they could deliver what the VC firms would need or feared losing control of their companies. Other SMEs reported that they found the correct investors and were happy with the situation. Access to finance for SMEs was rated as a medium barrier, and SMEs commented that – although many schemes were available – it was often difficult to get the necessary match funding. Other SMEs mentioned that there was often a high administrative burden for a small amount of money. One company mentioned that they recently stopped being an SME, and many types of funding were not accessible to them as a result.

Investment barriers were high for every country, although Belgium reported the lowest investment barriers. Investment barriers were also rated as lower by companies developing biotech tools. Although investment barriers are one of the highest barriers, the situation has improved since 2014, when investment was the top barrier. The mean score for investment barriers has decreased from 3.5 to 3.1.

Investment has long been recognised as a major barrier to bringing innovations to market by various policy instruments on a regional and European level. For example, the Europe 2020 strategy (2010)<sup>13</sup>, recognised that R&D spending in Europe was below that of the USA and Japan, “mainly as a result of lower levels of private investment”. The Innovation Union, one of its 7 flagship initiatives, aimed to “revolutionise the way public and private sectors work together, notably through Innovation Partnerships between the European institutions, national and regional authorities and business”. The Bio-Based Industries Joint Undertaking (BBI JU) is such a partnership. Founded in 2014 and financed by Horizon 2020 (the financial instrument implementing the Innovation Union), BBI JU’s Innovation Action funding supports demonstration and flagship projects. The 2018 European Bioeconomy Strategy<sup>14</sup> recognised the positive impact of the BBI JU and recommended more strengthening and scale-up of the biobased sectors and unlocking investments and markets. The first action of the Strategy is “to intensify the mobilisation of public and private stakeholders, in research, demonstration and deployment of bio-based solutions”.

### 3.4. Regulatory barriers

- Around one third of SMEs saw high barriers in regulatory policies
- Regulatory barriers were particularly important for SMEs from Belgium, Germany and Ireland
- Regulatory barriers were remained important from 2014 to 2018

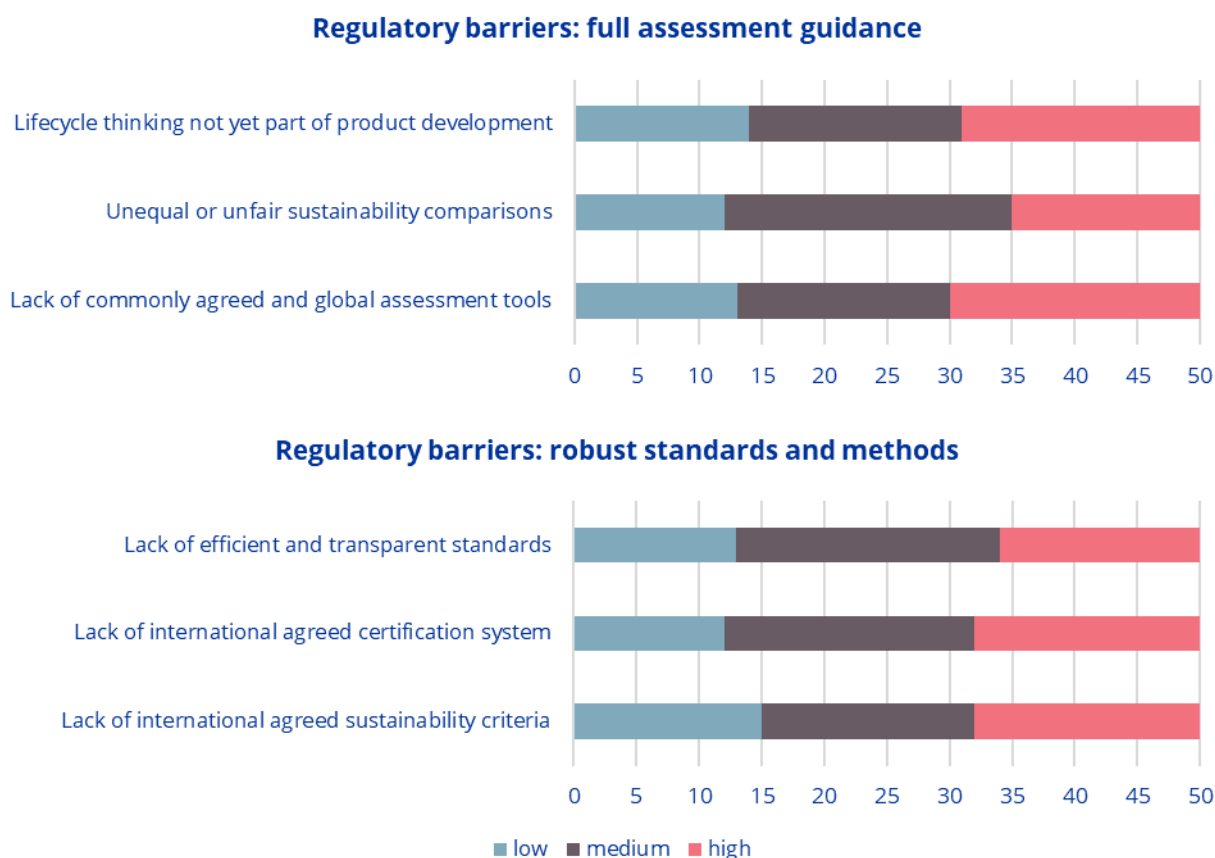
Regulators often struggle to match the pace of changes in technology and market appetites. Regulation, whether general or sector-specific regulation, can have a profound effect on innovation and it can happen that regulations block innovations.

Regulatory barriers were also seen as high barriers, with a mean barrier score of 3.1. Regulatory barriers were divided into two subcategories, assessment guidance and standards and methods, each with 3 barriers (Figure 6). Most barriers were rated as high by over a third of respondents, except “unequal or unfair sustainability comparisons” and “lack of efficient and transparent standards”, which were rated as high by just under a third of respondents. All 6 barriers were rated as medium by over a third of respondents.

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<sup>13</sup> European Commission (2010) *EUROPE 2020: A strategy for smart, sustainable and inclusive growth*. COM/2010/2020 final <https://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX%3A52010DC2020>

<sup>14</sup> European Commission (2018) *A sustainable Bioeconomy for Europe: Strengthening the connection between economy, society and the environment*. COM/2018/673 final, doi:10.2777/792130 [https://ec.europa.eu/research/bioeconomy/pdf/ec\\_bioeconomy\\_strategy\\_2018.pdf](https://ec.europa.eu/research/bioeconomy/pdf/ec_bioeconomy_strategy_2018.pdf)



*Figure 6: Suggested barriers in the category of regulatory barriers (divided into 2 subcategories) along with the number of SMEs that scored the barriers as low, medium or high.*

Some SMEs said that lifecycle assessments (LCAs) were too complicated, expectations were too high, or comparisons were unfair, while others said that they felt that some certificates were meaningless. However, many SMEs felt this question was less important. This is partly because they were not yet selling product or because details on sustainability were not very relevant for their product (e.g. plant and animal health products). One SME pointed out that there was no demand for LCA as they were selling business to business.

It is worth noting that regulations actually provided opportunities for some SMEs (e.g. environmental protection) as they had created a market for their environmentally friendly products. Others said they felt suitable sustainability assessment tools did exist.

Regulatory barriers were particularly important for Belgian and German companies, who rated them as the second highest barriers, and also for Ireland, who rated them as the third highest barrier. Materials and services companies rated regulatory barriers as particularly high, while companies developing bulk chemicals or food or cosmetic ingredients saw regulatory barriers as less important. Regulatory barriers remain unchanged since 2014.

The importance of regulation has long been recognised. The Advisory Group on Bio-based Products recommended the Commission develop and implement robust methodologies, criteria, standards and certification schemes for assessing sustainability impact of bio-based products, and the 2018 bioeconomy strategy included an Action (1.4) “for promotion and development of standards, which can serve to verify the products’ properties”.



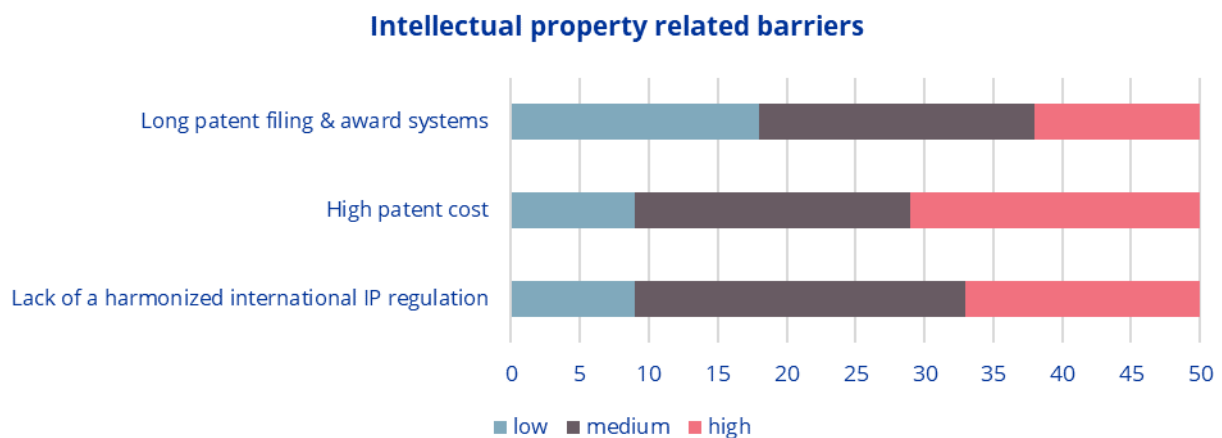
## 4. Medium and low barriers

### 4.1. Intellectual property related barriers

- Only cost of patenting was seen as a high barrier
- The perception of IP-related barriers has improved since 2014

Questions on intellectual property barriers referred to the long times needed for patent applications, the high cost of patenting and the lack of harmonised IP regulations (Figure 7). Over a third of respondents reported high patent costs and a lack of harmonised international IP regulation as a high barrier, and another third reported the same barriers as medium level. Only the long time needed to file a patent was not seen as a high barrier, with more than a third of respondents rating it as low and more than a third rating it as medium.

Some companies reported it was difficult to find IP lawyers who understood the subject matter. Several SMEs highlighted the costs, and one company reported that spending on IP was 10% of their company's costs, while another earlier-stage company reported that it was 25% of their costs. The challenge of knowing which countries to patent in, given the cost of patenting, was highlighted by several SMEs.



*Figure 7: Suggested barriers in the category of intellectual property barriers with the number of SMEs that scored the barriers as low, medium or high.*

Intellectual property barriers were seen as higher barriers for Belgian SMEs than for other regions. Companies developing food or cosmetic ingredients, plant or animal health products, or biotech tools found this barrier to be more important, while SMEs developing consumer goods or fuel/energy found IP barriers to be less important.

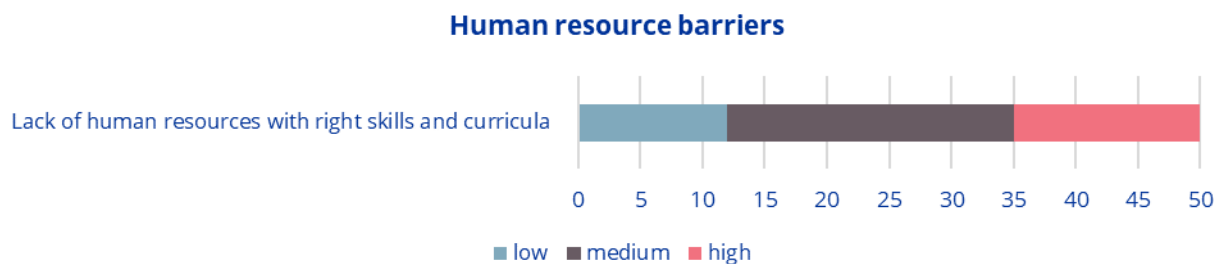
Intellectual property barriers decreased significantly between 2014 and 2018, moving from 2<sup>nd</sup> highest barrier to 5<sup>th</sup> highest (out of 9). The mean score for IP barriers also decreased from 3.4 in 2014 to 2.9 in 2018.

## 4.2. Human resource barriers

- Human resource barriers were particularly low for Belgium and particularly high for the UK

There was only one question on human resources (HR), about a perceived lack of qualified employees (Figure 8). Just under one third of SMEs reported that finding a skilled workforce was a large barrier, while over a third found it to be a medium barrier. Several SMEs mentioned the difficulty of paying a competitive salary to recruit and keep good employees. Some mentioned that it was hard to find managers with the right technical skills, while others said that it was also hard to find appropriate low-skilled workers.

Answers differed across regions, with Belgian SMEs giving this barrier the lowest mean score out of all countries. For Belgium and Germany, HR was the second lowest barrier, and for Ireland HR was the lowest barrier. In contrast, the Netherlands reported HR as quite important, and the UK reported it to be their largest barrier, with 4 out of 10 UK SMEs either mentioning Brexit or highlighting the need for EU migration to secure the necessary skills. However, UK SMEs also found HR challenging in 2014 (mean barrier score of 3.6 in 2014 versus 3.4 in 2018). In contrast, the Dutch SMEs found HR to be a much higher barrier in 2018 (mean barrier score of 1.6 in 2014 versus 3.0 in 2018). Companies developing bulk chemicals and companies developing food or cosmetic ingredients found this barrier particularly important.



*Figure 8: Suggested barriers in the category of human resource barriers with the number of SMEs that scored the barriers as low, medium or high.*

Human resource barriers increased slightly in importance from 2014, when they ranked as the lowest barrier, to 2018, when they ranked as 6<sup>th</sup> most important barrier (out of 9). This is surprising because there have been many efforts across the region to improve university education in the bioeconomy. The mean score remained unchanged.

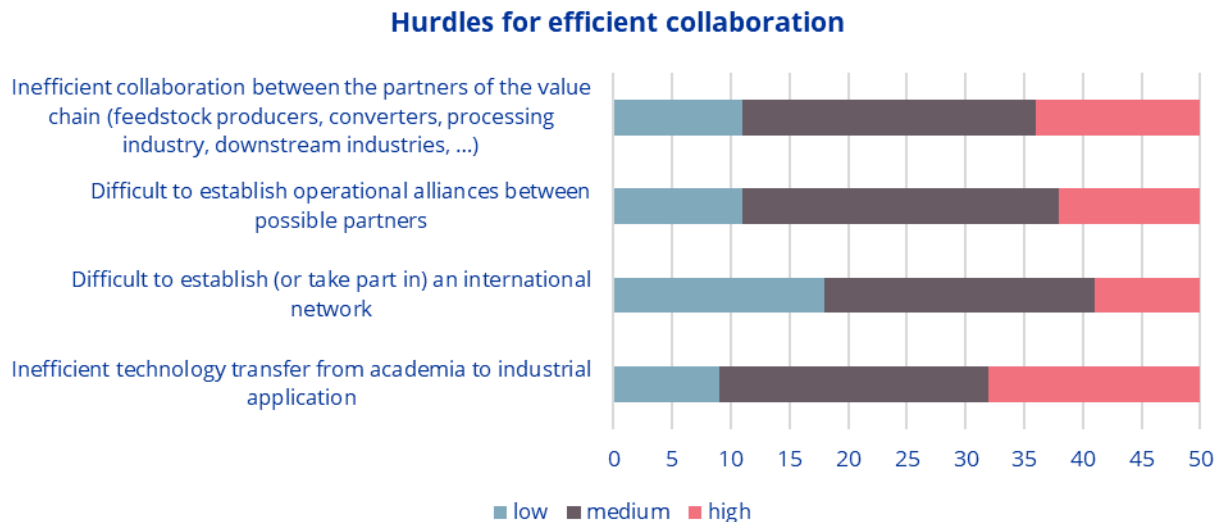
## 4.3. Hurdles for efficient collaboration

- Only poor technology transfer from academia to industrial application was a large barrier

There were 4 questions on hurdles for efficient collaboration (Figure 9). Only inefficient technology transfer from academia to industrial application was seen as a large barrier by more than a third of respondents. Value chain collaboration and operational alliances were rated as medium barriers, and international networks were seen as not applicable or a low barrier by more than a third of SMEs.

On the topic of technology transfer from academia to industry, many SMEs commented that academics or university technology transfer offices demanded too much from SMEs in terms of IP and money. Belgian (Walloon) SMEs, in

particular, cited technology transfer offices as being difficult to deal with. One SME mentioned trade secrets (rather than patents) as essential to their business, which prevented work with academia. One SME identified the problem very succinctly as a “mismatch between how academics are evaluated and how they are encouraged to work with industry”. Another SME highlighted that it was difficult to know, as a start-up, what collaborations usually looked like and said that some sort of industry standard contract for collaboration between academics and start-ups would be helpful.



*Figure 9: Suggested barriers in the category of collaboration barriers with the number of SMEs that scored the barriers as low, medium or high.*

On the topic of collaboration in value chains and operations, several SMEs commented that this was indeed very challenging, but nonetheless rated it as a medium level barrier, partly because they felt they had succeeded. One SME said there was often a snowball effect if one partner agreed. However, SMEs still had many comments on the challenges of collaboration. One SME said that none of the stakeholders spoke the same language, which made it challenging. Another SME warned of not involving too many stakeholders, while another said that failed bioeconomy projects affected partner confidence. One SME specifically named the waste industry as not being interested in innovators developing new technologies, so they found it very difficult to obtain representative feedstock during process development. Another SME said that more co-operation along the value chain would help speed up development.

Belgian, Dutch and French SMEs rated collaboration as one of their lowest barriers. Companies developing bulk chemicals or services felt efficient collaboration was a larger barrier.

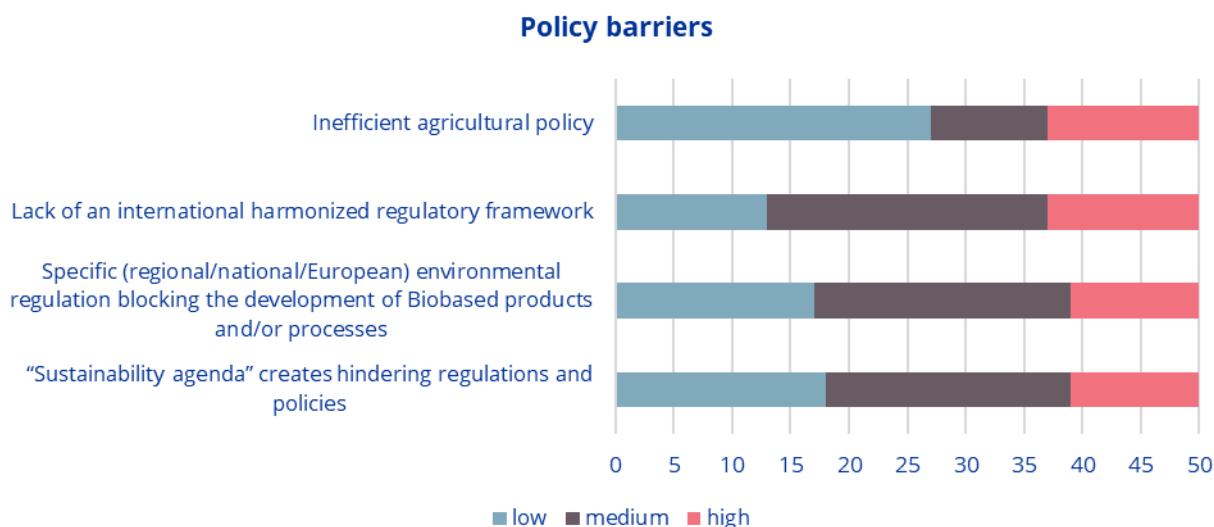
Hurdles for efficient collaboration decreased between 2014, when they were the 5<sup>th</sup> most important barrier, to 2018, when they were the second lowest barrier. The mean barrier score decreased from 3.0 to 2.7.

#### 4.4. Policy barriers

- Many bioeconomy SMEs felt agricultural policy in particular was not directly relevant
- SMEs working in fuel or energy found policy more important

There were 4 suggested barriers related specifically to policy, including inefficient agricultural policy, lack of an international harmonized regulatory framework, specific (regional/national/European) environmental regulation blocking the development of the biobased sector, and that the “sustainability agenda” creates hindering regulations and policies (Figure 10). Inefficient agricultural policy was not applicable or a low barrier to more than half of surveyed SMEs, while the other three barriers were rated medium by over a third of SMEs.

Agricultural SMEs were not included in the survey, so this barrier was largely not applicable. Nonetheless, one SME criticised that current agricultural policy favoured the status quo rather than emerging industries, and another SME gave a specific example about false expectations for agriculture and the bioeconomy: farmers expected to be able to get the same price for certain crops with the biobased industry as they did previously under subsidy schemes.



*Figure 10: Suggested barriers in the category of policy barriers with the number of SMEs that scored the barriers as low, medium or high.*

While many SMEs also rated the other policy barriers as not applicable, over a third of SMEs rated them as medium-level barriers. One SME said that “internationally” harmonised regulatory frameworks were not the only issue, because even in Belgium the regions have different standards for compostable plastic bags. Another SME highlighted their problem that PLA<sup>15</sup> was not allowed in Flemish composting facilities. France goes a step further and taxes the compostable plastic PLA because it is not yet ‘recycled’. Another SME felt that existing regulations favoured the use of biomass for energy rather than materials or chemicals, and another felt that regulations changed frequently and that this led to uncertainty in the industry.

No countries perceived policy barriers as particularly high, although French and British SMEs perceived them as particularly low barriers. Companies developing fuel or energy found policies to be particularly important barriers, while SMEs developing consumer goods, bulk chemicals or materials rated them as low barriers. Policy barriers remain unchanged since 2014.

<sup>15</sup> PLA: Poly(lactic acid), a biobased plastic with good biodegradability properties. Many PLA-based products have been certified as suitable for industrial composting.

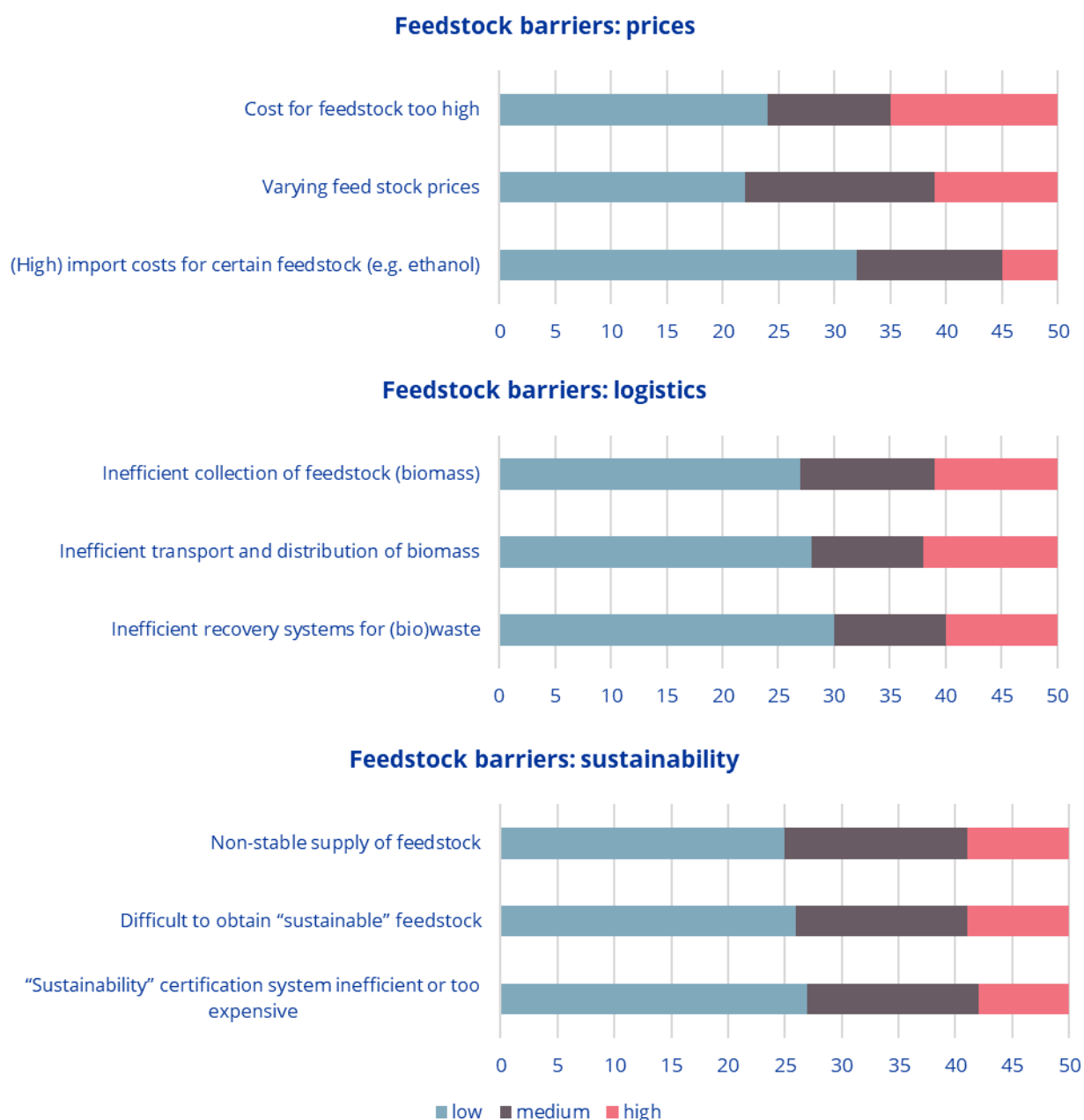
## 4.5. Feedstock-related barriers

- Feedstock barriers were not applicable to many SMEs interviewed

There were 9 suggested barriers related to feedstocks, with three barriers in each of the subcategories of prices, logistics and sustainability. All feedstock barriers were low; 7 of the 9 were rated as low or not applicable by at least half of SMEs, and the remaining two barriers, related to costs, were rated as low or not applicable by over a third of respondents (Figure 11). Of all feedstock-related barriers, high costs were the most important and high import costs were the least important or relevant.

Feedstock-related barriers were not applicable to many SMEs because many of them were developing a process, not a product, or were making a low-volume product. This is not to say that feedstock issues are not a problem in the industry, but rather either that SMEs interviewed were not producing at large scale, or that SMEs had only founded their business because they knew the feedstock they were looking at was affordable and available. Some SMEs also said they partnered with feedstock suppliers to circumvent supply issues. For example, in France, agricultural co-operatives have been investing in bioeconomy SMEs to ensure new markets for their products, which also benefits the feedstock supply to the SMEs.

No country found feedstock barriers to be particularly high overall, although Dutch SMEs rated feedstock logistics as higher barriers and French SMEs rated feedstock costs as higher barriers. Companies developing fuel or energy and companies developing consumer goods found feedstock prices to be a larger barrier than other SMEs. Companies making consumer goods also found sustainability to be a larger issue than other SMEs. While feedstock barriers were low in 2014, rated 8<sup>th</sup> out of 9 and with a mean score of 2.8, they were even lower in 2018 with a mean score of 2.3 and a ranking of 9 out of 9. The barrier reduction was visible across all 3 subcategories of prices, logistics and sustainability.



*Figure 11: Suggested barriers in the category of feedstock barriers (divided into 3 subcategories) with the number of SMEs that scored the barriers as low, medium or high.*

## 5. Development of the bioeconomy since 2014

As the survey was identical to one carried out in 2014, progress over the years can be seen. Overall, the results of the survey were very similar in 2014 and 2018. The overall mean barrier score went from 3.08 in 2014 to 2.91 in 2018. In addition, the number of barriers scoring 3 or higher has dropped from 28 to 21. This could be interpreted as a small improvement in the bioeconomy.

Table 3 shows that, overall, there are no large changes in the barrier categories. On a country-by-country level, human resources have become a much more important barrier in the Netherlands and have become much less

important in Belgium. Barrier ratings varied between countries, with Irish SMEs reporting the highest overall barrier score in both 2014 and 2018, and UK SMEs reporting the lowest barriers in 2018 and 2014.

*Table 3: Change in average (mean) barrier score from 2014 to 2018, where a negative number (barrier decrease) suggests the situation has improved and a positive number (barrier increase) suggests the situation has deteriorated.*

	<b>All</b>	IE	NL	FR <sup>16</sup>	DE	UK	BE
All barriers	<b>-0.2</b>	<b>-0.4</b>	<b>-0.3</b>	/	<b>-0.1</b>	<b>-0.2</b>	<b>-0.2</b>
Demand-side policy barriers	<b>0.3</b>	-0.2	-0.8	/	1.0	0.4	0.5
Stakeholder perception barriers	<b>0.2</b>	-0.5	-0.1	/	0.7	0.6	0.0
Investment barriers	<b>-0.4</b>	-0.6	-0.4	/	-0.7	0.2	-0.7
Regulatory barriers	<b>0.0</b>	0.0	-0.4	/	0.6	-0.5	0.0
Intellectual property related hurdles	<b>-0.5</b>	-0.7	-0.4	/	-0.8	0.0	-0.9
Human resource barriers	<b>0.1</b>	0.3	1.4	/	-0.1	-0.2	-1.1
Policy barriers	<b>-0.1</b>	-0.4	0.4	/	0.6	-0.7	-0.7
Hurdles for efficient collaboration	<b>-0.4</b>	-0.6	-0.8	/	-0.1	-0.1	-0.8
Feedstock related barriers	<b>0.0</b>	-0.3	-0.5	/	-1.3	-0.7	0.8

Looking at individual barriers rather than barrier categories, some demand-side policy barriers (in particular, lack of green public procurement and lack of stakeholder knowledge of biobased products) and public perception barriers (in particular, lack of labelling) were rated as significantly worse in 2018. Areas with the largest improvements were in investment barriers (in particular, funding for R&D and funding for new production facilities), feedstocks (in particular, import costs and biowaste recovery) and IP barriers (in particular, long time for patenting).

The SMEs were invited to comment on the changes in the bioeconomy over the last years. The main negative change mentioned by SMEs was that they felt their administrative burden had become higher. Several UK SMEs also said that Brexit was the biggest negative change in recent years, and that it had affected funding and recruitment. Despite the fact that demand, stakeholder perception and investment were the top barriers faced by SMEs in 2018, there were many comments indicating that all 3 categories had improved. Stakeholder perception was mentioned the most, although SMEs specified that it was perception among the general public in particular (e.g. awareness of plastics waste and climate change) that had improved. Many SMEs also said that public investment, both in R&D and in demonstration projects (e.g. Ireland) had improved.

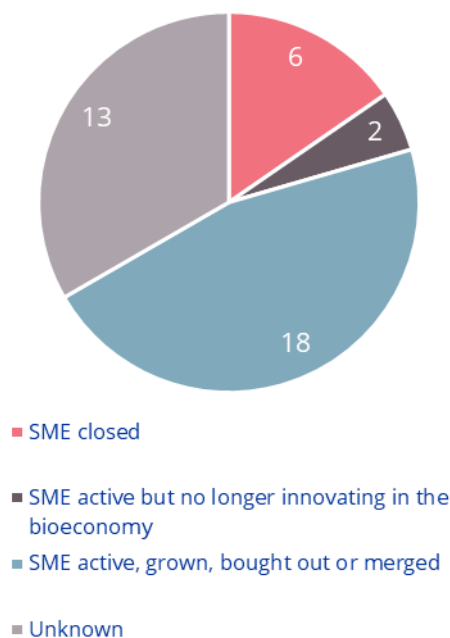
<sup>16</sup> No French SMEs were interviewed in the 2014 survey.

## 5.1. Development of SMEs interviewed in 2014

Further to the 2018 survey, we followed up on the 39 SMEs who were interviewed in 2014, where possible (Figure 12). For 13 of the 39 SMEs, it was not possible to follow up because the SMEs had requested that – for reasons of anonymity – their names not be recorded within the project. As a result, only 26 SMEs were further investigated.

Only 6 SMEs were confirmed to have closed down. One of these SMEs in particular had won awards and featured heavily in the news. This SME had rated the barriers as very low in the 2014 survey. Nonetheless, it entered into insolvency owing to lack of demand for the product and technical issues in scale-up to demonstration scale, both of which were overlooked by investors. This ties together with the results of the 2018 survey that market demand and investment (particularly suitable investors) are key barriers.

A further 2 SMEs interviewed in 2014 did not have their key activities in the bioeconomy but were partially involved with some innovative bioeconomy processes. These two companies have now moved away from the bioeconomy.



*or continued to operate in the bioeconomy (either remaining active, growing, being bought out, or merging with another company), and the number of SMEs interviewed in 2014 with an unknown identity and fate.*

One further SME (early-stage start-up) closed down but the same team immediately opened a business carrying out the same work under a different name and has therefore not been considered a closure (counted in the remaining 18 SMEs).

Nine of the remaining 18 SMEs worked on both services for clients and innovations for their own benefits. Four of these SMEs have grown by carrying out contract research and consultancy in their specialist fields, and 2 of these 4 are still trying to develop their own technologies in parallel. The remaining 5 SMEs have not grown significantly but continue to exist, largely through services and participation in projects.

*Figure 12: Number of SMEs interviewed in 2014 that since closed, stopped operating in the bioeconomy,*

Six SMEs interviewed in 2014 have merged or been bought. Two of the SMEs interviewed in 2014 from the same region have merged, and two interviewed SMEs from different countries in NW Europe have also merged. One SME was bought by a larger company within the NW Europe region, while another SME was bought by a large multinational with headquarters outside Europe.

In addition to the companies growing through services and the companies merging or being bought, there have been several notable success stories of SMEs starting production.

One SME interviewed in 2014 has grown and received new investment so that it is no longer an SME (although it was interviewed again in 2018). It has set up a production facility outside of Europe while continuing to carry out R&D within NW Europe. This SME had rated many barriers as high in 2014, and reported lower barriers in the 2018



survey, particularly in the categories of feedstocks, stakeholder perception, demand and regulations. Only R&D funding was significantly worse, because – as the company no longer qualifies as an SME – it is not eligible for many funding schemes.

Another 2 SMEs have a range of products on the market through contract manufacturers, while continuing to carry out R&D. Both SMEs were interviewed again in 2018. One reported many barriers as the same or higher than in 2014, in particular stakeholder perception, demand and regulations or standards as higher barriers, and only SME finance as a lower barrier in 2018. The other SME rated barriers as the same overall, with stakeholder perception barriers being lower and investment barriers being higher in 2018.

## 6. Discussion and policy context

### 6.1. Survey in 2018

It should be noted that only 50 SMEs were interviewed in total. This report therefore provides only a snapshot of the situation of SMEs in NW Europe. Nonetheless, the barrier categories of demand, investment, perception and regulation clearly come out as important.

These major barriers are recognised by various policy instruments on a regional and European level. For example, the updated European Bioeconomy Strategy, adopted by the European Commission in October 2018, proposes three main action areas, the first of which “aims to strengthen and *scale-up* the biobased sectors and unlock *investments* and *markets*” and relates strongly to the top bioeconomy SME barriers. The 2018 bioeconomy strategy does not include hard measures to stimulate demand for biobased products (in contrast to the USDA BioPreferred scheme), although this was a major criticism of the previous 2012 European Bioeconomy Strategy (by the Commission Expert Group on Bio-based Products in their 2017 report). Nonetheless, the 2018 Bioeconomy Strategy does aim to facilitate access to both private and public *investment*, identify *regulatory barriers* to biobased development, and promote *biobased standards*.

### 6.2. Changes since 2014

As seen in section 5, SME perceptions of some barriers have changed since 2014. Only 38 SMEs responded to the survey in 2014, and only some of them were interviewed again in 2018, so the report only provides limited insight into the improvements for SMEs in recent years. Nonetheless, several barrier categories have shown barrier reductions, including IP, investment and collaboration.

National and European strategies may have influenced some of these changes. Reducing barriers for SMEs and innovation in SMEs has been a European priority for many years, for example through the Competitiveness of Enterprises and SMEs programme (COSME) of 2014, as well as its predecessor the Competitiveness and Innovation Framework Programme (CIP) and its operational programme Entrepreneurship and Innovation Programme (EIP) of 2007. While the early CIP/EIP programmes focussed on *access to finance*, *encouraging investment in innovation* and enabling SME *cooperation*, the later COSME added a focus on supporting internationalisation and *access to markets*. These programmes also founded the Enterprise Europe Network (EEN), where regional teams provide advice on issues such as finance and research funding and *intellectual property rights*.

Other policies focussed less on SMEs and more on innovation in general, such as the Innovation Union (one of the flagship initiatives of the Europe 2020 strategy announced in 2010). Among other things, this aimed to remove obstacles to innovation like *expensive patenting*, *market fragmentation*, *slow standard-setting* and *skills shortages*.

Investment had been particularly limited in 2014 owing to the economic recession that followed the 2007–2008 financial crash. Europe has been gradually recovering and it is therefore perhaps not surprising that investment was perceived as a slightly lower barrier category in 2018 compared with 2014. Improving investment was also the top priority of the Investment Plan for Europe (Juncker Plan, announced in 2014).

### 6.3. Regional highlights

Fewer than 10 SMEs responded per country, so differences between countries and sectors can only be seen as indicative. Many responses were similar between countries, but some of the country-specific results are unexpected, particularly for Ireland and the UK, who rated the barriers as highest and lowest, respectively.

Ireland reported the highest barriers both in 2014 and in 2018. Of all the countries in the NWE region, Ireland had the largest cuts in government spending after the economic crisis, which affected all industries, including the bioeconomy. This was one of the reasons why Ireland was considered a bioeconomy follower region in the BioBase4SME project. Other reasons include the composition of the Irish bioeconomy, which is focussed more heavily on the food industry (rather than speciality chemicals and other higher-value industries), as well as the lack of bioeconomy pilot plants in Ireland. Nonetheless, Ireland ranks highly on the Innovation Scoreboard<sup>17</sup>. Over half of people aged 25-34 have completed tertiary education in Ireland, which was the highest in the NWE countries investigated and helps explain why HR is a low barrier there.

The UK is an outlier in that human resources were rated as the top barrier in 2014 and 2018. This could be attributable to the lack of a large biobased industry in the UK. For example, there are few companies in the UK carrying out industrial biotechnology<sup>18</sup>. In contrast, the pharmaceutical industry is large and is likely to capture a large share of the biosciences talent leaving education. Therefore, employees with relevant experience in (non-pharmaceutical) industrial biotechnology are difficult to find. In addition, it is difficult for small bioeconomy companies to compete with large pharmaceutical companies in terms of salary. A further issue could be the education system, as technical universities and apprenticeships are less common than other countries.

Belgium reported some of the lowest barriers (compared to other countries) for collaboration, human resources and investment, suggesting that many bioeconomy and innovation-specific policies are having positive effects in Belgium. However, demand and regulations remained hugely challenging. One example that was repeated by several Belgian SMEs was the difference in organic waste collection rules between different regions, with Flanders in particular not permitting the collection of compostable plastics.

### 6.4. Experience with BioBase4SME service coupons

This SME survey was a small part of the BioBase4SME project, as the main part of the project was to provide 'innovation services' to SMEs in the bioeconomy. The services were delivered by the project partners and awarded to suitable SMEs in the form of 'coupons', where 50% of the cost of the service was paid by the SME and the remaining 50% was paid by the project.

The most popular service coupon was application testing, co-ordinated by REWIN, which aimed to reduce some of the technical risks associated with bringing a product to market. It should be noted that was the one service that did not require SMEs to contribute 50%. Another popular service was bioprocess scale up, carried out by Bio Base Europe Pilot Plant. Both of these services aimed to remove some of the technical risk associated with the large investment needed for SMEs to reach commercial scale production. This reflects the survey result, with demand

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<sup>17</sup> European Commission (2018) *European Innovation Scoreboard 2018: Europe must deepen its innovation edge*. Available at [https://ec.europa.eu/growth/content/european-innovation-scoreboard-2018-europe-must-deepen-its-innovation-edge\\_en](https://ec.europa.eu/growth/content/european-innovation-scoreboard-2018-europe-must-deepen-its-innovation-edge_en)

<sup>18</sup> Johnson M et al. (2015) *Demand Assessment and Feasibility Study into the Establishment of Advanced Training Partnerships in Industrial Biotechnology*. Report for Cogent Skills on behalf of the Science Industry Partnership. Available at [https://www.scienceindustrypartnership.com/media/1055/pn03214r\\_atp\\_demand\\_assessment\\_v17.pdf](https://www.scienceindustrypartnership.com/media/1055/pn03214r_atp_demand_assessment_v17.pdf)

and investment being ranked as high barriers. A third technical service on anaerobic digestion and pyrolysis, carried out by tcb Resource, also proved popular once some investment in equipment was completed.

A further service coupon offered support with market research and identifying relevant regulations, carried out by NNFC. Here, market research was more popular than work into regulations, which reflects the perception of regulatory barriers as less important than demand-side barriers.

Two of the service coupons offered in the BioBase4SME project were less popular and were only used by a couple of SMEs. These were coupons for eco-design services (including LCA), carried out by Materia Nova, and social acceptance training, carried out by AC3A. It was surprising that so few SMEs use these services, particularly social acceptance training, because stakeholder perception was seen as one of the top barriers. This suggests that SMEs did not feel that they had any control over stakeholder perception (although the BioBase4SME social acceptance training<sup>19</sup> demonstrated clearly that SMEs can have a great influence on their stakeholders).

Another part of the BioBase4SME project involved training, workshops and bootcamps. The ‘innovation biocamps’, in particular, were well attended and highly praised. These one-week intensive entrepreneurship courses, organised by BioVale for innovative bioeconomy startups, took place in the UK and the Netherlands. This was particularly important as they were also the two countries where SMEs rated lack of qualified staff as especially large barriers.

## 7. Conclusions

The survey carried out in 2018 as part of the BioBase4SME project shows that, although SMEs in the bioeconomy in North-West Europe felt that barriers to business in the bioeconomy decreased over the last 4 years and companies were optimistic about the industry, several barriers remain and some barriers have become more important.

A lack of demand-side policy for biobased products and services is a growing concern and is now seen as the largest barrier (up from 6<sup>th</sup> barrier out of 9 in 2014). Barriers related to stakeholder or public perception have also grown in importance and this barrier category was ranked as the second highest barrier in 2018 (up from 4<sup>th</sup> highest barrier in 2014). Although SMEs’ perception of access to investment has improved, investment remains a large barrier for bioeconomy SMEs, ranked 3<sup>rd</sup> in 2018. Investment for scaling up and bringing a product to market is a larger concern than investment for research and development.

The barriers identified in this report are reflected in the 2018 EU Bioeconomy Strategy, adopted by the European Commission in October 2018. Although the new strategy does not include hard measures to stimulate demand for biobased products (like the USDA BioPreferred scheme), it does aim to scale up Europe’s biobased markets by facilitating access to investment, both from the private and public sector, as well as by identifying regulatory barriers to biobased development, and promoting biobased standards.

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<sup>19</sup> Handbook from the social acceptance training in BioBase4SME is available at [http://www.nweurope.eu/media/3974/social-acceptance-guide-pdf-version\\_22032018.pdf](http://www.nweurope.eu/media/3974/social-acceptance-guide-pdf-version_22032018.pdf)

The BioBase4SME partners are:



BioBase4SME is 60% funded by the INTERREG NWE Programme. The Interreg North-West Europe Programme fosters transnational cooperation to make the North Western Europe a key economic player and an attractive place to work and live, with high levels of innovation, sustainability and cohesion. <http://www.nweurope.eu/>

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## Appendix - the survey

	Type of company (producer, technology developer, etc)	mean answer	NA to 1.9	2-3.9	4+
<b>Investment barriers</b>					
<i>Capital requirements</i>	availability of public R&D funding (regional/national/European)	2.42	13	26	11
	public support for scale up activities	3.18	12	15	23
	access to finance for spin-offs and start-ups (e.g. seed funding, VC funding)	2.91	15	19	16
	access to finance for SMEs	3.02	12	24	14
	financial support for new production facilities (cheap loans, subsidies, etc.)	3.46	13	15	22
<i>Industrial biotechnology and biobased sectors perceived as sector with high investment risk:</i>	lack of investor confidence in industrial biotechnology	3.18	10	20	20
	lack of visible tangible products & blockbuster products	3.30	10	13	27
	time “return to investment” too long for venture capitalists	3.44	12	10	28
<b>Feedstock related barriers</b>					
<i>Logistics: securing large quantities of biomass:</i>	inefficient collection of feedstock (biomass)	2.29	27	12	11
	inefficient transport and distribution of biomass	2.32	28	10	12
	inefficient recovery systems for (bio)waste	2.20	30	10	10
<i>Feedstock at affordable prices:</i>	cost for feedstock too high	2.61	24	11	15
	varying feed stock prices	2.41	22	17	11
	(high) import costs for certain feedstock (e.g. ethanol)	1.95	32	13	5
<i>Sustainability of feed stock supplies:</i>	non-stable supply of feedstock	2.23	25	16	9
	difficult to obtain “sustainable” feedstock	2.18	26	15	9
	“sustainability” certification system inefficient or too expensive	2.23	27	15	8
<b>Public perception barriers</b>					
<i>Poor public perception</i>	Biobased products not visible enough: stakeholder knowledge in respect of bio refining activities is virtually non-existent	3.43	8	14	28
	lack of labeling (environmental performance, origin, etc.)	3.07	11	20	19

	benefits of biobased products not well-enough communicated	3.44	4	20	26
	fundamental lack of understanding of industrial biotechnology	3.11	10	18	22
	negative messages in the media create fear for the unknown (e.g indirect land use, genetic modification, food versus fuel, ...)	3.04	10	18	22
<b>Human resource barriers</b>					
<i>Skilled workforce</i>	lack of human resources with right skills and curricula	2.73	12	23	15
<b>Hurdles for efficient collaboration</b>					
<i>Suitable network and cooperation strategy</i>	inefficient collaboration between the partners of the value chain (feedstock producers, converters, processing industry, downstream industries, ...)	2.84	11	25	14
	difficult to establish operational alliances between possible partners	2.60	11	27	12
	difficult to establish (or take part in) an international network	2.30	18	23	9
<i>Knowledge exchange</i>	inefficient technology transfer from academia to industrial application	2.90	9	23	18
<b>Intellectual property related hurdles</b>					
<i>Patent filing, cost and regulation</i>	long patent filing & award systems	2.51	18	20	12
	high patent cost	3.10	9	20	21
	lack of a harmonized international IP regulation	3.03	9	24	17
<b>Demand-side policy barriers</b>					
<i>Demand-side policies</i>	Commercial frameworks are not yet developed to promote bio based products (incentives, taxation, market supports, product standards and specifications, etc)	3.62	6	17	27
<i>Public procurement policy</i>	lack of an efficient “green public procurement” legislation at regional/national level	3.13	10	18	22
	Public procurement regulation does not take into account Biobased products	3.08	9	21	20
<b>Regulatory barriers</b>					
<i>Full assessment guidance</i>	life cycle thinking not yet part of product development	3.16	14	17	19
	Unequal or unfair sustainability comparisons	3.01	12	23	15
	Lack of commonly agreed and global assessment tools	3.19	13	17	20
<i>Robust standards and methods</i>	Lack of efficient and transparent standards	2.89	13	21	16

	lack of international agreed certification system	3.02	12	20	18
	Lack of international agreed sustainability criteria	3.07	15	17	18
<b><i>Policy barriers</i></b>					
<i>National and European policies and regulations</i>	inefficient agricultural policy	2.68	27	10	13
	lack of an international harmonized regulatory framework	2.91	13	24	13
	specific (regional/national/European) environmental regulation blocking the development of Biobased products and/or processes	2.63	17	22	11
	“sustainability agenda” creates hindering regulations and policies	2.61	18	21	11