Standards and Regulations for the Bio-based Industry STAR4BBI

Work Package 4

D4.3

Report on implementation for creation of new or revised standards

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1 Background and Objective

Standards are documented agreements containing technical specifications or other precise criteria to be used consistently as rules, guidelines or definitions, to ensure that materials, products, processes and services are fit for their purpose. Standards provide people and organizations with a basis for mutual understanding, and are used as tools to facilitate communication, measurement, commerce and manufacturing. Standards are developed for safety and reliability reasons, where users perceive standardized products and services as more dependable – this in turn raises user's confidence, increases sales and the take-up of new technologies. Standards are developed as a collaborative process that includes manufacturers, users, consultants, governments and other interested parties. Standardization bodies seek to have all parties concerned at the table during the development of standards. When stakeholders are not represented during the development of the standard, the outcome may be less than optimal for stakeholders that use the standards. The development of standards takes up to several years. During this time, it is also possible that processes have evolved which makes the standard already outdated once it is published. To tackle this issue a systematic review of standards is therefore in place. For European standards, CENCENELEC initiates a review at the latest five years after the publication date. Upon decision of the responsible technical committee a review can start earlier.

For the bio-based industry the European Commission identified that standards are needed to promote the uptake of its products by consumers, facilitate the functioning of the Single Market, and enable public authorities to implement 'green procurement' policies[1]. Mandated by the European Commission, the CEN/TC 411 'Bio-based products' developed standards that cover horizontal aspects of bio-based products. These standards play a crucial role in supporting the growth of the bio-based products market. They can help to increase market transparency by providing common reference methods and requirements that enable the verification of claims and certification regarding the bio-based content, bio-degradability or environmental sustainability of different products. Certification is a procedure by which a third party gives written assurance that a product, process or service is in conformity with certain standards. Over the last years many certificates have been developed by NGOs, authorities or certification bodies to help consumers, manufacturers, distributers and traders choose the right products for their purpose and to provide for conformance testing. Among others, certificates help to demonstrate the sustainability of biomass, the bio-based content of a product or the end-of-life options. As a result, many certification schemes are available in the market. Implementing standards and achieving standards accreditation comes at certain costs. These costs tend to be fixed irrespective of scale, and thus adversely affect starters or small producers.

The objective of this report is to identify standards or other initiatives that hamper the growth of bio-based producers in the market. The goal is to remove these identified and shortlisted barriers preferably before the end of the project.

2 General Approach

During the desk research as well as the interviews with the value chains for the development of other deliverables of the project (D2.1, D3.1, D4.1 and D4.2), several issues related to standards and certificates in the bio-based economy were identified. The identified issues are further

[1] Innovating for Sustainable Growth: A Bioeconomy for Europe (COM(2012) 60), European Commission 2012

described in this report. Initially, the intention was to present a long list of issues in this report. However, it was concluded during the work that the report would have more value when somewhat further research into the identified issues together with the outcome of the workshop would be added to the report. This additional information was needed to prepare the short list of issues that will be dealt with in the remaining of the project.

The long list of standards that are part of this report was evaluated by stakeholders during a workshop taking place in October, 2018. NEN and nova organised this workshop to get support for the selection of identified issues. Participants came from industry, associations, certification bodies, test houses and the European Commission. During the workshop the needs, expectations and hurdles within the bio-based economy were discussed with the participants. In the end a short list of identified issues was established. To deal with the identified issues, the responsible CEN, ISO or ASTM committees will be identified and contacted. In the case that the project partners do not have direct influence on the responsible CEN or ISO committees, “industry champions” will be identified to propose the amendments to the standards to the technical committees. The intention is to propose solutions for the issues related to identified standards and certificates in the remaining time of the project.

3 Longlist of issues

Resulting from desk research and interviews with the value chains, the following long-list of issues has been identified:

- Non-functional specifications
- Biodegradability
- Compostability
- Multiple certificates in the market
- Double testing

3.1 Non-functional specifications

For many years product standards have been developed that specify requirements to be fulfilled by a product or a group of products, to determine its fitness for purpose. Most of these standards have been developed when fossil-based products were still the “mainstream” products. These standards are developed to evaluate the characteristics of materials to demonstrate this fitness whereas it would be more appropriate to evaluate the functionality of materials or products against the requirements of the application. For bio-based products to demonstrate their fitness for purpose they must comply with tests based upon these standards. Two specific examples related to this issue are described below.

3.1.1 Climate test

During transport, vibrations, shocks, knocks, pressure loads, changes in temperature or changes in air humidity can have a great influence on products and/or packaging. Customers of packaging products producers (usually) require successfully passing a climate test to secure that the shipment can deal with these possible issues. Climate testing involves exposing a package or a product to different controlled levels of temperature and humidity inside a calibrated test chamber. This simulates a range of climatic changes that may occur during distribution. The test can expose flaws in packaging such as seals and glue joints becoming impaired and packaging getting damaged, impairing its ability to protect the product. The conditions for these climate

tests are however not based upon actual transportation situations and the high relative humidity (RH), hence part of the tests are not representative for real life situations.

According to an interviewee, the atmospheric test is too strict as the conditions in real life are never as extreme as in the climate tests. The tests are historically based upon plastic being resistant to 100% RH, so only faults in the package (design) would then lead to water leakage and thus test failures. Due to their hydrophilic nature, bio-based materials respond differently to changes in the RH (and to a lesser extent temperature). For this reason, bio-based materials (can) fail the climate test, whereas the test actually is set to determine failures in the product and not in the materials used. At the time the standards were developed, alternative materials entering the market were not considered.

Climate tests are accredited to standards for environmental testing. Standards that are the basis for the climate tests are usually from ASTM, ISTA conditioning, IEC standards and ISO. It is usually up to the final customer to decide which test should be taken. In most cases to establish the atmospheric (pre)conditioning the ASTM D4332-1 '*Standard Practice for Conditioning Containers, Packages, or Packaging Components for Testing*' is used.

3.1.2 Certificates in the building sector

The building sector is a traditional sector when looking at materials. As bio-based materials do not have a track record as long as traditional fossil-based products, bio-based product developers are required to prove that these materials are functionally equivalent to traditional materials. Certifying bodies that evaluate these materials use reference standards or (standard) test methods that are developed to evaluate the quality of fossil-based products.

Certification of bio-based materials in the building industry is important as the provision of objective information on the performance (and guarantee of performance) of available bio-based technologies by product certifications can boost customers' acceptance and accelerate deployment. Harmonised and standardised national/international testing and evaluation procedures for specific bio-based products and technologies increase understanding of functionalities and performance of bio-based building materials among developers, architects and installers and accelerates the maturity of the industry more broadly. The current standardised tests are not always sufficient enough to be applied to bio-based materials (e.g. moisture regulating effect of bio-based materials).[2]

In France the regulatory framework for construction materials is traditionally based on the Spinetta law from 1978, which declares that it is up to insurance companies to approve the choice of materials for construction. The insurance companies refer to a set of standards which lay down rules for design and implementation and technical recommendations applicable to products. New and innovative products are not covered under the traditional set of rules and standards, and therefore constitute an unknown risk for insurers. To get approved, new products must go through a different process. The two options are 'ATec' or 'ATex'. ATec is a technical approval procedure where new products are tested and declared fit for purpose by independent experts. It can take up to two years to receive this declaration, which is valid for 3 - 5 years. Alternatively, the ATex approval can be attained within three months, but its application is restricted to a small number of buildings, or a limited time period.[3] Especially for SMEs the process is daunting. A welcome next step would be the integration of more bio-based construction materials into the rules and standards governing 'traditional' (conventional) materials, so that these bio-based construction

[2] http://edepot.wur.nl/382318

[3] http://evaluation.cstb.fr/en/assessments/

materials are no longer required to gain ATec/ATex approval. This is a necessary step to growing the market for these products in France.

This topic was raised by one of the interviewees from the Netherlands. They applied for a certificate for their bio-based insulation material. When they started the application process the certifying body could not certify the materials as the bio-based material was a new material, not part of the Dutch standard and without a long track record. After several re-evaluations, the producer and certifying body were able to prove that the bio-based insulation material was equivalent to traditional insulation materials. As a result, it is now part of the Dutch standard. However, this process took much time and effort.

In the Netherlands, a certification body for the construction and real estate sector, SKG-IKOB, issues the KOMO quality certificate. The KOMO quality certificate stands out because the demands it places on products, processes and services are determined by all parties involved (manufacturers, suppliers, customers, consumers and governments). Those parties record the requirements in writing. Based on this, a so-called assessment guideline (BRL) is established. It states exactly what must be met for the KOMO quality certificate and how it must be tested and checked. Since recently, a KOMO quality certificate has been issued based on an innovative assessment guideline (IBRL). Here, as the name implies, specific attention in the process is given to the fact that it concerns an innovative (e.g. biobased) product. On average, writing an IBRL takes 1 year and the certification process takes 6 months. The validity of the certificate is a maximum of 3 years. SKG-IKOB is affiliated to the European Organization for Technical Approvements (EOTA).

3.2 Biodegradability

When bio-based materials are biodegradable, their constituents can be returned to nature by means of organic recycling based on biological processes, enabling biogenic circular routes where the biodegraded material becomes nutrients for new plants and trees which can then become new bio-based products and thus closing the loop. There are several standards to demonstrate the biodegradability of products. These standards prescribe for degradation to CO2, water, methane, biomass and minerals within a certain time (typically 90% within 6 months). This requirement cannot be met by products containing lignin. Lignin is a recalcitrant biopolymer, meaning that it resists degradation. When a plant is degraded in soil, the polysaccharides are degraded to CO2 and water fast, while the last 30% of the plant, the lignin, is converted to soil organic matter (humins, humic acid). The latter is essential for soil to be productive. Lignin will, in the end, degrade to CO2 but this takes longer than the prescribed 6 months in the standard tests.

Examples of standards that use these requirements for biodegradation are:

- EN 14995 - Plastics - Evaluation of compostability – Test scheme and specifications
- EN 13432 - Packaging - Requirements for packaging recoverable through composting and biodegradation - Test scheme and evaluation criteria for the final acceptance of packaging
- EN 14046 - Environmental management - Water footprint - Principles, requirements and guidelines
- ISO 14855 - Determination of the ultimate aerobic biodegradability of plastic materials under controlled composting conditions - Method by analysis of evolved carbon dioxide

For producers that use lignin in their bio-based products and want to comply to this standard the prescribed limit setting is a barrier to access the market. One specific application where this contradiction of demanding lignins to be biodegradable is in the use of lignins as binders in controlled release fertilizers. The EU demands that all polymers or coatings used in controlled release fertilizers must be biodegradable. The problem arises when biodegradability is assed with

one of the above standards. As a result will lignin not be allowed as a controlled release polymer in fertilizers (not degraded to CO2 and water, only to humic acid). This is contractionary as lignin is possibly the soundest polymer to use; the soils need the lignin.

3.3 Compostability

Compostability is a characteristic of a product, packaging or associated component that allows it to biodegrade under specific conditions (e.g. a certain temperature, timeframe, etc). These specific conditions are described in standards, such as the European standard on industrial composting EN 13432 "Requirements for packaging recoverable through composting and biodegradation - Test scheme and evaluation criteria for the final acceptance of packaging". This standard defines how quickly and to what extent a biodegradable plastic must degrade under industrial composting conditions. The EN 13432 is a harmonised European standard linked to the European Directive on Packaging and Packaging Waste (94/62/EC).

The standard prescribes:

- biodegradation: at least 90% of the materials have to be broken down to CO2 by biological action within six months at 58°C +/- 2°C;
- disintegration: after twelve weeks, at least 90% of the product should be able to pass through a 2 x 2 mm mesh;
- chemical composition: certain limits regarding volatile matter, heavy metals and fluorine should be obeyed;
- quality of compost and ecotoxicity: the quality of the final compost should not decline as a result of the added packaging material.

The general opinion is that when the characteristics of bio-based plastics are in line with the EN 13432 standard, they can be composted by industrial composters without complications. Bio-based plastics usually do not have problems to comply with these requirements in the standards.

Composters on the other hand run composting installations in less time that the described 12 weeks. The Dutch Waste Management Association (VA) states that composting time is around 2-3 weeks. During the workshop the VA confirmed that at some composting installations the composting time is even shorter: between 5 and 18 days.

As a result, the bio-based plastics will not be fully composted and need to be or will be sieved out.[4] The composters state that they must comply with the Fertilizers Act which states that there cannot be any plastics (bio-based or fossil) in the compost. Customers of the composters are also reluctant to see any plastic (bio-based or fossil) in their compost. Most bio-based plastics currently end up in the incineration facilities. Bio-degradable plastic (packaging) producers have real difficulties to accept that their biodegradable products are incinerated.

3.4 Multiple certificates in the market

Over the last years many certificates have been developed by NGOs, authorities or certification bodies to help consumers, manufacturers, distributers, traders to choose the right products for their purpose. Within the bio-based economy multiple certificates to demonstrate the

[4]https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=2ahUKEwixoNqnnuzcAhVEURoKHeZVA18QFjAAegQIAxAC&url=https%3A%2F%2Fwww.rijksoverheid.nl%2Fbinaries%2Frijksoverheid%2Fdocumenten%2Frapporten%2F2017%2F10%2F24%2Fbiobased-plastics-in-a-circular-economy%2Fbiobased-plastics-in-a-circular-economy.pdf&usg=AOvVaw2kYxVXpWV8T4gtVvPEyBFW

sustainability of biomass, the bio-based content and certificates for the end-of-life have been developed. A challenge arises when specific certificates are asked for by users in specific regions (or sectors). As a result, doing business in different regions requires multiple certificates.

3.4.1 FSC/PEFC

An example that was given and researched is on sustainable forest management. The Forest Stewardship Council (FSC) is an international non-profit, multi-stakeholder organization established in 1993 to promote responsible management of the world's forests. The FSC does this by setting standards on forest products, along with certifying and labelling them as eco-friendly. The Programme for the Endorsement of Forest Certification (PEFC) is an international, non-profit, non-governmental organization which promotes sustainable forest management through independent third-party certification. It is considered the certification system of choice for small forest owners. FSC and PEFC together account for some 98% of the world's certified forests and chain of custody certificates.

An interviewee from Norway presented the suboptimal situation where the company needs to import FSC certified wood as requested by customers where Norwegian wood is usually PEFC certified. It was raised that Inter-changeable certificates would solve this issue. However, FSC and PEFC welcome the competition of both schemes. They consider that by having two competing global schemes, the interests of all stakeholders are best protected. Competition between the two global schemes would encourage continuous improvement, ensures cost effectiveness, delivers efficiency and provides a legitimate choice.

3.4.2 The need for multiple certificates

Another case around multiple certificates was raised in relation to the workshop. A bio-based packaging producer has the following certificates: EN 13432 “Compostable” for 8 different products, EN 13432 “Industrial Compostable” for 2 products, EN 16785 “Bio-based content certification scheme, AS 5810: 2010 “Home and garden compostable”, Vinçotte “OK compost Home” for 3 products, Vinçotte “OK biobased” class ****” for 2 products, ASTM D 6866 “Bio-based > 85 %” or 2 products. The total costs for these certificates are over €80,000 per year. There are two reasons why there is a need for multiple certificates. The first reason is that in some cases these certificates overlap but are requested by users in certain regions. The second reason is that certificates are often complimentary, and they demonstrate the different characteristics of bio-based products. Bio-based product producers often express their frustration of the number of certificates needed. However, as described it is difficult to reduce the number of similar certificates due to the fact that users are used to specific certificates. It is in most cases unwanted to reduce the number of certificates that demonstrate the different characteristics of bio-based products as these add value to the end product. Alignment of similar tests to reduce the costs of certification is an option that STAR4BBI has discussed with test houses. See §3.5 double testing on this topic.

3.5 Double testing

Standards help to ensure safety, reliability and environmental care. As a result, users perceive standardized products and services as more reliable – this in turn raises user confidence, increases sales and the take-up of new technologies. When products cross borders (or oceans), testing is needed to be performed to guarantee national or regional safety requirements. Private parties in different countries may also request certain safety requirements compliance. Usually, these compliance tests are based on the same standards as in the “home” country. In practise this often comes down to performing the same or similar tests on products twice. The costs of these tests are

in most cases for the producer. “Double” testing is costly as well as time consuming. This is not a barrier for bio-based products as such as it also applies to non-bio-based products. The subject was however raised during the interviews with the value chains. Bio-based product producers are usually not multinationals. The costs of testing are relatively high for smaller companies that enter a new market.

To reduce costs, transparency around requested tests is recommended. International alignment and transparency of testing (equivalency comparison) could reduce double testing of products when tests are based on the same standards. This topic was discussed during the workshop. Test houses that were present shared their experiences and views on this topic. They mentioned that there is already transparency around tests. Their opinion is that most testing facilities have arrangements in place where they do not duplicate tests that have already been executed. It is however not clear if all test houses are as transparent as the ones present at the workshop.

4 Workshop

NEN and nova-institut organised a workshop to discuss the long list of issues. To get the right participants in the room the workshop was in the afternoon of the 23th of October 2018 at CEN-CENELEC. In the morning of the 23th of October the BioMonitor project organised a workshop. BioMonitor is a project funded under the European Union’s Horizon 2020 Biotech programme. The BioMonitor project wanted to address the information gap and mismatch of emerging innovative industries coming from the chemical and materials sectors that deal with the production of bio-based intermediate and end-products. It also aimed to resolve the lack of indicators needed to quantify the bioeconomy’s economic, environmental and social impacts in the EU and its Member States. On the 22nd of October the European Commission organised the “Bioeconomy Conference” in Brussels. See Annex A for the invitation to this workshop. See Annex B for the participation list.

Participants of the workshop came from industry, associations, certification bodies, test houses and the European Commission. The invitation is presented in Annex A. Invitations were distributed via the value chains, the contact list of the partners, the advisory partners (websites) and via some press outreaches. The effective participants are listed in Annex B.

During the workshop the long list of issues was discussed but there was also the opportunity to raise additional needs, expectations and hurdles within the bio-based economy. In the end, STAR4BBI received feedback of the participants on all the identified issues.

The partners then developed a short list of issues that were addressed by the value chains and confirmed as being an issue (perceived or experienced as well) by the stakeholders during the workshop. That short list of three items (compostability, non-functional specifications and double testing) will be further dealt with in the project.

5 Conclusion and next steps

Interviews and desk research identified several issues related to standards and certificates in the bio-based economy. This resulted in a long list of standards that have been evaluated by participants of the workshop. The results have been discussed during a STAR4BBI project meeting. During this project meeting the partners discussed the final selection of standards or topics that are in most need of harmonization or show the best feasibility of success within the project time.

The discussion resulted in the following short list of issues that will be dealt with in the remaining project time:

- Compostability (EN 13432)
- Non-functional specifications
- Biodegradability

These issues will be further looked into during the remaining time of this project. The aim is to have solid solutions for the three issues raised and to have these offered to the correct technical committees to take action to amend or harmonize the standards. To deal with the identified issues the responsible CEN, ISO or ASTM committees will be identified and contacted. In case the project partners do not have direct influence on the responsible CEN or ISO committees, “Industry champions” will be identified to propose the amendments to the standards to the technical committees.

Annex A, Invitation to the workshop

STAR4BBI Stakeholder Workshop on improved Standards and Certificates for Bio-based Industries

23 October 2018, between 13.30 - 16.00
Venue:

CEN-CENELEC Meeting Centre
Rue de la Science 23
B-1040 Brussels
Belgium

The objective of STAR4BBI is to help establish a coherent, well-coordinated and favourable regulatory framework that helps develop a cutting-edge bio-based economy for Europe. Standards provide people and organizations with a basis for mutual understanding, and are used as tools to facilitate communication, measurement, commerce and manufacturing. For the bio-economy standards have a crucial role to play in supporting the growth of the bio-based products market. In particular, they can help to increase market transparency by providing common reference methods and requirements that enable the verification of claims regarding the bio-based content, bio-degradability or environmental sustainability of different product. At the same time there are standards in place that bring obstacles to (enter) the bio-based economy. During desk research and interviews with companies within the bio-based economy several issues related to standards and certificates in the bio-based economy were identified.
Identified issues are related to the following subjects:

- Climate test
- Biodegradability definition in standards
- Compostability standard: EN 13432
- Certificates in the building industry
- Harmonization of FSC/PEFC
- Cooperation between ASTM-EU

STAR4BBI will hold a workshop on the 23th of October from 13.30-16.00 to evaluate the identified issues with stakeholders. During the workshop, the STAR4BBI project partners would like to receive confirmation from stakeholders that these identified issues related to standards and certificates indeed cause challenges in the bio-based economy. There is also room to discuss any other issues raised by stakeholders concerning standards that currently exist or identified gaps where standards should be developed. With the information resulting from the workshop the project partners of STAR4BBI will make proposals to make changes to the standards/certificates with the correct committees. The aim is to have these changes passed through in the standards before the end of the project (October 2019). We are happy to welcome you at the workshop! For registering please contact Ms. Tatevik Babayan: Tatevik.babayan@nova-institut.de

Annex B, Participant list workshop

Erwin	Vink	NatureWorks
Lucas	Scridelli	Stora Enso
Uwe	Fritsche	IINAS
Achim	Dr. Boenke	EC, DG GROWTH
Sointu	Räisänen	East and North Finland EU Office
Agnese	Litti	C.I.B.E. - International Confederation of European Beet Growers
Gustavo	Gonzalez-Quijano,	COTANCE – Working for the European leather industry
Ortwin	Costenoble	NEN
Stephan	Dr. Piotrowski	nova-Institut GmbH
Minique	Vrins	NEN
Philippe	Michon	Eranova Bioplastics
Ute	Merrettig-Bruns	Fraunhofer UMSICHT
John	Vos	BTG Biomass Technology Group BV
Nike	Mortier	OWS nv
Mona	Duhme	Fraunhofer UMSICHT
Uwe	Kies	InnovaWood Secretariat
Dennis	Froeling	VA, Dutch Waste Management Association
Tatevik	Babayan	nova-Institut GmbH
Peter	Reuschenbach	BASF
Monika	Wozowczyk	European Commission / EUROSTAT
Stephen	Webb	RTDS Association

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