



GLOBAL
BIOECONOMY
SUMMIT 2018

Food Security

Decarbonization

Society

Sustainability

Energy

Health

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Global Bioeconomy Summit Communiqué

19–20 April 2018, Berlin, Germany

Communiqué

Global Bioeconomy Summit 2018

Innovation in the Global Bioeconomy
for Sustainable and Inclusive Transformation
and Wellbeing

Note:

This first part of the document summarizes the key messages of the Communiqué of the Global Bioeconomy Summit 2018 (GBS2018). The second part presents the full version of the Communiqué. In an Annex, stock is taken on the progress made on the measures proposed at the Global Bioeconomy Summit 2015 (GBS2015).

Executive Summary of Recommendations

The International Advisory Council (IAC) of the GBS2018 re-emphasizes the recommendations from GBS2015 and recognizes that a **surge in international policy collaboration and dialogue is needed** to achieve sustainable bioeconomy and leave no one behind. The GBS2018 defines a set of 14 **themes of global relevance for bioeconomy research and policy agendas**. While some of these key themes relate to discussions continued from GBS2015, others are newly **emerging topics**, specifically: a) the links between climate change, health impacts and bioeconomy, b) digitization and converging technologies in the bioeconomy c) communication and trust in transformative sciences & technologies, d) interdisciplinary education and training at all levels in bioeconomy, e) biodiversity as a resource and foundation for bioeconomy, f) sea and ocean bioeconomy g) innovative ways of financing and h) bioeconomy in the cities or “biocities”¹

GBS2015 identified the key role of bioeconomy as a transformative strategy for advancing SDGs. Practically all of the bioeconomy policy strategies adopted since GBS2015 address the UN Agenda 2030 and seek to contribute to a number of SDGs.² **However, the bioeconomy is yet to be appropriately included in international fora on innovation, climate, biodiversity and sustainable development policy.** Bioeconomy promotes distinct features of interest to several SDGs, including knowledge-based growth and jobs, the renewability of resources, resilience of ecosystems, circularity, as well as efficiency and value-orientation. Biobased solutions frequently provide innovative or unique benefits, which facilitate sustainable consumption.

In view of the noted diversity of bioeconomy in countries around the world, we may **define bioeconomy from a global perspective** in rather general terms. The definition is partly vision and partly reality, by saying ‘bioeconomy is the production, utilization and conservation of biological resources, including related knowledge, science, technology, and innovation, to provide information, products, processes and services across all economic sectors aiming toward a sustainable economy’. Bioeconomy is a dynamic and complex societal transformation process, which demands a long-term policy perspective; countries are welcome to define their bioeconomies, as any definition also has programmatic elements.

¹ Bio-cities or bioprincipled cities have been identified as future flagship project of bioeconomy in the Delphi Study of the GBS2015. Available at <http://bioekonomierat.de/fileadmin/Publikationen/berichte/Delphi-Study.pdf>

² German Bioeconomy Council. (2018). Bioeconomy Policy Part III: Update Report of National Strategies around the World. Available at <http://gbs2018.com/resources/>

With a view to the grand societal challenges, we call urgently for an increase in multilateral dialogue and collaboration in:

- bioeconomy R&D, in particular sustainability and global change research,
- governance,
- capacity building.

With respect to effectiveness, international policy collaboration in the bioeconomy will need to become more formally structured maybe even institutionalized. The **IAC as an informal platform** composed of leading bioeconomy experts should be strengthened and continued beyond GBS2018. **We recommend exploring options for the design and establishment of an international mechanism for knowledge exchange and coordination on global bioeconomy.** It should involve the stakeholders of the GBS and interested United Nations Organizations.

In line with our policy recommendations, the mechanism would need to contribute to the following:

- organization of a **structured exchange of policies and practices** among the global bioeconomy community on the key themes identified by the GBS2018
- provision of a **state-of-the art knowledge base** for bioeconomy policy and governance, specifically of evidence-based information and assessments that are considered trustworthy by all stakeholders.
- **a competent and significant bioeconomy voice** in global policy fora related to innovation, sustainable development, biodiversity and in particular the Paris Agreement, providing a holistic perspective and considering the interdependencies between individual SDGs in the bioeconomy.
- facilitation of **multilateral collaboration programs in bioeconomy R&D and capacity building** as well as governance oriented on common goals

Communiqué of the Global Bioeconomy Summit 2018

Innovation in the Global Bioeconomy for Sustainable Transformation and Wellbeing

Aim and Purpose

This communiqué of the second Global Bioeconomy Summit, held in Berlin from 18 to 20 April 2018, was developed in a collaborative effort by the International Advisory Council (IAC)³ and tabled at the Summit. We, a community of international experts and stakeholders from all hemispheres, met in Berlin to review the state of bioeconomy in different parts of the world and to identify opportunities for accelerated transition to sustainable bioeconomy. We build on the work and recommendations of the International Advisory Council, published in the Communiqué of the GBS2015 conference.

Re-visiting the Proposed Measures of GBS2015: Summarized Stock-taking

The GBS2015 resulted in mutual learning and recognition of a broad diversity in bioeconomy strategies and programs around the globe. Despite this diversity, the participants clearly **shared the vision of a sustainable bioeconomy in which humanity lives with respect for nature, and where the economy benefits society and protects planet and local environments.**

In view of the noted diversity of bioeconomy in countries around the world, we may **define bioeconomy** from a global perspective in rather general terms. The definition is partly vision and partly reality, by saying ‘bioeconomy is the production, utilization and conservation of biological resources, including related knowledge, science, technology, and innovation, to provide information, products, processes and services in all economic sectors aiming toward a sustainable economy’. Bioeconomy is a dynamic and complex societal transformation process, countries are welcome to define their bioeconomies, as any definition also has programmatic elements.

³ The members of the International Advisory Council (IAC) are listed at the end of this Communiqué.

The GBS 2015 recognized three key areas of action for achieving sustainable bioeconomy - (i) promoting **innovative as well as proven technologies**⁴, (ii) establishing **good governance** and (iii) strengthening **international dialogue**.

Consequently, the IAC of the GBS2015 agreed on seven measures to promote the development of sustainable bioeconomy across the globe. A number of activities and initiatives unfolded regarding these measures over the past two and a half years. These are briefly summarized here and are presented in greater detail and including many examples in the Annex of this document:

- To establish an international forum for bioeconomy as an informal network to foster strategic dialogue with policy-makers, private sector, civil society and scientists, including foresight and thinktank-oriented activities. In addition, a shared understanding of sustainable bioeconomy, and monitoring and reviewing progress at an international level should be part of its agenda.
>> A dedicated initiative was taken by FAO with an international working group to develop sustainable bioeconomy guidelines and facilitate bioeconomy dialogue globally; the BioFuture Platform was launched during COP22 facilitating global policy cooperation among 20 countries for a low-carbon bioeconomy; an International Bioeconomy Forum for long-term R&D collaboration among global players in the bioeconomy was established in November 2017 by the EU; many more regional and national events were held than ever before. The establishment of a central forum for bioeconomy policy is however still missing and no mechanism to approach such a structure can be identified up to this moment.
- To explore opportunities for long-term international research and development collaboration to advance biobased technologies, processes and products in selected innovation areas, building on key themes identified at the GBS2015 in Berlin;
>> Research activities accelerated in and between hemispheres. Global programs were however not started in the promising fields identified during GBS2015.
- To initiate a dialogue among stakeholders regarding the knowledge, skills and competencies, which will be crucial for implementing the bioeconomy, and to promote mutual capacity building efforts.
>> Bioeconomy higher education initiatives expanded in many countries, including at BSc and MSc levels at new and significant scale. A steady forum to exchange experiences and proven practices, such as curricula and standards, is however still missing.

⁴ Improvement efforts relate to applying state-of-the-art practices and proven technologies. Innovation efforts relate to scientific and technological breakthroughs, to social innovations (new forms of collaboration and of doing things) and to institutional and policy innovations. The bioeconomy is a very interesting field where such technological, social and policy innovations emerge and develop. The GBS2018 discusses promising avenues, risks and challenges of worldwide improvement and innovation efforts.

- To build up dialogue with civil society and the interested publics to render bioeconomy a venture based on a widely shared vision of a sustainable future; innovative ways of communication with the public must be identified and developed, based on principles of transparency, openness and evidence.
>> Extensive stakeholder dialogues were held by governments as well as business and civil society organizations, mostly at national and regional levels. However, new participatory and evidence-based ways to communicate bioeconomy are needed in view of rising concerns and decreasing trust in transformative science and technologies.
- To include bioeconomy topics into ongoing discussions on how to achieve the Sustainable Development Goals at international and national levels.
>> On this measure, GBS2015 contributed to a breakthrough in that there is now a broad understanding that bioeconomy is needed to achieve the SDGs. The global sustainability governing organizations such as those related to climate change and biodiversity have however yet to comprehensively embrace bioeconomy and define meaningful measures.
- To exploit synergies from collaboration at regional level, in particular by coordination of smart regional innovation strategies.
>> Most new action in bioeconomy emerged at national and even subnational levels in promising clusters. Coordination and cooperation increasingly occurs across the science and business communities involved in these clusters or centers. Synergies from policy coordination among governments and public authorities however remain underexploited.
- To hold the next Global Bioeconomy Summit in two years, and to maintain the IAC until then as an informal mechanism for international coordination and cooperation activities, incl. facilitating the above mentioned international forum.
>> This measure was fully taken: an expanded IAC was formed and provided leadership for the GBS2018.

It is reassuring to be able to state that there has been significant progress in implementing the seven agreed measures from the last Summit. However, further action is still needed to achieve the goals of sustainable bioeconomy.

Sustainable Bioeconomy: Global Agenda Setting

Considering the dynamics and the recent developments described in the above stock-taking (see details and examples in the [Annex](#)), the members of the IAC emphasize that the policy agenda and recommendations from 2015 are still valid and of high relevance.

We note that bioeconomy development globally is and will be driven by three broad forces:

- 1) societal aspirations and good governance for sustainable development and for improved health and wellbeing ,
- 2) needs and opportunities of valorization and protection of biological resources, including residues, in the traditional bioeconomy core-sectors linked to agriculture, forestry, fishery, water management food and bioenergy,
- 3) scientific breakthroughs in biological, digital and other technology fields, expanding the frontiers of innovation possibilities.

The structure of the GBS2018 program and the recommendations are built around these drivers. The GBS2018 defines a set of **globally relevant key themes for bioeconomy research and policy agendas**. The themes were elaborated in a bottom-up and demand driven process guided by the IAC and subject to an open call for workshop proposals. The call resulted in nearly 50 workshop proposals. In order to foster international perspectives and collaboration already in the preparatory phase, the proposals were merged into 14 co-organized workshops and clustered into 4 tracks.

GBS2018 Workshop tracks and topics (key themes)

Bioeconomy of World Regions (intra- and inter-regional collaboration)

- Africa
- Asia
- Latin America and the Caribbean
- Europe and North America

Industry

- Bioeconomy Financing – Bringing Innovation to Market
- Bioenergy and Biorefineries – Innovation and Futures
- Biobased Innovations in Manufacturing
- The Great Convergence – Digitalization, Biologicalization and the Future of Manufacturing

Innovation and Environment

- Biodiversity for a Sustainable and Thriving Bioeconomy

- Blue Growth: Seizing Opportunities for a Sustainable Future
- Bioeconomy, Health and Climate Change

Policy

- Measuring and Monitoring the Bioeconomy – What, Where and How?
- Transformative Science and Communication
- Cooperation in Education and Training at all levels for the Bioeconomy

The results of all 14 workshops will be published in a detailed report. All of the workshop themes would benefit from follow-up after the GBS2018 by the chairs and networks that have formed around them during preparation and at the GBS2018. The themes could serve as a nucleus for future collaboration and joint projects in the bioeconomy.

Recommendations for Strategic Directions

In response to the drivers of global bioeconomy development, we propose a set of recommendations for international bioeconomy policy.

a) Bioeconomy to respond to societal aspirations for sustainable development

In the past years, the damages to the environment resulting from unsustainable resources use have become even more visible and tangible globally. We recognize a growing societal awareness of the bundle of impacts, such as climate change, degrading ecosystems and soils, pollution of air and water, health risks and scarcity of resources, such as water.

Sustainable bioeconomy can help respond to societal aspirations and needs through its links to several relevant SDGs including poverty reduction, food security, access to water, energy and education, and sustainable innovation, production and consumption. Bioeconomy policy needs to respond faster and better to the demands and aspirations of citizens and to environmental needs.

Countries therefore need to define how a transition to bioeconomy should respond to local and national development needs. This will require long term planning and prioritization, investment in R&D, human capacity, S&T infrastructures, entrepreneurial capacity and innovation facilitating structures. However, many countries with rich biodiversity have not yet defined and agreed on how they should take advantage of locally, regionally and globally emerging bioeconomies. Global fora such as the GBS2015 and GBS2018, supporting national bioeconomy strategy and policy agenda development – together with global networking - are therefore crucial in this regard.

Specific recommendations for international policy

1. Science, technology and experience provide the knowledge base for bioeconomy policy regarding interdependencies with sustainable development. International measuring and monitoring efforts are required to understand and address the impact of bioeconomy developments, specifically on climate change, food security, health, and nature conservation. Tapping into big international initiatives such as Future Earth/Belmont Forum, Global Environment Facility or the Mission Innovation would provide additional funds for complex sustainability research in the bioeconomy. International scientific assessments are also required to develop options for bio-based sustainable lifestyles. **Public R&D support and international collaboration are required to establish and maintain a state-of-the art knowledge base for bioeconomy policy and governance**
2. Bioeconomy opportunities in the medical and pharmaceutical fields and in the health sector have to become integrated in bioeconomy policy strategies. Furthermore, health risks resulting from air pollution have emerged as a key sustainability issues. In this respect, potential health impacts of the bioeconomy need to be better understood and communicated. **We recommend addressing health aspects of bioeconomy more directly and to integrate them in the international environment, climate and health policy agendas**
3. The development of national bioeconomy strategies is complex and challenging. **Mechanisms and fora where countries can share knowledge and experiences in the development of strategies** and how to **monitor the impact** of policies and interventions in support of bioeconomy development are therefore important.

b) Bioeconomy to be based on the needs and opportunities of better valorization and protection of bio-resources related to agriculture, forestry, fishery and bioenergy

Valorization is not only understood in monetary terms (mostly resulting from desirable product qualities and valuable benefits) but includes the intrinsic values of biodiversity and ecological functions. In the sectors of agriculture, forestry and fishery and those of food, biochemicals, biomaterials and bioenergy production, bioeconomy policies and programs should generally recognize and value the functionality and quality of biological resources instead of considering them as quantitative “biomass”. Furthermore, high amounts of losses and organic waste are still generated across international agri-food, forestry and fishery supply chains, which could be either avoided or better used for the benefit of people and the environment.

Such improvements on the consumption and production side are of global importance and vital for resource efficiency. With a view to countries with an important share of smallholder production, the successful implementation of agricultural development strategies that ensure food and nutritional security is one of the most important challenges of the 21st century. Connecting the smallholder farmers to markets, value chains and agro-processing opportunities is an important tool in elevating agricultural productivity, decreasing poverty and improving rural livelihoods, and a central task in a modern bioeconomy.

Specific recommendations for international policy

4. Knowledge transfer for achieving the SDGs is urgent. **Supporting the promotion of proven and broadly accepted good practices** in the production and the sustainable management of relevant natural resources as well as ensuring an inclusive decision-making process in that respect will significantly contribute to using biological resources more efficiently and for the benefit of society and the planet.

5. **Bioeconomy policy needs to set the framework that stimulates sustainable resources use in bioeconomy value-networks.** Given the close inter-linkages between water, energy and food, a water-energy-food nexus approach is needed to address the tradeoffs and synergies in their production and/or use. Responsible production, circular approaches and the functionality-oriented use of resources should be part and parcel of bioeconomy approaches that need to be more widely applied in the primary sector. Policy agendas need to promote rural and coastal areas development by motivating new value-networks between agriculture, forestry, fisheries and bio-based industries. The participation of women and youth in the development of new bio-businesses should be encouraged to broaden their economic and social impact. An example are food packaging materials made from biobased materials, e.g. from agri-food residues, instead of fossil-based plastics.

c) Bioeconomy fostered by knowledge, science and innovation

A key driver of bioeconomy innovation is the rapid development in the life sciences, in combination with digitization, and the convergence of key technologies in applications. Promising innovations have for example been developed from genomics, applying big data analysis, and artificial intelligence as well as bio-, neuro- and nanotechnology. Such high-tech applications provide huge potential in the various areas of bioeconomy and for sustainable development. They typically require only small amounts of biomass, but are of transformative nature, i.e., they contribute to the establishment of novel and more connected industries and markets.

Yet, the developments in biotechnology and related high-tech areas are dominated by a few innovation hubs globally, while many countries rich in bio-resources are lacking critical S&T investment to participate in technological developments. In many emerging economies, an absence of technology and business incubation mechanisms that move bioscience innovations from R&D along the innovation chain to markets is a barrier for making use of S&T to optimize the use and add value to bioresources.

Consequently, policy actions and S&T investments of the public sector are needed to broaden the innovation agenda and to stimulate fair innovation sharing and to close science and knowledge gaps in the global bioeconomy. Also, active bioeconomy-related industrial policies should initially be considered, and experiences shared. The principles of fair, rule-based and free trade will remain important as stimulus for international competition and cooperation across bioeconomy value-chains.

Furthermore, trust and confidence in evidence-based technology assessments have been declining at a worrying pace in general, and especially in industrialized countries. Governments and policy makers will need to find more suitable formats for the dialogue among societal stakeholders on how to manage and effectively monitor the application of new technologies.

Specific recommendations for international policy

6. Digitization in combination with the scientific and technological advances in bioeconomy promise solutions for many societal challenges. Public R&D funding is important for initial development stages of most bioeconomy innovations. Public R&D partnerships between more and less advanced countries, especially assisting in the translation of R&D into marketable applications, are key to improve the chances that the benefits of the bioeconomy innovations also reach smallholder farmers, resource poor communities and a broader set of market actors. Incentivizing private innovation investments should complement these efforts.

In order to leverage public funds and to support knowledge transfer, more multilateral and cross-sectoral collaboration in bioeconomy R&D projects with common goals are recommended. As topics worthy of such transnational R&D and converging technology projects in the bioeconomy we propose:

- Sustainable sources of protein for human and animal nutrition
- Healthy diets including sustainable production, affordability, and behavioral change
- Health, food and environmental applications developed from microorganisms (including microbiome based solutions)
- Bioenergy in the renewable energy mix

- Sustainable soil and water management
 - Nature conservation and regeneration of the ecosystems
 - Conceptualizing and realization of bio-cities⁵
 - Sustainable materials, specifically addressing the plastics pollution crises⁶
 - Measuring and monitoring of bioeconomy impact
 - Bioeconomy approaches to minimize food loss & waste
7. The application of advances in bioeconomy R&D depends also on the **availability and trustworthiness of expert assessments and the compatibility of regulatory procedures**.⁷ This relates to standards in R&D, to the assessment and regulatory processes for technologies, to certification and labeling systems as well as to intellectual property law. Multilateral and cross-sectoral collaboration on the above is recommended to keep up with the speed of development, to foster mutual learning and to provide balanced and solid assessments and information that are considered trustworthy by politicians and citizens. Standards and good business practices are also vital for market creation and development.
8. Startup companies and small businesses are often the pioneers and drivers of bioeconomy innovation, however they need access to capital and markets. Policy and business stakeholders need to understand how these businesses can grow to medium-sized companies and be better integrated in bioeconomy value chains and how **policy should support the development of level-playing fields for bioeconomy innovators worldwide**, paying special attention to the needs of young bio-entrepreneurs. Policy also needs to encourage and initiate new ways of financing, which correspond to the more longer-term and complex nature of bioeconomy innovation.

d) Good governance to support sustainable bioeconomy development

The Communiqué of the GBS2015 highlighted in one section the key areas of good governance for the bioeconomy and recommended three sets of measures related to governance, specifically to leading an international policy and stakeholder dialogue, to promoting societal participation and to establishing linkages with sustainable development policy. The Annex to this Communiqué presents actions developed since

⁵ Bio-cities or bioprincipled cities have been identified as future flagship project of bioeconomy in the Delphi Study of the GBS2015, available at <http://bioekonomierat.de/fileadmin/Publikationen/berichte/Delphi-Study.pdf>

⁶ Relates to the pollution of rivers, oceans, lakes as well as land soils with plastic particles. Plastic waste needs to be avoided, at least it should be recycled or become biodegradable. Problematic are especially single use plastics in all sorts of packaging and fast-moving consumer goods like clothes, shoes, toys, cosmetics, etc. Equally critical is the plastic abrasion resulting from product use such as car tires, textile washing, etc.

⁷ Artificial intelligence and biotechnology have for example been rated as the most promising but also most risky technologies in a survey among top managers (see WEF 2017).

then regarding these measures. While such efforts are laudable, so far, they have still been fragmented and lack strategic planning and implementation.

Specific recommendations for international policy

9. To establish the international forum called for by GBS2015 as a global platform mechanism to contribute to an organized and continued international dialogue on bioeconomy policy, providing a counterpart for international sustainable development and climate policy fora. Options for the design of this platform mechanism, including stakeholder participation and public engagement should be explored at and after the GBS2018.

In sum, the IAC of the Global Bioeconomy Summit 2018 calls for an increase in multilateral and cross-sectoral collaboration and coordination on bioeconomy R&D, governance as well as in capacity building to ensure “Sustainable Bioeconomy For All”.

ANNEX: Stock-taking of Progress since GBS2015

The 1st Global Bioeconomy Summit was held in November 2015. It was initiated by the Bioeconomy Council of the German federal government in order to **create an evolving multi-stakeholder platform aimed at addressing the policy issues related to global bioeconomy development**. For the first time, bioeconomy policy stakeholders from more about 80 countries were brought together to discuss opportunities, perspectives and risks of bioeconomy development with a view to sustainability. The summit resulted in mutual learning and recognition of a broad diversity in bioeconomy strategies and programs around the globe. Despite this diversity, the participants clearly shared a vision of a sustainable bioeconomy in which humanity lives in harmony with nature and the economy benefits society and planet. With a view to global policy, the GBS2015 Communiqué called for “a more comprehensive and shared understanding of the concept of bioeconomy, which defines biological resources holistically, and considers the challenges together with the unique features and advantages. Specifically, its potential for resilience, carbon neutrality, its renewability, circularity, re-usability and multi-functionality.” Furthermore, it highlighted key areas where international policy dialogue and cooperation were considered necessary in order to meaningfully advance the bioeconomy and to contribute to sustainable development.

Since the GBS2015, Bioeconomy has taken a steep and exciting way forward. The term "bioeconomy" has become more mainstream in policy papers and strategies globally, however with differing definitions. In parallel, we observe that new terms and wider concepts are emerging. In the European Union, synergies between the concepts of bioeconomy and circular economy are being explored. Many of the recent bioeconomy policy papers from European member countries accordingly refer to “sustainable and circular bioeconomy”. In Finland and in Canada policy papers have defined the term “forest-based bioeconomy”. In the Anglo-Saxon countries, like the UK, the US and New Zealand, but also in China bioeconomy policy papers relate more strongly to concepts of high-tech innovation, such as synthetic biology, digitization and advanced manufacturing. In the US, the term “industrialization of biology” has been coined, whereas in Germany terms like the “biologization of economy” or “biological transformation of industry” are emerging in key innovation policy papers.

A recent analysis of bioeconomy policy strategies around the world indicates that since 2015 more countries have decided to develop holistic national bioeconomy strategies than strategies related to sub-policy areas, such as biotechnology. New bioeconomy policy strategies have been adopted in France, Ireland, Italy, Latvia, Norway, Spain and Thailand. Globally, 49 countries pursue policy strategies related to bioeconomy development, of which 15, including the European Union and the West Nordic Countries, have developed holistic or dedicated bioeconomy policy strategies, with the trend rising in

the past two years. In fact, the governments in Austria, Brazil, Colombia, Ecuador, Estonia, Iceland, Japan and the United Kingdom are in the process of preparing dedicated bioeconomy strategies. And still others, like Namibia, Kenya or Iran have tasked S&T committees working on bioeconomy policy.⁸ However, many of these strategies are not backed by concrete action plans and budgets for implementing the visions and long-term goals. An interesting approach has been adopted by the French government that published an action plan one year after its bioeconomy strategy. The plan details the implementation measures to be taken by the government and key stakeholders. Also, Thailand has issued a Bioeconomy Roadmap together with an action plan.

However, the dynamic development of bioeconomy is not restricted to national policy making. It is also reflected by the increasing number of bioeconomy-related initiatives promoted by public and private actors. Considerable bioeconomy innovation programs are underway, for example in Australia (Queensland), Argentina, Brazil, in Canada, China, in Eastern Africa, in the European Union and its member states, in India, New Zealand, South East Asia and the USA. New bioeconomy and bio-industry policy strategies have been launched in the past two years, for example in China, Italy, France, Latvia, Norway, Spain and Thailand. A number of countries are in the process of setting up such dedicated bioeconomy and bio-industry strategies, such as Argentina, Ireland, Iceland, Namibia, Japan, South Korea and the United Kingdom.

All of these activities involve public support for bioeconomy development and some form of innovation budget, which provides a new and unprecedented scope for international collaboration.

The International Advisory Council (IAC) of the Global Bioeconomy Summit 2015 proposed seven measures to promote the development of sustainable bioeconomy across the globe. A number of activities and initiatives, often involving IAC members or GBS2015 participants, are unfolding. These are briefly presented for each of the recommended measures:

Measure 1. “To establish an international forum for bioeconomy as an informal network to foster strategic dialogue with policy-makers, private sector, civil society and scientists, including foresight and thinktank-oriented activities. In addition, a shared understanding of sustainable bioeconomy, and monitoring and reviewing progress at an international level should be part of its agenda.”

⁸ German Bioeconomy Council. (2018). Bioeconomy Policy Part III: Update Report of National Strategies around the World. Available at <http://gbs2018.com/resources/>

- We observe at least three attempts of the bioeconomy community to establish structures for a multilateral policy dialogue to foster the development of sustainable bioeconomy; the UN-FAO has set up an International Working Group on Sustainable Bioeconomy to advise on the development of sustainable bioeconomy guidelines, the European Commission has initiated an International Bioeconomy Forum, for long-term R&D collaboration among global players in the bioeconomy; During COP22 in Marrakech, the BioFuture Platform was launched with 20 signatory governments seeking policy cooperation and mutual learning in the development of a low-carbon bioeconomy.
- We observe tremendous international meeting activities in the bioeconomy and related to key sustainable development challenges, such as food and energy security as well as industrial innovation and economic growth.
- However, these events are not supported by a more institutionalized and strategic approach regarding the links between bioeconomy and the SDGs. There is currently no international mechanism for bioeconomy policy and for exchanging experiences, practices and information as well as initiating or supporting joint global R&D projects.

Measure 2. “To explore opportunities for long-term international research and development collaboration to advance biobased technologies, processes and products in selected innovation areas, building on key themes identified at the Global Bioeconomy Summit in Berlin”

- Several countries have signed bi-lateral bioeconomy R&D collaboration agreements including co-funding schemes and capacity building partnerships. Just to name a few examples: the Newton UK-China Agritech Challenge, Brazil’s joint research project calls with the UK and France and the Embrapa Labex Program for international research collaboration, the German “Bioeconomy International” R&D funding program for research collaborations e.g. with Argentina or the joint funding of bioeconomy research projects between India and Norway.
- Regional and multilateral collaboration in education and R&D have for example been initiated in the Nordic Council member countries extending to the Baltic Sea Region countries, in Eastern Africa and by the International Bioeconomy Forum (IBF). The International Bioeconomy Conference 2018 in Lodz (Poland) has established a Bioeconomy Education Platform among key European players.
- The country profiles assembled in the G20 innovation report for 2016⁹ show that the biosciences, bio-innovation and the bioeconomy are prominently considered in the innovation agendas of the leading industrialized countries – with competitiveness and economic development as key goals. Both Germany, holding the G20 presidency in

⁹ OECD. (2016). G20 Innovation Report., Available at: www.oecd.org/sti/inno/G20-innovation-report-2016.pdf.

2017, and Argentina in 2018, have set policy priorities in bioeconomy development and could propose a forum for developing partnerships and joint-initiatives.

- The newly set-up Technology Facilitation Mechanism under the UN AGENDA 2030 process brings together the stakeholders on Science, Technology and Innovation for Sustainable Development Goals. Biotechnology and bio-based innovations are expected to have a significant impact on the SDGs. It remains to be seen whether this Mechanism supports multilateral cooperation in bioeconomy capacity building and R&D.

Measure 3. “To initiate a dialogue among stakeholders regarding the knowledge, skills and competencies, which will be crucial for implementing the bioeconomy, and to promote mutual capacity building efforts.”

- Several public institutions and schools have engaged in bioeconomy education and awareness programs, for example the Federation of Danish Workers has published a brochure on the bio-based society, which is distributed to employees and in schools. Through international cooperation with other trade unions the brochure has been translated and distributed in other countries, e.g. in Germany (IG BAU).
- A number of universities have developed bioeconomy courses and even dedicated bachelor and master programs. Examples can be found in Argentina, Finland, France, Germany, Italy, Malaysia, Poland and in the US. Some initiatives have been started to make these experiences available for institutions and bodies interested in establishing education and training programs, for example in Eastern Europe and Argentina (open online lectures and courses). GBS2018 will host a workshop looking at international collaboration for bioeconomy education and training. To our knowledge there has been little international dialogue on the curricula and training methods used. A global exchange platform of curricula could be considered.
- Pilot projects involving bio-based businesses and training centres do exist, for example the “BioBase4SME” network holds business workshops and professional trainings supported by bioeconomy experts involved in the BioBase North-West-Europe project. To our knowledge, such programs have not been rolled-out on a larger scale.

Measure 4. “To build up dialogue with civil society and the interested publics to render bioeconomy a venture based on a widely shared vision of a sustainable future; innovative ways of communication with the public must be identified and developed, based on principles of transparency, openness and evidence.”

- Since the GBS2015, several countries have initiated participatory bioeconomy strategy development processes involving public consultations, public conferences and stakeholder workshops, for example in Austria, Canada, the European Union, France, Germany, Ireland, Italy, the UK, Thailand, and Argentina.

- Bioeconomy policy makers also seek to better understand societal expectations. The EU Commission has for example nominated a Bioeconomy Stakeholder Panel tasked to draft a social agenda for bioeconomy (Bioeconomy Stakeholder Manifesto). In Japan, the government supports survey and communication activities to understand societal expectations related to new bio- and plant breeding technologies. In Finland, a bioeconomy exhibition travels the country to engage with the public on bioeconomy development questions. Germany funds a social sciences research program to better understand the social and cultural aspects of a transition to the bioeconomy.
- Communication and dialogue concepts have been or are being developed. For example, governments in Finland, Germany, Malaysia, the Netherlands have already gained experience with public road shows, exhibitions and citizen conferences. There is still a need for sharing of these experiences and lessons-learned. For example, an EU project (BioStep) has been funded to collect such experiences with dialogue and outreach formats for mutual learning. The final project report has been published in February 2018.

Measure 5. To include bioeconomy topics into ongoing discussions on how to achieve the Sustainable Development Goals at international and national levels.

- Some core issues for a sustainable Bioeconomy have firstly been addressed in discussions at COP21 in Paris, at COP22 in Marrakech and COP23 in Bonn, however, still in fragmented policy fields, such as sustainable agriculture and forestry and renewable energies. The IPCC process itself has by now hardly considered the challenges and opportunities of bioeconomy and bio-innovation to achieving the Paris climate agreement. COP24 in Katowice (Poland) will offer new opportunities for a stronger reference to bioeconomy and its contribution to achieving the Paris climate goals.
- When it comes to global policy fora, the transformative contribution of agricultural and biotechnologies as well as bio-based innovation to the sustainable development goals (SDG) were highlighted in a chapter on Technology Foresight in the 2016 Global Sustainable Development Report as well as in the 2017 report of the multi-stakeholder forum on Science, Technology and Innovation for SDG. However, international efforts and initiatives to achieve the SDGs have slowed down and need to be stepped-up considerably in the coming years.
- Policy programs with a focus on monitoring and assessing the contribution of bioeconomy to the sustainable development goals have for example started in the European Union and some of its member states, in the US, Malaysia, the Nordic Council Countries, South Korea and in Latin America. Yet, country level sustainable development strategies hardly recognize the bioeconomy as a pillar for achieving the SDGs.

Measure 6. To exploit synergies from collaboration at regional level, in particular by coordination of smart regional innovation strategies.

- We observe that a considerable share of bioeconomy activities seeks to exploit synergies from regional specialization approaches. Several sub-regions in the European Union have for example coupled bioeconomy development with their Research and Innovation Strategies for Smart Specialization (RIS3). For example, the Central Hungarian region, the Island of Crete (Greece) the Spanish regions of Extremadura, Galicia and the Basque country, the Haute de France region (France), Lapland (Finland), the Lodzkie region (Poland), North Denmark, the Norte region (Portugal), Olomouc and South Bohemia (Czech Republic), Upper Austria, Värmland and Skåne regions (Sweden), Weser-Ems region (Germany), West Romania and the Emilia Romagna (Italy). Sub-regional bioeconomy strategies are further promoted in Argentina, Australia, and Canada.
- Macro-regional bioeconomy collaboration with a view to harnessing synergies across borders have been initiated, for example by the Latin American Countries of the Southern Cone, the Nordic Council Countries and the Baltic Sea region as well as by regions in Eastern Europe (BioEAST) and in the Mediterranean.
- Furthermore, regional industrial clusters in different countries have begun to collaborate. For example, the EU funded “Bio Innovation Growth mega Cluster (BIG-Cluster)” is a cross-border collaboration of clusters in the Flanders region of Belgium, the Netherlands and the German state of North Rhine-Westphalia as well as the “3BI strategic partnership” involving the Cluster Biobased Delta (The Netherlands), the BioEconomy Cluster (Germany), the Cluster BioVale (UK) and the Cluster Industries & Agro-Resources IAR (France).

Measure 7. To hold the next Global Bioeconomy Summit in two years, and to maintain the IAC until then as an informal mechanism for international coordination and cooperation activities, incl. facilitating the above mentioned international forum.

- The second GBS2018 is held from 18–20 April 2018 in Berlin. The International Advisory Council has been maintained and extended to reflect recent developments and changes. The members of the IAC2015 and IAC2018 initiated and contribute to many of the above-mentioned fora, platforms and working groups,

The Members of the International Advisory Council of GBS2018, serving in their personal capacity

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- Mohammed Ait Kadi, Morocco
- Harry Baumes, United States of America
- John Bell, European Union
- Zurina Che Dir, Malaysia
- Paul Colonna, France
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