GLOBAL BIOECONOMY SUMMIT 2020

Global Bioeconomy Summit 2020 Conference Report

Expanding the Bioeconomy

SUPPORTED BY:
Federal Ministry of Education and Research

Content

Executive Summary

About the Global Bioeconomy Summit 2020

For the first time, the third Global Bioeconomy Summit organized by the International Advisory Council on Global Bioeconomy (IACGB) was held in an interactive and virtual format from the 16th to 20th of November 2020. The Summit digitally brought together around 3000 representatives from politics, science, civil society and the business sector and from more than 50 countries to discuss the latest developments and challenges in the global bioeconomy. The international character of this year's Summit was strengthened by the guidance of five official partners, representing the European Union, Japan, the ASEAN region, Eastern Africa, and Latin America & the Caribbean.

The Summit week kicked off with a three-day (16th–18th) interactive workshop marathon, consisting of 12 workshops and over 50 breakout sessions. From the more than 50 workshop proposals received in an open call, bioeconomy stakeholders from around the world organized workshops covering a highly diverse range of topics from bioinnovation and economy to biodiversity protection and climate action.

The plenary agenda (19th and 20th) focused on innovation in a sustainable bioeconomy and the bioeconomy's role in addressing global crises, and spurring bioinnovations, markets and consumer approaches. More than 100 high-level speakers contributed to the event, including ministers and government representatives from partner countries, the European Union, Japan, the ASEAN region, Eastern Africa, and Latin America & the Caribbean, international policy experts from the United Nations and European Commission, and leading international personalities and changemakers from science, industry, and NGOs.

This year a number of special elements guided the virtual program, including a digital bioeconomy exhibition and media corner, virtual roundtables for networking, entertaining and informative video clips from projects, start-ups, and corporations from the bioeconomic sector, and an evening reception with presentations emerging food start-ups. With the goal of bringing together an eclectic and geographically diverse group of young people to act as ambassadors for the bioeconomy, this year, the IACGB selected eight Youth Champions. In addition, key summit outputs, the Global Bioeconomy Policy Report (IV) and Global Expert Survey on sustainability governance for the bioeconomy were launched.

Contributions to the Summit came from every corner of the world and with one common message: the bioeconomy has achieved significant progress in recent years in moving us towards a new economy. Nearly 60 countries around the world are pursuing bioeconomy-related policies, adapted to local conditions, and using sustainable high-tech solutions across sectors. Throughout the summit, the importance of global cooperation for sustainability and the innovations needed to drive this forward were strongly emphasized.

In its Communiqué, the IACGB, issued an urgent appeal to accelerate the global economic system into a sustainable biobased system. The Council highlighted exploiting the potential of life sciences, digitization and their interlinkages and argued that the promotion of jobs in the bioeconomy is an opportunity that needs new educational programs. Further priorities were the mobilization of financial resources for the development of the bioeconomy, more involvement of industry and business, resilient value chains, and to involve consumers much more closely through information and incentives. The Council made clear that the Bioeconomy Summit should continue to be held every two years. The first summits were organized by Germany in 2015 and 2018. With the dynamics of the bioeconomy having now increased worldwide, it provides an opportunity to take the summit to other regions of the world.

Reports on the Plenary Sessions

Political Addresses
19 November 2020

Anja Karliczek, MdB
Federal German Minister for Education and Research

In her political welcome address **Anja Karliczek**, Federal German Minister for Education and Research, highlighted the broad range of opportunities of the bioeconomy, ranging from sustainably producing more food for a growing global population, to tapping into sustainable resources and creating entirely new products. She emphasized the recent commitment for targeted innovation funding the German Federal Government made in early 2020 when adopting a new bioeconomy policy strategy. In order to expand our biological knowledge and use it to develop new procedures and systems and to strengthen a sustainable bioeconomy on a global scale the strategy strives, amongst others, to expand international cross-border collaboration. Minister Karliczek stated that the transition to a bioeconomy will only be successful if people are ready to get on board. This is why research on the transition's social impact would be key as well as developing holistic solutions together with business, science and civil society to cope with present challenges

Don Pramudwinai
Deputy Prime Minister & Minister of Foreign Affairs, Kingdom of Thailand

In his address **Don Pramudwinai**, Deputy Prime Minister & Minister of Foreign Affairs of the Kingdom of Thailand stated that the current crises force us to rethink our development plans and policies while we need to change our lifestyles. He urged the development of transformative green policies and highlighted the bioeconomy's role in driving such a transformative process with global advancements in science, technology and innovation. However, Deputy Prime Minister Pramudwinai emphasized that no country can drive this transformation process alone. This is why Thailand has contributed to the GBS since its beginning while initiating collaborating projects with various partners, e.g. the EU and the OECD on bioeconomy policies as well as research and knowledge transfer. Furthermore, Thailand, in conjunction with ASEAN countries, has developed a science, technology and innovation roadmap in order to promote regional sustainable growth. Deputy Prime Minister Pramudwinai explained that ASEAN will create an innovation ecosystem that accelerates a sustainable bioeconomy by initiating incentives and further government support as well as increasing investment in human development. As part of these efforts, Thailand has developed the Bio-Circular-Green (BCG) economy model as a new national development priority in 2018. The BCG economy focuses on 4 main areas, including food and agriculture, health and wellness, energy and materials, tourism and creative economy while each agenda is driven by public-private partnerships.

Political Addresses
20 November 2020

Julia Klöckner
German Federal Minister for Food and Agriculture

Minister **Julia Klöckner** begin by depicting the great innovative potential of the bioeconomy with science and technological progress helping to create entirely new bio-based innovation across all sectors from e-mobility, construction, to plant breeding. She further highlighted the bioeconomy's capacity to resolve target conflicts by taking into account climate and environmental protection and food security. For these reasons, Germany developed a new bioeconomy strategy in 2020 with the aim of integrating bioeconomy principles into all spheres of society and economy with the support of an investment of EUR one billion in research, development and innovation. Lastly, she touched on the global dimensions of the bioeconomy, the close strategic cooperation of the German Minister and the UN FAO over the years, and the need for events like GBS2020 to bring together different regional bioeconomy approaches.

Qu Dongyu
Director General, United Nations Food and Agriculture Organization (UN FAO)

Director General **Qu Dongyu** spoke of the critical role of the bioeconomy in bringing about a radical transition. He highlighted three types of innovation necessary for this transition, including technological e.g. the power of biotechnology and bioindustry, organizational e.g. new polices to promote innovation and institutional behavior change, and social e.g. balancing the interests of the planet, smallholder famers, and consumers. Five essential elements necessary to advance the bioeconomy were brought to the forefront: 1) the importance of international cooperation between governments, and public and private researchers, 2) comprehensive data monitoring to measure bioeconomy development and contributions to the SDGs, 3) linking bioeconomy initiatives to the multilateral policy process such as the Paris Agreement and Biodiversity targets, 4) identifying how public policies can contribute or create barriers to bioeconomy development, 5) and the need for research, development and innovation programs to encourage global cooperation and innovation in the bioeconomy.

Plenary Session I:

Setting the Scene – New Dynamics in Bioeconomy Development

Introduction

Co-Chairs:

- Christine Lang, Co-Chair, International Advisory Council on Global Bioeconomy (IACGB)
- Joachim von Braun, Co-Chair, International Advisory Council on Global Bioeconomy (IACGB)

The first day of the GBS2020 plenary program was opened by Christine Lang and Joachim von Braun, the Co-Chairs of the International Advisory Council on Global Bioeconomy by looking back on how the bioeconomy has developed since the GBS2015 and GBS2018. They concluded that today the bioeconomy is not only focusing on biomass anymore and is no longer only about the substitution of fossil fuels, but rather on producing high value products and developing high value processes. Today the bioeconomy is a global theme which needs to support health and wellbeing through innovation. Lang revealed that the GBS2018 showed more complexity in the global bioeconomy arena and that mindsets have changed since. Von Braun highlighted today's sense of opportunity for further bioeconomy development as consumers are asking for more sustainability and also increasingly for biobased products. At the same time, this sense of opportunity would be paired with a sense of urgency to move quickly to a sustainable bioeconomy in order to cope with climate change and avoiding costs of inaction.

Finally, the Co-Chairs emphasized the focal points of GBS2020, which are: capitalizing on the power of science and technology, especially in breakthroughs in biosciences; mobilizing finance and investment for bioeconomy development; strengthening the involvement of industry and business; promoting resilient biobased value chains that combine the global with the local; educate and train for new jobs; foster start-up innovation capacities; and strengthening demand-side polices.

The Debate

Co-Chairs:

- Christine Lang, CSO, BELANO Medical AG | Manager, MBCC Group I IACGB
- Joachim von Braun, Director, Center for Development Research (ZEF), University of Bonn I IACGB

Panelists:

- Ruben G. Echeverría, International Food Policy Research Institute (IFPRI) I IACGB
- Julius Ecuru, Head, BioInnovate Africa Program, International Centre of Insect Physiology and Ecology (icipe) I IACGB
- Yin Li, Professor, Institute of Microbiology, Chinese Academy of Sciences (CAS) I IACGB
- Elspeth MacRae, Chief Innovation and Science Officer, SCION I IACGB
- Mary Maxon, Associate Laboratory Director for Biosciences, Lawrence Berkeley National Laboratory I IACGB
- Morakot Tanticharoen, Senior Advisor to the President of the National Science and Technology Development Agency Thailand (NSTDA) I IACGB

In Plenary Session 1 the panelists identified the key issues and opportunities of bioeconomy addressed throughout the GBS2020, including the three overarching themes: bioeconomy and health, science and technological breakthroughs, and climate action and biodiversity protection.

During the debate, **Mary Maxon** explained how our perspective on the bioeconomy concept has broadened, e.g. through advances in synthetic biology, genome editing, artificial intelligence, machine learning etc. which transformed the potential of biotechnology to drive the economy and all economic sectors. Bold bioeconomy policies would be necessary that support and advance these developments and contribute to the industrial transition.

Yin Li highlighted that the bioeconomy should position itself to provide better solutions and innovations as well as products and services for the health of the people and the health of the planet. While we would be faster than ever before to react to global crises with the help of innovations, he asked how we could accelerate new processes and technologies in the future.

Julius Ecuru emphasized that policy initiatives that encourage innovation ecosystems in the biobased sectors and that promote mutual and beneficial partnerships between science and industry across countries and regions will make "build back better" successful in emerging economy countries and will also be beneficial for job growth in the bioeconomy.

Ruben Echeverría explained the bioeconomy's important role for a sustainable global food system. In this context, he highlighted the need to design and implement better international food policies, sharing knowledge and building capacity to promote an inclusive bioeconomy across countries and to create business opportunities across value chains and sectors.

Morakot Tanticharoen focused on the importance of the science-policy interface (SPI) and the challenges of finding new SPI approaches to foster the bioeconomy, including addressing the broader policy context, maintaining continuity, expertise and quality, integrating SPI activities, and identifying respective SPI strategies.

Elspeth MacRae stated that COVID-19 gives us the opportunity to accelerate bioeconomy development, which is why long-term science investments would be needed that consider the whole value chain. Open source data and sharing the results of scientific work would be key for global bioeconomy cooperation.

Joachim von Braun urged that the Global Bioeconomy Summit must remain a vital platform and global public good.

Christine Lang concluded that the transition to a sustainable bioeconomy will be the joint, long-term task of governments, industry, academia, and citizens.

Plenary Session II:

The Bioeconomy's Role in Solving Global Crises and Contributing to a Resilient, Sustainable Economy and Future for All

The Keynotes:

- Paola Vega-Castillo, Minister of Science, Technology and Telecommunication, Costa Rica
- Emily Leproust, CEO, Co-founder and Director of Twist Bioscience
- Frank Rijsberman, Director General, Global Green Growth Institute (GGGI)
- Dabo Guan, Professor for Climate Change Economics, Tsinghua University

Plenary Session 2 looked at solutions for a complex set of crises (climate, biodiversity, economic and health) through the lens of the bioeconomy, how they can be addressed as interdependent events, and how bioeconomic solutions contribute to long-term strategies for more resilient economic and environmental systems. The session shed light on options and experiences of evidence-based policy actions and business approaches that seek to cope with global crises and to achieve the SDGs and the Paris Agreement.

In her introductory keynote **Paola Vega-Castillo** highlighted that her country aims at promoting the bioeconomy as one pillar of its productive transformation in order to promote innovation and added value as well as the diversification and sophistication of the country's economy. In this regard, Costa Rica launched a national bioeconomy strategy in August 2020. Minister Vega-Castillo emphasized that the greatest challenge will be to manage the globalization of the bioeconomy which is why international political agreements would be necessary to collectively transform our societies into sustainable and resilient bioeconomies, e.g. through collaborative research, regulatory systems and market incentives.

Emily Leproust explained the potential of gene synthesis to enable the exponential growth of synthetic biology applications in multiple fields including medicine, DNA data storage, agricultural biology and industrial chemicals. In order to accelerate these technological advances in the future she urged for augmented course offerings for professional careers, increased coordination among government agencies, fostering international coordination for biosecurity standards, categorizing biomanufacturing as critical infrastructure, prioritizing investment in synthetic biology R&D, and evaluating security implications.

Frank Rijsberman highlighted the role of nature-based solutions for climate adaption. He was optimistic that the COVID-19 recovery could be combined with green deal policies and NetZero commitments by 2050. Especially for emerging and developing economies novel green deals would provide opportunities to focus on natural capital investments for job creation in rural areas. He further emphasized the bioeconomy's role in contributing to green recovery from COVID-19, green jobs, and GHG emissions reductions (accelerate climate action).

Dabo Guan stated in his keynote that the COVID-19 pandemic caused a record decline in global CO_2 emissions while the pandemic's costs for the economy comprise 40 percent of global GDP loss. Guan elaborated that relaxing lockdown restrictions gradually over a long period of time results in substantially lower supply-chain effects than lifting restrictions quickly if it means avoiding another round of strict lockdowns in the coming year. In the case the pandemic recurs, stricter and shorter lockdowns (which may depend on global coordination) greatly would reduce losses (11 percent globally). According to Guan, strong climate policies and sustained investment can provide valuable jobs, revitalize economies and get the world on track to meeting the 1.5°C Paris Agreement goal.

The Debate

Moderator:

- Magdalena Skipper, Editor in Chief, Nature

Panelists:

- Dirk Carrez, Executive Director, Bio-based Industries Consortium (BIC)
- Brendan Edgerton, Director, Circular Economy at World Business Council for Sustainable Development (WBCSD)
- Torfi Jóhannesson, Senior Adviser at the Nordic Council of Ministers
- Leena Srivastava, Deputy Director General for Science of the International Institute for Applied Systems Analysis (IIASA)
- Helena Vieira, Director General Maritime Policy, Ministry of Agriculture and Sea, Portugal
- Rachel Wynberg, Professor, Department of Environmental and Geographical Science, University of Cape Town

In the second part of plenary session 2 the panelists discussed, amongst others, how we best interpret what globally oriented SDGs mean when implemented in the biobased industry context. Torfi Jóhannesson stated that while the SGDs are still a valid framework for a more sustainable future, we constantly need to revisit and adapt them from the global to the regional and local level.

Dirk Carrez highlighted the need to measure the biobased industries' progress to the SGDs in a quantitative way and to develop a toolbox with instruments to assess whether and how projects and investments are contributing to certain SGDs.

Leena Srivastava discussed how can we strengthen the science system for bioeconomy in the post COVID-19 area and highlighted that science and the science system are currently not doing well in supporting sustainable values (especially in terms of equity, justice and resilience) and that the science community needs to respond to the challenges, e.g. faced by small-holder farmers and their families.

Brendan Edgerton urged that successful innovation of tomorrow needs to solve our greatest challenges within the socio-economic and environmental context, which is why we would need to adapt the framework through which we define successful innovation and ensure that it counts for natural and social capital impact.

Helena Vieira explained that the bioeconomy provides great solutions for addressing climate change, biodiversity loss and unsustainable food systems, e.g. solutions for carbon sequestration and storage through sea forestation or new biobased products, while sustaining growth and jobs. In this respect, she highlighted that when we talk about bioeconomy, we need to look at the totality of the planet, including oceans.

Torfi Jóhannesson further emphasized that platforms encouraging networking, collaboration, targeted dialogue and inclusive discussions are needed for sharing best practices in bioeconomy development and using big data to better understand consequences of polices at local level.

Rachel Wynberg discussed how we best integrate environmental, climate change, and bioeconomy issues into policy. She came to the conclusion that we need to start making bold moves to new economic thinking and paradigms that include shifting towards metrics to better measure people and planet. She further emphasized that the lens of policy strategies must be widened by including a much broader range of voices and that they need to address critical questions, e.g. concerning our foundational vision of a good society and the purpose of new technologies (such as genetic engineering).

A poll during the session asking for the audiences' ideal of progress revealed that 54 percent of the participants advocate for relative decoupling, including technological progress and efficiency gains as a declared goal, while 46 percent voted for absolute decoupling and to stop the increase in resource consumption. The panelists came to the conclusion that it is not either or, rather we would need a scenario were these two approaches are combined and viewed as transitional in order to channel technological progress to lead us to absolute decoupling.

Plenary Session III:

Bioeconomy Innovations, Markets, Consumers and Wellbeing

The Keynotes:

- Jeffrey Sachs, University Professor & Director, Center for Sustainable Development, Columbia University
- Agnes Matilda Kalibata, President, Alliance for a Green Revolution in Africa (AGRA)
- Marcus Remmers, Chief Technology Officer, Royal DSM
- Hiroyuki Kojima, Chief Innovation Officer, Ajinomoto Co., Inc.

Plenary session 3 sought to gain new insights on how to advance a "biologization of the economy" and to identify the drivers and hurdles as well as governance and enabling frameworks for emerging technologies, innovations and markets. Pioneering examples from public policy, industry and business were presented on how to achieve sustainability in production and use of biological resources as well as emerging trends and concepts in sustainable consumption and wellbeing.

Jeffrey Sachs returned to the GBS stage to deliver remarks on the vast opportunities of the bioeconomy and the necessity of honoring broader constraints to ensure holistic and sustainable pathways. Sachs warned against the temptation of single solutions and identified four critical constraints to be observed, namely 1) healthy diets, 2) conservation of biodiversity, 3) carbon management, 4) and circular economy. Furthermore, he highlighted promising areas of the bioeconomy to be further explored in a holistic manner, including 1) plant-based protein diets, 2) global supply chain management, 3) limited space for bioenergy and biofuels, 4) agro-ecological farming systems, and 5) mass land regeneration and restoration. Sachs also noted that this is a decisive time for global diplomacy on bioeconomy, with key events such as the development of the European Green Deal, CBD COP15, COP26, and the World Foods Systems Summit taking place.

Strengthening global food systems for people and planet was the topic of discussion for **Agnes Matilda Kalibata**. Kalibata identified five critical areas from the African context where opportunities exist for improvement: 1) keeping a hunger perspective in the foreground, 2) examining consumer behavior, 3) shifting to nature positive agriculture production, 4) improving livelihoods, and 5) building resilience. She further identified current solutions which are both good for people and planet and could be successfully scaled up.

Marcus Remmers shared emerging trends and opportunities from the corporate world, where transitioning from a linear to circular economy presents an extra economic output of USD 4.5 trillion globally by 2030. Opportunities in cellular agriculture, plant-based proteins, genomic editing, artificial intelligence, and biobased chemicals as well as other key enabling elements such as digitalization that will accelerate the speed and precision of biosciences R&D were presented. Lastly, Remmers touched on the importance of creating ecospheres to incentivizes innovation and competition and of partnering across sectors and industry to create sustainable solutions.

Pioneering examples from industry in Japan on how to achieve sustainability in production were presented by **Hiroyuki Kojima**. Kojima highlighted the benefits of amino-acid production for nutrition, animal feed, effective use of farmland, and emissions reduction in the bioeconomy.

The Debate

Panelists:

- Daniel Dominguez, Co-founder and Strategic Alliances Director, Allbiotech
- Louise Fresco, President, Wageningen University
- Klaus Pellengahr, Director, Novozymes A/S and General Manager of Novozymes Berlin
- Lucia Reisch, Professor of Intercultural Consumer Research and Behavioural Public Policy, Copenhagen Business School
- Virgilio Mauricio Viana, Director General of the Sustainable Amazon Foundation (FAS)

In the plenary session 2 debate, **Louise Fresco** provided critical insights into expanding the science and policy interface, key among them, bringing the agriculture, food, and energy sectors together to find sustainable solutions. At the European level, this entails aligning the Green Deal with agriculture policy in a realistic way to better promote circularity, recycling, upcycling etc., examining the entire food chain as one area of policy, and identifying tradeoffs.

The role of new business models and entrepreneurship as a main source of sustainable innovation and job growth in the bioeconomy was highlighted by **Daniel Dominguez**. Dominguez spoke to the need for new models for education and technological transfer to ensure a new generation of scientist entrepreneurs. Expanding on this issue, **Klaus Pellengahr** underlined how sustainability has become a key business driver for companies, which are beginning to incorporate the SDGs into impact categories and actions in their business models. He further highlighted differences setting the EU apart from the rest of the world and the need to overcome gaps in outdated regulatory frameworks and financing schemes so that biobased products are on level ground with fossil-based products and new solutions can be brought to the market.

Virgilio Viana took an institutional perspective by identifying five key areas that can be better designed to support the development of sustainable bioeconomies: 1) addressing poor coordination through cross institutional alliances, 2) ensuring continuity in public polices by supporting processes facilitated by civil society, 3) resolving conflicts between different stakeholder groups through cross institutional public commitments and transparent and harmonized accounting, and 4) moving from boycotts to better incentives.

Lucia Reisch dove into the different strategies (e.g. increasing efficiency, sufficiency, and consistency) for sustainable consumption, including the unintended consequences and potential of each area. Reisch underlined the need to not only increase awareness, but to also change behavior through laws, regulations and financial incentives. Both Reisch and Fresco stressed the urgent need to engage society at large in such discussions and ensure that the social and ethical perspectives are not left behind.

In response to an audience poll on designing productive alliances among public and private actors, panelist acknowledged the importance of levelling the playing field for biobased businesses and products as well as ensuring cross sector and ministerial alliances.

Plenary Session IV:
Investing in the Bioeconomy

The Keynotes:

- Emily Chew, Global Head of Sustainability for Investment Management, Morgan Stanley
- Werner Schmidt, Director of the Environment and Sustainable Territorial Development Department within the Projects Directorate of the European Investment Bank (EIB)
- Ipshita Mandal-Johnson, Founder and CEO, Global Bio Fund & Co-Founder of the Global Biotech Revolution
- Kolawole Adisa Olonade, Senior Lecturer, Department of Civil and Environmental Engineering, University of Lagos

Plenary Session 4 looked to identify the capabilities and financial resources necessary to accelerate the transition to a sustainable bioeconomy. The introductory keynotes shed light on key actors and initiatives relating to funding, investment, and entrepreneurship.

In her keynote, **Emily Chew** spoke to the current challenges and opportunities in bioeconomy investing. She touched on the different implementation styles of integrating sustainability in investments, such as exclusions, Environmental, Social, and Corporate Governance (ESG), and impact-oriented investing and the data challenges and lack of standards hindering better company disclosure. Promising trends included increasing investor engagement such as the Climate Action 100+ initiative, nature-based asset funds, new taxonomy standards such as the EU Taxonomy project, and technologies that allow greater surveillance.

Werner Schmidt discussed in his keynote the role of the European Investment Bank (EIB) in supporting a sustainable bioeconomy through the Natural Capital Financing Facility (NCFF), Circular Bioeconomy Fund (ECBF), the Land Degradation Neutrality (LDN) Fund, and Climate Bank Roadmap, which will provide EUR 1 trillion in investment for climate action and environmental sustainability in the decade to 2030.

As founder and CEO of the Global Bio Fund and Global Biotech Revolution, **Ipshita Mandal-Johnson** highlighted the role of global platforms and funds in supporting diverse entrepreneurs. She stressed the need for venture capital to evolve to ensure long-term stakeholder value and to build businesses focused on more comprehensive value creation.

Kolawole Adisa Olonade presented an example in the design and implementation of sustainable construction practices using biowaste and its importance as a form of capacity building and regional and international collaboration in Africa.

The Debate

Panelists:

- Michal Devir, Co-Founder and General Managing Partner at Rimonim Agro VC
- Ray Dhirani, Head of Sustainable Finance, WWF-UK
- Chris Fall, Director of the Department of Energy's Office of Science, USA
- Pablo Nardone, Advisor, Ministry of Science, Technology and Innovation, Argentina
- Kitipong Promwong, President, Office of National Higher Education Science Research and Innovation Policy Council, Thailand
- Benjamin Simmons, Founding head of the Green Growth Knowledge Partnership

In the second half of Plenary Session 4, a diverse group of panelists discussed a range of topics related to investing in the bioeconomy.

Michal Devir spoke to experiences from Israel in driving early stage investment in the bioeconomy.

Ray Dhirani from the WWF called attention to the proliferation of standards for sustainable finance and the need for their science-based alignment. He noted that while the climate change agenda has entered many board rooms, challenges remain with integrating the closely interlinked topics of biodiversity and the bioeconomy.

Chris Fall from the US Department of Energy discussed ways in which the government can foster innovation in the bioeconomy e.g. through large investments in infrastructure and fostering the convergence of different disciplines. Furthermore, he drew lessons from the COVID-19 crisis in which we witnessed speedy collaboration and regulation simplification.

Pablo Nardone focused on how education and training formats could be adapted to better ensure the cooperation of entrepreneurs and investors.

Kitipong Promwong provided examples from Thailand on how innovation ecosystems can be best organized for bioeconomy development.

Benjamin Simmons provided concrete examples on how international knowledge platforms can contribute to empowering evidence-based decisions and ultimately investment.

The panelist further reacted to an audience poll in which the government was seen as holding the highest responsibility for driving the bioeconomy forward and discussed the notion of shared responsibility. Many noted the unprecedented collaboration due to the COVID-19 crisis and the need to build on these efforts.

Plenary Session V:

Outlook and Recommendations

The Debate (Part A)

Co-Chairs:

› Christine Lang, Co-Chair, IACGB | CSO, BELANO Medical AG | Manager, MBCC Group

› Joachim von Braun, Co-Chair, IACGB | Director, Center for Development Research (ZEF), University of Bonn

Panelists:

› Vladimir Popov, Full Member of the Russian Academy of Science I IACGB

› Marcelo Regunaga, Member of the Group of Producing Countries from the Southern Cone I IACGB

› Charlotte Sode, Head of Sector Bioeconomy, European Commission

› Flora Ismail Tibazarwa, Programm Director, Southern African Innovation Support Program (SAIS) I IACGB

In the first panel session key recommendations of the Communiqué and Vision Document on a global sustainable bioeconomy were presented by the International Advisory Council on Global Bioeconomy (IACGB).

Vladimir Popov touched on the urgency of capitalizing on the power of science and technology during this moment and the capacity to provide a unified response to the most challenging tasks facing the world. The COVID-19 pandemic emphasized the importance of basic fundamental research leading to technological progress and the unprecedented speed, openness, and robustness with which the worlds scientific community can come together. With life sciences along with their merging with digital and material sciences at the heart of modern biotechnology and the bioeconomy, he called for ensuring the continuation of science funding.

Marcelo Regunaga noted the importance of promoting resilient value chains and the role of the bioeconomy in reconciling local and global opportunities. He highlighted examples of successful intensification production systems and low carbon production strategies from the LAC region and the importance of shared and cooperative solutions.

The importance of fostering bioeconomy jobs through partnerships and innovation policies in emerging economies was highlighted by **Flora Ismail Tibazarwa** through her work supporting skill development and incubators and multipliers in the South African region.

Charlotte Sode reiterated the need to develop competitive and inclusive biobased industry and the tools utilized by the EU, including equity funds such as the ECBF and public-private partnerships such as BBI JU that are helping bring biobased products to the market and demonstrating enabling technologies.

Co-Chair, **Christine Lang**, noted the importance of mobilizing funding and strengthening demand-side policies as the bioeconomy has transitioned from the niche market to where biobased products and processes are fully integrated. She encouraged governments to act in their capacities to level the playing field, reduce regulator barriers, set up public procurement policies, and create the right incentives for finance.

Shared responsibilities and the need for a global platform on bioeconomy was highlighted by Co-Chair, **Joachim von Braun** in order to ensure coherent global polices on regulation, trade, and science and ultimately to bring about a global green deal. He highlighted the essential role of the IACGB in bringing about collective action and the need to build on the GBS2020 official partnerships to ensure a fourth GBS.

The Debate (Part B)

Panelists:

- Johann Liebeton, Bioeconomy Youth Champion
- Derk Loorbach, Director, Dutch Research Institute for Transitions (DRIFT) and Professor of Socio-economic Transitions at the Faculty of Social Science, Erasmus University Rotterdam
- Tokelo Shai, Bioeconomy Youth Champion
- Klaus Töpfer, former Director General of UNEP & former federal German Minister for the Environment.

In the second panel, the co-chairs of the IACGB discussed the key recommendations together with youth representatives and transition management experts.

Tokelo Shai and **Johann Liebeton**, Bioeconomy Youth Champions of GBS2020, presented findings developed at a youth workshop on the challenges and future opportunities for young people in the bioeconomy and discussed the need to ensure that experts and youth are sitting at the same table.

Klaus Töpfer spoke to further actions necessary to shape the bioeconomy, including incorporating intellectual property right issues, better communication between the public and private spheres, a deepening of discussions on ethics, and the inclusion of social aspects such as power and social structures in order to ensure a just and sustainable future.

Transition expert, **Derk Loorbach**, provided insights into how we deal with the destabilization that comes along with moving away from the linear and fossil based old model of working and towards a nature positive economy. This will require a different mindset and understanding of innovation and value in the economy, the embracing of disempowered communities and "translocal" context specific initiatives that connect communities to global markets but are guided by shared principles.

Co-chair, **Christine Lang**, recalled just how far the bioeconomy has come over the past years, from a niche area to holding a central role in discussions of societal change. While much has been accomplished over the past five years, she noted the need for future summits and more international collaboration. In looking back at key impulses from GBS2020, co-chair, **Joachim von Braun**, emphasized that a bioeconomy that doesn't protect nature, address nutritional and food security, and create jobs and employment is no bioeconomy at all as it would undermine the worlds prosperity and tolerate gross inequalities that persist to this day. He emphasized that the bioeconomy reflects the complexity of the world and that challenges remain to ensure a value-driven economic system that values people, economy, nature, and biodiversity holistically. He ended the summit by calling for a new higher level of ambition and action to fully equate opportunity and urgency.

Communiqué & IACGB

The International Advisory Council of GBS2020

The International Advisory Council on Global Bioeconomy (IACGB) has been setup as an informal platform of leading bioeconomy experts from both hemispheres to review the state of bioeconomy in different parts of the world and to identify opportunities for an accelerated transition to sustainable bioeconomy. The IACGB was first formed for the Global Bioeconomy Summit 2015 and has been maintained, extended and updated for the GBS2018 and GBS2020. The IACGB members contributed significantly to agenda setting and the workshop program of the GBS2020. Most importantly, the exchanges within the IACGB have resulted in the Communiqué, a set of recommendations for international bioeconomy policy which was presented at the Summit.

Communiqué ➔
https://gbs2020.net/wp-content/uploads/2020/11/GBS2020_IACGB-Communique.pdf

First Name	Last Name	Position
Mohammed	Ait Kadi	President, General Council of Agricultural Development Morocco
Mohd	Aslam	Advisor, Department of Biotechnology, Ministry of Science and Technology, India
Monique A.V.	Axelos	Scientific Director for Food and Bioeconomy, National Research Institute for Agriculture, Food and Environment (INRAE)
Anne	Bogdanski	Senior Natural Resources Officer, Climate and Environment Division (NRC), UN Food and Agriculture Organization (UN FAO)
Sascha	Bollermann	Senior Advisor, Strategy, Knowledge and Innovation, Ministry of Agriculture, Nature and Food Quality, The Netherlands
Hugo	Chavarría	Coordinator, Bioeconomy and Production Development Program, Inter-American Institute for Cooperation on Agriculture (IICA)
Achim	Dobermann	Chief Scientist, International Fertilzer Association
Ben	Durham	Chief Director Bio-innovation, Department of Science and Innovation, South Africa
Ruben	Echeverría	Senior Research Fellow, International Food Policy Research Institute (IFPRI)
Julius	Ecuru	Head, BioInnovate Africa Program, International Centre of Insect Physiology and Ecology (icipe)
Ahmed	Fahmi	Program Specialist, Natural Science Sector, United Nations Educational, Scientific and Cultural Organization (UNESCO)
Fabio	Fava	Professor, Industrial and Environmental Biotechnology, University of Bologna
Yoshiyuki	Fujishima	Senior Analyst, Bioeconomy Unit, Technology Strategy Center, New Energy and Industrial Technology Development Organization (NEDO)
Josef	Glössl	Former Vice Rector for Research and International Research Collaboration, University of Natural Resources and Life Sciences, Vienna (BOKU)
Torfi	Jóhannesson	Senior Advisor, Agriculture & Forestry, Nordic Council of Ministers
Richard	Kitney	Professor, Imperial College London & Chairman, Institute of Systems and Synthetic Biology
Christine	Lang	Manager, MBCC Group – Consulting and Coaching in Microbiotics and Bioeconomy
Yin	Li	Professor, Institute of Microbiology, Chinese Academy of Sciences (CAS)
Mauricio	Lopes	Senior Scientist, Brazilian Agricultural Research Organization – Embrapa
Mogens	Lund	Director of Division for Food Production and Society, Norwegian Institute of Bioeconomy Research (NIBIO)
Elspeth	MacRae	Chief Innovation and Science Officer, SCION
Jussi	Manninen	Executive Vice President, Solutions for Natural Resources and Environment, VTT Finland
Mary	Maxon	Associate Laboratory Director for Biosciences, Lawrence Berkeley National Laboratory
Murray	McLaughlin	Co-chair, Government's Industrial Bioproducts Value Chain Roundtable
Paulus	Mungeyi	Manager Biotechnology, National Commission on Research, Science and Technology
Ian	O'Hara	Professor, Queensland University of Technology
Christian	Patermann	International Bioeconomy Expert & former Director Biotechnology, DG Research & Innovation, European Commission

First Name	Last Name	Position
James	Philp	Policy Analyst, Science and Technology Policy Division, Organisation for Economic Co-operation and Development (OECD)
Vladimir	Popov	Director, Federal Research Center «Fundamentals of biotechnology» of the Russian Academy of Sciences
Frank	Rijsberman	Director General, Global Green Growth Institute (GGGI)
Adrián	Rodriguez	Chief, Agricultural Development and Biodiversity Unit, United Nations Economic Commission for Latin America and the Caribbean (UN ECLAC)
Morakot	Tantichaoren	Senior Advisor to the President, National Science and Technology Development Agency (NSTDA)
Omid	Tavakoli	Assistant Professor, School of Chemical Engineering, College of Engineering, University of Tehran
Flora Ismail	Tibazarwa	Program Director, Southern African Innovation Support Program (SAIS)
Federico	Torres-Caballo	Vice-Minister for Science and Technology, Ministry of Science, Technology and Telecomunications,, Costa Rica
Eduardo	Trigo	Bioeconomy Advisor to the Government of Argentina
Marcelo	Regunaga	Advisor, Group of Producing Countries from the Southern Cone
Ivar	Virgin	Senior Researcher, Stockholm Environment Institute (SEI)
Joachim	von Braun	Director, Center for Development Research (ZEF), University of Bonn
Peter	Wehrheim	Head of Bioeconomy and Food Systems, DG Research & Innovation, European Commission
Seung Jun	Yoo	Chief Strategy Officer, TP Global/Healthcare

GBS2020 Partners

For the first time, the International Advisory Council on Global Bioeconomy (IACGB) welcomed official partners from each continental region to strengthen the international character of the GBS. The Summit was thus organized together with five official partners, representing Japan, the ASEAN region, Eastern Africa, the European Union, and Latin America & the Caribbean. As an essential part of the GBS2020, each partner led a Spotlight Session to present its bioeconomy activities and also participated in a Partner Debate.

Spotlight on Official GBS2020 Partners

EASTECO & BioInnovate Africa

Participants:

- Muyambi Benda Fortunate, Acting Executive Secretary at East Africa Science and Technology Commission (EASTECO)
- Elioda Tumwesigye, Minister for Ministry of Science, Technology and Innovation Uganda
- Kassahun Tesfaye, Director, Ethiopian Biotechnology Institute, Ministry of Science and Technology
- Julius Ecuru, Steering Group Member, IACGB | Head, BioInnovate Africa Program, International Centre of Insect Physiology and Ecology (icipe)

During the Spotlight Session of the East African Science and Technology Commission (EASTECO) and the BioInnovate Africa Program **Muyambi Benda Fortunate** took the opportunity to present the new Eastern African Bioeconomy Strategy, published in October 2020 and comprised of six countries, Burundi, Kenya, Rwanda, South Sudan, Tanzania, and Uganda. He called attention to the objectives of the strategy, including promoting the sustainable industrialization of the region, creating jobs and green growth, improving food, nutrition security and health, creating new forms of sustainable bioenergy and protecting the environment. In order to achieve these objectives, the strategy focuses on key enablers, such as creating an enabling policy environment; enhancing the bioeconomy innovation system; fostering capacity development; and promoting coordination, partnerships, communication and effective regional collaboration. **Kassahun Tesfaye** highlighted that the regional strategy came just in time as many developing countries are following the trend of placing bioeconomy on their political agendas in order to transform their domestic economies into sustainable ones by benefiting from sustainable bioresource development. **Minister Elioda Tumwesigye** emphasized that the bioeconomy is as catalytic as oil and gas for industrial development and that mutual partnerships through south-south and north-south cooperation will be key in developing a sustainable bioeconomy. **Julius Ecuru** summarized the session by highlighting the opportunities for synergizing a sustainable bioeconomy with the digital economy, which would be the future driver for sustainable development in the region. Ecuru further emphasized that the Eastern African Bioeconomy Strategy gives the region a shared vision and framework for investing in R&D and building a regional innovation ecosystem. Political leadership and collaboration between academia, industry and government would be key in order to translate biological based ideas into sustainable businesses.

Spotlight on Official GBS2020 Partners

European Commission

Participants:

- John Bell, ”Healthy Planet” Director in the DG Research & Innovation at the European Commission
- Philippe Mengal, Executive Director of the Bio-based Industries Joint Undertaking (BBI JU)
- Marc Palahí, Director of the European Forest Institute
- Sarah Mubareka, Scientific and Technical Officer at European Commission, Joint Research Centre

The spotlight was on the European Commission, as an official GBS2020 partner, and specifically the role of bioeconomy in the European Green Deal. **Philippe Mengal** introduced the work of the BBI JU and outlined the importance of sustainability in its work. **Marc Palahí** highlighted the role of the forest-based sector and the bioeconomy as the missing link in the Green Deal connecting the dots to ensure inclusive prosperity, climate neutrality, and biodiversity. **Sarah Mubareka** provided a scientific perspective on whether the demand for biomass in the EU is in line with planetary boundaries and the need to better understand the impact of climate change on biomass availability and the impact of biomass imports. **John Bell** wrapped up the discussion by highlighting aspects of the bioeconomy that were central to the Green Deal such as the Farm to Fork Strategy, the industrial part of the circular economy strategy, the post waste strategy, pollution strategy, the Renovation Wave strategy and decarbonization goals. He characterized the bioeconomy as the secret weapon of the transition, an intelligent green algorithm ticking away behind this great shift.

Spotlight on Official GBS2020 Partners

Inter-American Institute for Cooperation on Agriculture (IICA)

Participants:

- Hugo Chavarría, Manager of the Hemispheric Program of Bioeconomy and Productive Development; IICA
- Elizabeth Hodson, Prof. em. Pontificia Universidad Javeriana, Colombia
- Federico Trucco, CEO of Bioceres Crop Solutions, Argentina
- Carolina Balian, Adviser, Office of Agricultural Programming and Policy, Ministry of Livestock, Agriculture and Fisheries, Uruguay
- Eduardo Trigo, Adviser of the Hemispheric Program of Bioeconomy and Productive Development; IICA

During IICA's Spotlight Session **Hugo Chavarría** highlighted that the bioeconomy in Latin America and the Caribbean (LAC) means both, need and opportunity. Particularly the new frontiers of technology, science and knowledge would provide new opportunities to capitalize on resources differently – efficiently and sustainably – to produce products and services for whole communities. He further highlighted that in LAC the bioeconomy provides not only great potential, but is reality already, e.g. when referring to biotechnology applications, green chemistry businesses, low-carbon agriculture, and efforts in biodiversity protection. In the following discussion the panelists discussed the evolution of the bioeconomy in LAC and what is expected for the future. They agreed that a paradigm shift from economies of scales to economies of repetition (of knowledge) would be needed to accelerate the bioeconomy as sustainable territorial development model with circular productive systems. As financial resources will be scarce in the future due to the pending global corona crisis the panelists emphasized the need to prioritize activities for bioeconomy development and concentrate on promoting education and training, raising public awareness, fostering agriculture 4.0 activities, facilitating knowledge and technology transfer, adopting bold policies and ensure good governance at national level.

Spotlight on Official GBS2020 Partners

Thailand/ASEAN

Participants:

- Yongyuth Yuthavong, Advisor to the President of Thailand National Science and Technology Development Agency (NSTDA)
- Wijarn Simachaya, President of Thailand Environment Institute
- Stefanos Fotiou, Director of the Environment and Development Division in the UN ESCAP
- Narong Sirilertworakul, President of National Science and Technology Development Agency (NSTDA)

This Spotlight Session was organized by the National Science and Technology Development Agency (NSTDA) of Thailand, representing the ASEAN region, as an official GBS2020 partner. It provided insight into the bioeconomy activities of various ASEAN countries and young PH.D. students from Cambodia, Indonesia, Laos and Hong Kong were allowed to share their experiences in this field during the session. **Yongyuth Yuthavong** emphasized at the outset that the three areas, agriculture/bioresources, industry and service were merging more and more (e.g. to agro-industries) and that an era of modern bioeconomy had dawned in almost all of Asia. **Wijarn Simachaya** highlighted the bioeconomy's contribution to biodiversity conservation and job creation. With a view to the booming construction and transport sector, **Stefanos Fotiou** pointed out the potential of bioeconomy products and materials for sustainability. He also pointed to the important contribution to nature conservation and food security. Finally, **Narong Sirilertworakul** drew attention to public private partnerships (PPPs) especially in the form of innovation hubs, which could achieve great success in the food sector in particular.

Spotlight on Official GBS2020 Partners

Japan

Participants:

- Shigeo Okaya, Deputy director general of National Institute of Sciense and Technology Policy, Minstry of Education, Culture, Sports, Science and Technology (MEXT)
- Tokutaro Nakai, Vice-Minister, Ministry of Environment
- Takashi Tatsumi, President, National Institute of Technology and Evaluation (NITE)
- Shigetoshi Ikeyama, Deputy Director General, Ministry of Agriculture, Forestry and Fisheries (MAFF)
- Yuji Sekiguchi, Principal Research Manager, National Institute of Advanced Science and Technology (AIST)

The spotlight was on Japan, as an official GBS2020 partner, and specifically the role of biotechnology and digitalization in its bioeconomy. **Shigeo Okaya** began by pointing out the genesis, main themes and particularities of the Japanese Bioeconomy Strategy. The Strategy was published in June 2019 and will be updated annually to reflect the development of research and industry efforts. **Tokutaro Nakai** appealed to emerge stronger from the COVID-19 pandemic and to advance the transformation to a more sustainable and resilient economy with a focus on decarbonization and circular economy. **Takashi Tatsumi** emphasized the great importance of microorganisms for developing innovative bio-based products. In this context the DBRP, Data and Biological Resource Platform, which contains various kind of data associated with microbial resources, was highlighted. **Shigetoshi Ikeyama's** main focus was microbiome research. Standardization of microbiome measurements was a challenging, but important task for supporting many industrial activities and Japan has followed this path very successfully. Finally, **Yuji Sekiguchi** presented Japan's project "Biomass Industrial City", which creates industry utilizing local biomass and builds local circular economy.

Spotlight on Official GBS2020 Partners

Partner Debate

Panelists:

- Christophe Bazivamo, Deputy Secretary General, Productive and Social Sectors East African Community (EAC)
- John Bell, "Healthy Planet" Director in the DG Research & Innovation at the European Commission
- Lloyd C. Day, Deputy Director General of Inter-American Institute for Cooperation on Agriculture (IICA)
- Taro Hokugo, Director for Atomic Energy, International Affairs and Biotechnology of Bureau of Science, Technology and Innovation at Cabinet Office – Japan
- Yongyuth Yuthavong, Advisor to the President of Thailand National Science and Technology Development Agency (NSTDA)

This session brought together representatives from the GBS2020 partners of Japan, the ASEAN region, Eastern Africa, the European Union, and Latin America & the Caribbean to discuss their individual spotlight slots and the future of global bioeconomy cooperation.

Yongyuth Yuthavong laid out a picture of what the bioeconomy will look like in ten years in Thailand and the ASEAN region, with recycling and reduced consumption the norm, and so-called Biopolis complexes facilitating bioeconomy experimentation throughout the region. **Taro Hokugo** shared experiences from bioeconomy development in Japan, where the new bioeconomy strategy continues to emphasis the close collaboration between academia and industry and the formation of so-called international bio communities/bio clusters. **Lloyd Day** highlighted exciting developments in the LAC region and the need for more national bioeconomy strategies and continued technical cooperation between developing and developed countries. **Christophe Bazivamo** spoke to the regional significance of the East African Regional Bioeconomy Strategy, where the promotion of local industries, sharing of resources and knowledge, rural development and social economic inclusion are critical for the predominately agro-based economies of the six partner states. **John Bell** described the role of the bioeconomy in supporting decarbonization, rural regeneration, ecosystem restoration, a post waste and post pollution circular economy, the transition to a renewable nature-based economy, and increasing resiliency in the eight policy areas of the European Green Deal. He noted the bioeconomy's shifting role from that of technical substitution to being a motor of sustainability.

The partner representatives then discussed the way forward for a global bioeconomy platform and the essential challenges of reconciling the biosphere with the economy, a global interdependent task. The importance of connecting was highlighted by **John Bell** in order to bring about the necessary systemic shift where technology cannot be moved along linearly, but where new ideas and contexts, different technologies and investment systems come into play. **Yongyuth Yuthavong** further highlighted the importance of long-lasting and predictable structured collaboration and **Lloyd Day** the importance of adhering to science in a collaborative way and developing more data and systems of indicators. All panelists stressed the importance of the work of the IACGB and the need to build off its accomplishments in forming a global platform for knowledge management and cooperation.

Workshop Reporting

The first three days of GBS2020 (November 16th –18th) were entirely dedicated to the workshop program. After receiving more than 50 workshop proposals to an open call, the International Advisory Council on Global Bioeconomy (IACGB) selected workshop leads and associated partners. As a result, the workshops were organized by a variety of bioeconomy stakeholders from all over the world and covered a highly diverse range of topics.

On each day, two sessions with 2–3 parallel workshops took place. Three workshops consisted of two parts, which resulted in a total of 15 workshops with a length between two and three hours. Many workshops included breakout groups with different topics or regional focus. Furthermore, many workshops made use of digital interactive tools, such as digital white boards or polling.

The 12 workshops were divided into four tracks:

- Science & Innovation
- Policy & Society
- Industry & Business
- Regional Bioeconomies & Global Collaboration.

On average, 100–120 participants joined each workshop. A full recording, a 5-minutes summary and output documents can be found on the GBS2020 website (www.gbs2020.net).

Track 1: Science and Innovation

How to shape education for a sustainable bioeconomy?

Panelists:

- Ingar Janzik, Professor for Plant Science at Forschungszentrum Jülich
- Iris Lewandowski, Chair of "Biobased Resources in the Bioeconomy" at the University of Hohenheim

Organizing Institutions:

- European Bioeconomy University (EBU) and European Community of Practice for Bioeconomy Education (CoP Bio-Ed)
- German Association for Synthetic Biology (GASB)
- Center for Synthetic Biology of the TU Darmstadt
- Swiss Coordination Committee Biotechnology (SKB)

Guiding Questions:

- What are the different skill requirements for the future circular sustainable bioeconomy (CSB) experts?
- Which educational formats can convey and combine these required skill sets?

Outcome:

Sub-workshop 1:

Education in Synthetic Biology – A role model for the education of next generation bioeconomy experts?

- Synthetic Biology is an essential part of the next generation bioeconomy.
- The global SynBio education program iGEM (a student competition) is for many participants a transforming experience.
- iGEM influences the next generation of high tech-driven bioeconomy on multiple levels: from education to governments, and industries.

Sub-workshop 2:

How should interdisciplinary education and training be developed to ensure that all graduates are well prepared for their career pathways in the CSB?

- Transdisciplinarity is the next step in CSB Education. Integrate the non-academic knowledge and include the public community and industry in development of curricula (schools, universities, and vocational training).
- Tell a story: To create awareness for the CSB modern communication tools are a key element.

Sub-workshop 3:

Skills and knowledge requirements for system changer that can move the transition to a truly sustainable bioeconomy.

- Systems changers need transformative competencies: they need to be able to reflect on existing paradigms, to co-create visions of a future world, and to induce the required changes in their environments/surroundings.
- Transformative learning environments are needed that provide spaces for reflection and problem-/project-based teaching.

Sub-workshop 4:

Trends in interfacing biobased industry requirements with bioeconomy education

- From an industry perspective:
  - Bioeconomy education to be included into study programmes (add socioeconomic disciplines beyond technical ones).
  - Importance of Life-long learning.
- Increase collaboration between industry and education institutions.
- Global exchange of best practices is needed.

Sub-workshop 5:

Do regional or national perspectives shape the current delivery of education for a sustainable circular bioeconomy?

- Recognition of the sustainable circular bioeconomy is not well developed in higher education programmes globally.
- We should engage globally to share experience and understanding.

Sub-workshop 6:

Strategies to implement CSB beyond tertiary education – engage and train the educators of primary and secondary education.

- Structural and political context: Ministry of education should support the integration of CSB into the curriculum (so far CSB in teaching is an “extra”).
- Provision of good teaching materials in the respective language of Teachers (see e. g. BLOOM school box).
- Connect and build up a network for teachers, so they can teach each other.

Follow-up

An opinion paper as well as elaboration of strategic recommendations for tertiary education programs will follow.

Goal:

- Educate bioeconomy graduates that meet the range in expertise required in the circular sustainable bioeconomy (CSB) workforce.
- Include the need for system changers, which can support the transition to a sustainable bioeconomy.

Track 1: Science and Innovation

New Technologies as Accelerator of a Sustainable Bioeconomy

Chairs and organizing Institutions:

- Sabine Krieg, Business Development, Fraunhofer IGB, Germany
- Jörn Viell, Chair for Process Systems Engineering, RWTH Aachen University, Germany
- Uwe R. Fritsche, Scientific Director of IINAS
- Florian Graichen, General Manager Forests to Biobased Products, Scion, New Zealand
- Dorit Lehr, Secretariat Provadis University and BioBall e.V., Germany
- Merja Penttilä, Research Professor at VTT, Finland

Moderator

- Markus Müller, Project Manager, CLIB – Cluster Industrial Biotechnology

Guiding Questions:

- What regional raw material/feedstock can be envisioned for regional and sustainable use?
- What processing technology can foster an accelerated implementation in bioeconomy?
- What do local citizens or stakeholders expect from bioeconomy (i.e., what niche should technology development fill)?
- What strategies can support technology implementation and what is missing, and which governance do we need for a sustainable circular bioeconomy?

Outcome:

Breakout group “Raw Materials”

- Resources: Waste and residues (examples include food, agriculture, forest waste or even wastewater) favour decentral utilization.
- Products will go beyond “renewable energy” solutions but for products of much higher value (e. g. polymers and chemicals).
- Business Model: Synergies of SMEs and larger industry reflect best the structure of local preprocessing and a central.
- Acceptance: working with nature and citizens (education an
- Technology: small scale, robust!
- Sophistication: more opportunities for low tech than high tech.

Breakout group “Synthetic Biology and Industrial Biotechnology”

- Synthetic Biology and Industrial Biotechnology are seen as key enabling technologies for sustainable bioeconomy both in low and high-tech environments.
- SynBio and Biotech are mandatory key elements for future Biointelligent Manufacturing (BM).
- BM needs infrastructure such as Pilotplants, Powerhouse, IBISBA, training and political support.

- Many regional Roadmaps on Bioeconomy (Blue, Red, Green …) already exist and need to be combined and harmonized to form “The Global Bioeconomy Technology.

Breakout group “Sustainability”

- Sustainability is dynamic, so bioeconomy monitoring systems must be able to evolve (no fixed set of
- Yet, stability of policies is essential to stimulate investments: Investors need certainty. This requires a minimum set of stable sustainability requirements.
- Sustainable agriculture, fishery, forestry, and the waste system all are part of a sustainable bioeconomy.
- Sustainability indicators are needed also at local/regional levels for which a participatory approach engaging citizens and communities is fundamental and should consider cultural contexts, aiming at an inclusive, sustainable BioWEconomy.

Synopsis:

- The global bioeconomy is critical for our COVID-19 response and recovery phases. The next phase rebuild needs to look long term and have bold aspirations that address climate change, non-sustainable production, environmental degradation and fosters employment. Besides biomass, CO_2 and wastes are key building blocks for an (urban) bioeconomy to replace fossil carbon sources
- Bioeconomy demands both centralized and decentralized (pre-)processing at small scale being more flexible and closer to the origin of resources, and markets. The principle of “Working with nature not against it” is the key criteria on for future sustainable processing and social acceptance.
- Sustainability has to be achieved economically, environmentally and socially. For that, measuring and monitoring the bioeconomy’s overall sustainability is critical for public acceptance and for financing (incentives, investments …) and needs transparency, flexibility for national and local contexts as well as inclusion of people (“citizen science”) and their cultures.

Follow-up:

Breakout group “Raw Materials”

Whiteboard results and presentation slides will be delivered after the conference

Breakout group “Synthetic Biology and Industrial Biotechnology”

- Participants agreed to continue exchange of views and experiences after GBS2020.
- The workshop organizers and IBISBA could host virtual Roadmapping workshops or technology expert panels.
- The publication of topic-oriented videos or technology marketing will be considered.

Breakout group “Sustainability”

A reading list is available http://iinas.org/tl_files/iinas/downloads/bio/IINAS_JRC_GBS2020_New_Technology_WS_Breakout_Group4_reading_list.pdf. Participants agreed to continue exchange of views and experiences after GBS2020. For that, EC JRC and IEA Bioenergy could co-host e. g. online workshops.

Track 1: Science and Innovation

How bioeconomy is transforming agriculture

Chairs:

- Regina Birner, Chair of Social and Institutional Change in Agricultural Development at the University of Hohenheim
- Carl Pray, Distinguished Professor Agricultural, Food and Resource Economics Department, State University of New Jersey

Organizing Institutions:

- The International Consortium on Applied Bioeconomy Research (ICABR)
- Forschungszentrum Jülich, PhenoROB and Bioeconomy Science Center
- AIT Austrian Institute of Technology
- Agricultural Systems of the Future at IGZ
- Biomonitor
- U.C. Berkeley, USA

Guiding Questions:

- What is the potential of digital technologies to revolutionize agricultural production and value chains?
- How does the biological revolution transform agriculture?
- What is the role of microbiome-based innovations and gene technologies?
- What are the main barriers and incentives for the transformation of agricultural systems?
- What are success stories in the implementation of bioeconomy strategies?
- What are the most important policy and regulatory issues regarding the acceleration of the bioeconomy?

Outcome:

- Sensor-based digital technologies and data analysis lead to a new understanding of crops and environment and may thus revolutionize agriculture and value chains, both in high- and low-tech systems.
- Microbiome research needs a holistic approach: plants, animals, humans and their biomes are all connected. Artificial Intelligence, robotics and sensor technologies will push microbiome R&D forward.
- We need to respect citizens as being more than just consumers and advocate for co-creation, e. g. through living labs and citizen science.
- Private sector initiatives can have large positive regional impact.

- Science-based regulation of new technologies is required.
- Large & growing research funding gaps between the Global South and wealthy countries + China, India, Brazil need to be addressed.

Follow-up:

- ICABR Conference in 2021
- Policy brief of the workshop
- Forming networks for digital innovation, involving the Global South
- Workshop outputs will be used by the EU project MicrobiomeSupport
- Consensus papers sustainable “Agricultural Systems of the Future”

Track 2: Policy and Society

Toward Sustainable Consumption: Policy Approaches and Perspectives

Chairs and organizing Institutions:

- Thumrongrut Mungcharoen, National Science and Technology Development Agency (NSTDA), Thailand
- Torfi Jóhannesson, Senior Adviser at the Nordic Council of Ministers

Moderators:

- Morten Jastrup, Managing Partner, Nordic Sustainability
- Michelle Gordon, Consultant, Nordic Sustainability

Guiding Questions:

WIn this workshop, three talks on global and regional policy perspectives and sustainable consumption were given and three case studies presented. This was followed by discussions in three regional themed groups (1. Asia, 2. Nordic/Western Europe, and 3. Global/Other International). Participants were asked to share their success story on how they created an impact for a sustainable future, along the following guiding questions:

- Scope: What has been achieved?
- Stakeholders: Who was involved?
- Success factors: Why did it succeed?

Outcome:

Group 1. Asia

- Need stronger emphasis on the connection between large-scale (governments and companies) and small-scale (prosumers and Networks) efforts to develop the bioeconomy (missing link).
- Networking essential for bringing small-scale innovations to life.

Group 2. Northern Europe

- Storytelling emerging from grassroot initiatives is a key driver for regional sustainable transformation.
- Cross-sectoral appeal of the developed storyline is important.
- A unified cross-sectoral agenda that involves economic and governmental actors on all levels creates new demands and drives product innovation.

Group 3. Global/Other International

- Policymakers need to create a regulatory environment that supports sustainable solutions
- Need stronger collaboration (Industry (SME) with Research/Universities and policy makers) on local and international level (connecting the right stakeholders).
- Capital intensive technology developments need to be able to receive the right financial support.

Track 2: Policy and Society

Moving towards a sustainable and circular economy: Bioeconomy Strategy Development

Chairs and organizing Institutions:

- Karel Callens, Senior Advisor to the Chief Economist, Food and Agriculture Organization of the UN
- Adrián Rodriguez, Chief of the Agricultural Development Unit of UN-ECLAC

Collaborating Partners:

- The International Sustainable Bioeconomy Working Group (ISBWG)
- Canadian Forest Service, Natural Resources Canada and at Agriculture and Agri-Food Canada
- Fraunhofer IGB, Germany

Moderators:

- Anne Bogdanski and Maria Silva Carrazzone (OCB, FAO)

Guiding Questions:

- How to ensure that bioeconomy strategies embed all aspects of sustainability, including social, economic, environmental and governance aspects?
- How can a sustainable, circular bioeconomy contribute to sustainable food systems transformation and a green recovery from COVID-19?
- How can public policies and concrete actions help to enhance synergies and address trade-offs among the dimensions of sustainability in a responsible bioeconomy?

Outcome:

- The bioeconomy has great potential to transform our societies towards greener, safer, healthier, and more equitable societies. Many countries are taking advantage of the potential of sustainable circular bioeconomy strategies to build back better for a post-COVID19 recovery.
- However, we know that sustainability does not come automatically. Policy makers need to become much more explicit and intentional about circularity and sustainability, showing both positive and negative bioeconomy impacts on society, the environment and health.
- To assess these trade-offs and identify synergies, we need to invest in systematic impact valuation to account for the true costs and benefits of bioeconomy activities beyond their financial value. However, data in and of itself is not enough.
- We also need robust and inclusive governance and accountability mechanisms to ensure that both the positive and negative impacts are being considered and that there is a level playing field across stakeholders. This is even more important as we are jointly preparing for the 2021 Global Food Systems Summit.

Follow-up:

A policy brief, co-authored by organisers, speakers and panellists, will be prepared. A FAO web article can be found at www.fao.org/in-action/sustainable-and-circular-bioeconomy

Track 2: Policy and Society

International policy instruments and governance of the bioeconomy and circular economy

Chairs and organizing Institutions:

- Jan Börner, Professor for Economics of Sustainable Land Use and Bioeconomy at the University of Bonn, Germany
- Christian Lutz, Managing Director Gesellschaft für Wirtschaftliche Strukturforschung (GWS) mbH in Osnabrück
- Jeffrey Furman, Professor of Strategy & Innovation at Boston University, USA

Collaborating Partners:

- Thünen Institute, Germany
- Institute for European Environmental Policy (IEEP)
- The Bio-based Industries Consortium (BIC)
- Joint Research Center of the EU (JRC)

Guiding Questions:

- What are the main barriers to bio-circular economic development at national and international scale?
- What are the main social, environmental, economic risks of bio-circular economy requiring regulatory governance?
- What are strengths and weaknesses of monitoring & scenario tools to support policy and governance decisions?
- How can national and international governance gaps towards sustainable bioeconomic futures be addressed?

Outcome:

From the different regional breakout groups:

Europe

- Low fossil fuel prices and biomass constrains limit bioeconomy development.
- EU policies have social and environmental implications globally.
- Monitoring & Scenario tools can help, but data gaps are a challenge.

North America (USA)

- Public misconception that sustainable/circular economy is incompatible with growth (exception: “biotechnology”).
- Challenge to coordinate across government agencies.
- Develop coordinated high-level national strategy on bio/circular economy.

South & Central America

- Inequalities and lack of economic incentives hamper bioeconomy development.
- Many opportunities, but also risks deepening the social divide and environmental degradation.
- Build partnerships for inclusive models of (bio-economic) growth, support green value chains, create long-term policies.

Africa

- Lack of investment flows, inappropriate infra-structure, and capacity gaps.
- Poverty and inequality as major risks, but also water and land conservation needs.
- Need for inclusive growth combined with regional bioeconomy hubs and measures to strengthen research & innovation capacities.

International level

- Need to improve/align bioeconomy monitoring at international scale (definitions, methodologies).
- International coordination mechanisms (e. g. trade & environmental agreements) need to ac-knowledge regional differences.

Follow-up:

A synthesis policy brief will be compiled in collaboration with the workshop organizers.

Track 3: Industry and Business

Scaling-up and industrial transition to bioeconomy

Chairs and organizing Institutions:

- Yoshiyuki Fujishima, Senior Analyst, New Energy and Industrial Technology Development Organization (NEDO), Japan
- Tatjana Schwabe-Marković, Cluster Industrial Biotechnology, CLIB
- Sarah Hickingbottom, CEO, BioVale
- Mary Maxon, Associate Laboratory Director for Biosciences, Lawrence Berkeley National Laboratory
- Vladimir Popov, Full Member of the Russian Academy of Sciences

Collaborating Partners:

- 3Bi Intercluster
- OECD

Moderators:

- Marcel van Berkel, 3Bi, CBBD
- Christophe Luguel, 3Bi/IAR

Guiding Questions:

- How can the global circular bioeconomy become a reality?
- What are the main challenges in bringing new or drop-in bio-based products to market?
- How can industry, from start-ups to established large companies, commit to a new, carbon neutral bioeconomy?
- How can new, innovative companies finance the scale-up of their novel processes to industrial scale?
- How can established companies justify the costs for their business model transition?
- What role does regulation play in bringing bio-based products or bioprocesses into the market?

Outcome:

- De-risking is essential to achieve scale: multiple smaller plants, clear milestones, diverse investment sources, engaging the complete value chain.
- Regulations can help or hinder market entry.
- Collaboration is essential, and especially public private partnerships can accelerate the development of breakthrough innovations.
- Novel bio products need to hit the sweet spot and be competitive on price, performance, and sustainability.
- Green premium possible if regulation (e. g. carbon tax, sustainability KPIs) forces faster shifts towards sustainable products.
- Start-ups are technology drivers, collaboration between large industry and tech start up is a success model.

Follow-up:

3Bi Intercluster will draw up a written conclusion and invites additional comments.

Track 3: Industry and Business

Bioeconomy revolution – opportunities for the start-up scene

Chairs and organizing Institutions:

- Natalia Rodriguez Muxica, Projects Director and Board Member of Allbiotech
- Romina Paillao Bustos, Project Sub-Director, Allbiotech
- Nicolas Domke Venegas, Master Student of Forestry Sciences at the University of Concepción

Moderator:

- Carolina Elizondo, Allbiotech

Guiding Questions:

- Biotech start-up-scene: are there different or similar factors between world regions?
- Which are the success factors concerning support & infrastructure, policies & regulations, access to financing, market conditions, availability of human resources, and existing culture in their local ecosystem?

Outcome:

- Founders mentioned the importance of having a good team and that the development and market launch of a specific product for a client with certain characteristics, as this is a process that the company must keep in mind from the beginning. As well, to not be afraid to ask.
- Jason Mellad mentioned that within the Cambridge ecosystem, it has benefited from young talent and have created ambition for new businesses that triggers the change from scientist to entrepreneur. As an accelerator, Start Codon tries to contribute to this change through experiences.
- Gabriela Couto mentioned that the efficiency of technology transfer in a territory is an important factor, as well as the presence of local associations that represent the actors of a certain cluster can help in the dialogue between academia, government and civil society and the following generation of networking among these.
- Cheng Kai Lim mentioned that to inspire, role models and examples of success serve as references for new talents. He talked also about the importance of public acceptance of technologies, so that policy makers better understand how to regulate and promote them.

Track 3: Industry and Business

Rebooting the economy – sustainability, growth, and climate action delivered by the bioeconomy

Chairs and organizing Institutions:

- Anne Bogdanski, Natural Resources Officer at the Office of Climate Change, Biodiversity and Environment (OCB) of the FAO
- Peter Wehrheim, Head of Unit for the "Bioeconomy and Food System" at the European Commission

Moderator:

- Roman Brenne, EU Commission

Collaborating partners:

- Region Grand-Est, France
- BIOVOICES
- BIOEASTsUP
- Power4Bio and BE-Rural
- Submariner

Guiding Questions:

- **What** are best practices and examples for scalable and actionable bioeconomy solutions which could
  - make (local and national) economies, including food systems, more **resilient**,
  - stimulate **growth** for the COVID-19 recovery,
  - address conflicting **sustainability** objectives and
  - contribute to deeply transformative **climate action** initiatives?
- **How** can such actions be included and scaled up in the context of regional and national recovery plans?

Outcome:

- The COVID-19 crisis has shone a spotlight on the fragility of linear business models and global supply chains.
  - Proven need to bounce back through a green and resilient recovery.
- A sustainable and circular bioeconomy has a major role to play here in aligning the economy with the biosphere.
- Concrete measures can include:
  - The inclusion of placed-based bioeconomy solutions in regional and national recovery plans and strategies.
  - The engagement of all stakeholders (leaving no one behind).

- Identifying barriers, assessing regulations, get the incentives right.
- Establish monitoring system to assess progress.

- Choose the Bioeconomy for a green and sustainable recovery!

Follow-up:

Selected follow-up links:

- Factsheet on the role of the Bioeconomy in the European Green Deal https://ec.europa.eu/info/files/how-bioeconomy-contributes-european-green-deal-factsheet_en
- "Built With Biology" – California's Biostrategy https://synbiobeta.com/wp-content/uploads/2020/05/Built-With-Biology-v3.0-May-20-2020.pdf
- The EU's Bioeconomy monitoring system https://ec.europa.eu/knowledge4policy/bioeconomy_en
- FAO's report on Bioeconomy Monitoring and Evaluation http://www.fao.org/in-action/sustainable-and-circular-bioeconomy/resources/news/details/en/c/1329387/
- BE-Rural and POWER4BIO https://be-rural.eu https://power4bio.eu

Track 4: Regional bioeconomies and global collaboration

Land and sea: sustainable bioeconomy and inter-regional ecosystems

Chairs and organizing Institutions:

- Morakot Tanticharoen, Senior Advisor to the President of the National Science and Technology Development Agency Thailand (NSTDA)
- Elspeth MacRae, Chief Innovation and Science Officer at Scion, New Zealand
- Ian O'Hara, Principal Research Fellow, Queensland University of Technology, Australia

Collaborating partners:

- Canadian Forest Service, Natural Resources Canada
- Instituto Escolhas, Brazil
- TUM Campus Straubing for Biotechnology and Sustainability, Germany
- SUBMARINER Network for Blue Growth

Guiding Questions:

- What are the major challenges to growing the sustainable bioeconomy while protecting natural ecological systems on land and sea?
- How do we enhance industry transition to sustainable bioeconomy?
- How do we balance consumption and utilisation of natural resources?
- What are the roles of technologies and public awareness in sustainable utilisation and conservation?
- What are the impediments to, and how do we enhance inter-regional and country collaboration in sustainable bioeconomy?

Outcome:

- The bioeconomy creates key opportunities and challenges in forest, industrial and ocean ecosystems.
- There is a need to improve our knowledge of these ecosystems and the interdependencies between them.
- Inter-regional cooperation is critical as ecosystems and impacts cross over international borders.
- Case studies from different regions provide valuable learnings that can be shared and used to advance bioeconomy around the world.
- Functioning multi-actor engagement is critical to managing bioeconomy in complex ecosystems.
- Need to build enhanced collaboration across knowledge development, innovation, education, industrial and government sectors.

Follow-up:

Summary documents and outcomes from the workshop will be published sometime after the workshop.

Track 4: Regional bioeconomies and global collaboration

Regional cooperation for innovative bioeconomy pathways to promote health and well-being

Chairs and organizing Institutions:

- Francis X. Johnson, Senior Research Fellow with Stockholm Environment Institute (SEI)
- Ivar Virgin, Senior Researcher at the Stockholm Environment Institute (SEI)
- Matthew Fielding, Deputy Director of the Swedish International Agriculture Network Initiative
- Nwadiuto Esiobu, Professor of Microbiology and Biotechnology at Florida Atlantic University, USA
- Sandra Venghaus, Head of Research Group at Forschungszentrum Jülich, Germany
- Sascha Stark, Senior Researcher at the Center for Development Research, Bonn, Germany

Guiding Questions:

The aim of the workshop was to discuss and evaluate bioeconomy pathways in the context of health and well-being, by adopting a broad, holistic and inclusive framing that combined thematic and regional perspectives to identify key priorities and promote innovation and resilience through regional cooperation.

Outcome:

Bioeconomy for health and wellbeing

- Bioeconomy as part of a **coupled socio-ecological system** -> where bioeconomy can be a solution, but also a problem, depending on the pathways. – **Liesbeth de Schutter**
- In East Africa, developing affordable plant-based products for malaria control while **harnessing local resources. – Tatien Masharabu**
- In Latin America, in spite of the **rich endowment** of bioresources in the region, there can be issues on **affordability** for healthy diets, particularly in mega cities (10+ million people). – **Guy Henry**
- In Asia, bioeconomy could represent an **opportunity** for a sustainable use of **traditional medicinal plants** in India (and beyond) through the One Health approach. – **Jagdish Krishnaswamy**

Bio-resources and Bio-industries

- Government action at national and regional levels is critical to create holistic bioeconomy strategic plan, with supporting policies and infrastructure/ investments.
- Creating regional BIO-hubs or Bio-incubators for sharing knowledge and assets. Standards for Bio-Product certification.
- Synthetic Biology expands the horizon of renewable Bioresources and authentic bioproducts.
- Knowledge & tech exchange are needed and must include indigenous knowledge of the peo-

ples --- whether in Amazon or Africa. How should nations create new bio-resources and sustainably harness more traditional ones?

Transnational Innovation Systems

- Bioeconomy implies a shift away from classical innovation types.
- Challenges from globalization lead to a new geography of innovation.
- Understanding regional strengths and weaknesses is the first step towards a successful transformation.
- A successful implementation of regional bioeconomies requires to move beyond national borders towards bioeconomic boundaries.

Cross-cutting and cross-regional perspectives

- **Capacity building** – key precondition for the transformation.
- **Competence networks and innovation clusters.**
- Bringing actors together!
- Local stakeholders – local knowledge and drivers of vision development.
- Global players – knowledge/technology transfer, access to global markets and economies of scale.
- **Policy frameworks** – initiation and promotion of transformation and cooperation.

Specialized excellence in many regional clusters has been achieved, now the focus will have to shift to interregional and cross-sectoral cooperation as a turbine for more widespread development.

Key messages:

- The convergence of modern biology and digital technologies is propelling **new partnerships and collaborations** on how to add value to bioresources and optimize biomass use.
- **Regional collaboration, and convening platforms** (e. g. incubators, Public-Private Partnerships, Clusters, Networks etc.) are greatly needed to catalyse knowledge sharing, policy development, capacity building and to support sustainable bioeconomy development at all levels.

Follow-up:

- Post-workshop report on key messages from the workshop.
- Follow-up interviews with speakers and participants.
- Online perspective pieces and blogs.
- Commentary article to be published in academic journal.

Track 4: Regional bioeconomies and global collaboration

Regional bioeconomy as a key driver to build up resilient economies – Lessons learned from Latin America and the Caribbean

Chairs and organizing Institutions:

- Eduardo Trigo, Adviser of the Hemispheric Program of Bioeconomy and Productive Development (IICA)
- Hugo Chavarría, Manager of the Bioeconomy and Productive Development Program, Inter-American Institute for Cooperation on Agriculture (IICA)
- Marcelo Regunaga, Member of the Group of Producing Countries from the Southern Cone

Moderator:

- Gabriela Quiroga Gilardoni, International Specialist, Bioeconomy and Productive Development Program (IICA)

Guiding Questions:

- How can carbon neutral agricultural production strategies be developed in sectors such as bioenergies and agricultural biotechnology?
- Which role does international cooperation play in the inception within the region of the concept of the bioeconomy?
- What are recent experiences concerning national strategy development in South and Central America?
- What would be possible to achieve in the region through the bioeconomy?

Outcome:

- The Bioeconomy is becoming an emerging field of action of development strategies in Latin-American and the Caribbean Region, striving for increasing value creation and rural development and local job creation based on their abundant bio-based resources. LATAM is very well positioned to develop a bioeconomy strategy based on its endowment of natural resources and its mega diverse environments.
- Despite the lack of formal and structured bioeconomy strategies and policies, in some countries of the Region there have been interesting developments in some bioeconomy areas, such as sustainable agricultural production, biofuels and bioenergies, green chemistry, use of waste and residues to produce bio-inputs and energy

(circular strategies in rural areas and cities), and health (human, animal, and plant). Many of them have been associated with economic and regulatory incentives implemented by governments, including enabling access to the respective products and services markets.

- Such developments provide an interesting background to contribute to improving sustainability in most of the countries of the Region, to preserve and rebuild natural resources, and to mitigate the impact of greenhouse gas emissions through alternative production systems (crops, livestock production, forestation).
- Many countries of the Region lack enough economic resources to support the need for additional innovations to add value and promote the local bioeconomy alternatives. There is a need for international cooperation to support such initiatives.
- The current economic and health crisis in the Region creates a bottle neck in relation to the need for financing associated with most of the bioeconomy developments that require high investments. The lack of other market incentives, such as carbon market payments, also limits the sustainable strategies implementation in the Region.
- It is interesting to highlight that countries of the Region that had progress in government interagency bioeconomy initiatives are having positive results, by implementing regulatory and governance policies, including market development of bioproducts and services.
- Similar comments could be highlighted in relation to the success of public-private initiatives to develop bioeconomy solutions in different fields, such as biotechnology and other high techs, biorefineries developments, etc. Such partnerships are very limited in the Region and should be promoted to provide financing and S&D developments.

Bioeconomy Youth Champions

Bioeconomy Youth Champions

From the beginning, the Bioeconomy Youth Champions have made it their objective to advocate for increased involvement of youth in the processes of the bioeconomy. In order to find out which thematic interests should be advocated by the Bioeconomy Youth Champions in the future, a workshop was developed. Globally, interested young professionals and students were invited to this workshop. The focus was the development of a roadmap for the bioeconomy from a youth perspective. The youth representatives have divided the bioeconomy into four overarching clusters: Agriculture, Health, Education and Energy. For each cluster, the roadmap should address short-, medium- and long-term developments. For the workshop in the context of GBS2020, a total of more than 160 people registered, and about 50 people participated. The Bioeconomy Youth Champions would like to build a Bioeconomy Youth Community beyond GBS2020. Initially, a LinkedIn group will be set up to connect people, highlight digital events and introduce the young pioneers of the bioeconomy so that it becomes visible how much each individual can achieve and contribute to the community. The Bioeconomy Youth Champions are also currently discussing whether it might be possible to repeat the workshop in different regions in order to be able to include even more perspectives in the development of the roadmap. This wish was also expressed to Bioeconomy Youth Champions from different regions (South America, Europe, USA, and Russia). In 2021, the Bioeconomy Youth Champions would like to work out how the workshop could be possible in these regions.

Infotainment

Digital Bioeconomy Exhibition

The bioeconomy has rapidly developed in recent years. What has been accomplished in the five years following the first GBS2015 alone is truly impressive: Many bioeconomy products have become bestsellers. Bio-based start-ups have grown into medium-sized companies and established, traditional industrial companies are integrating biobased production steps into their existing structures. The digital GBS2020 exhibition took up these developments in a playful way and showed two imaginary worlds in which products and processes of the bioeconomy are fully integrated into everyday life. To arouse the curiosity of the user, the exhibition contained various animations. Some of them ran automatically, most of them were reactive. Furthermore, each process und product was accompanied by a pop-up that contains the most important information as well as an external link where you can get further knowledge about the respective topic.

Colorful City

The imaginary Colorful City shows a lively hustle and bustle with innovative snacks, some fashion & cosmetics, street music and a colorful society. It is available via https://gbs2020.net/exhibition-city/.

Aiport World

The imaginary Airport World shows a modern type of an international airport, which is surrounded by wooden skyscrapers and bio-based industry elements (e.g. an algae kerosene producing biorefinery). It is available via https://gbs2020.net/exhibition-airport/.

Media Corner

The GBS2020 Media Corner is the digital continuation of GBS2018's offline version. Divided in the four areas books, learning/teaching materials, policy documents and videos you can find a selection of new bioeconomy communications material from 2019 until today. The Media Corner is available via https://gbs2020.net/media-corner/.

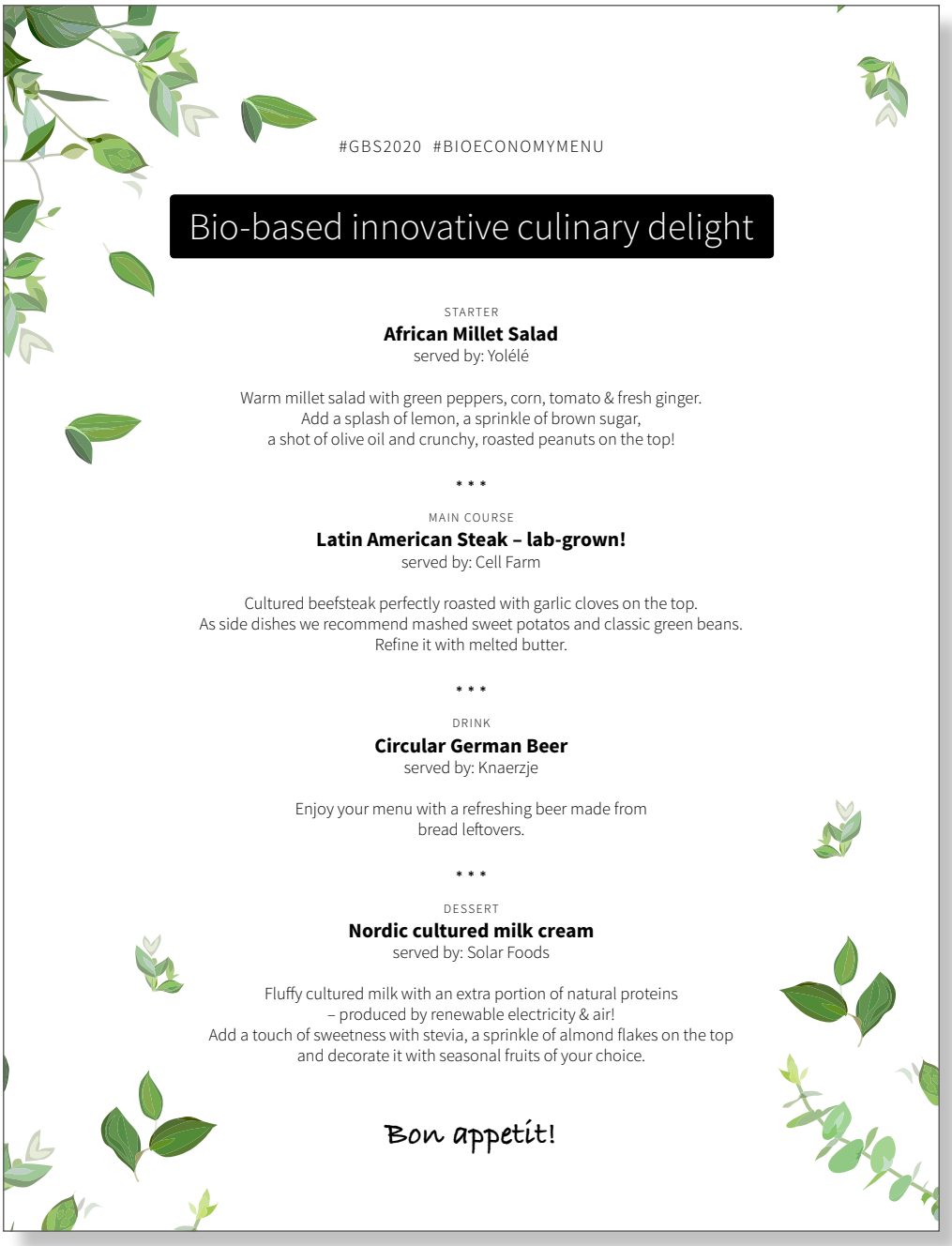
Call for Videos

The videos mentioned before are not just part of the Media Corner, but twenty of them, as winners of the Call for Videos, were also shown during the plenary program. The Call for Videos was initiated by the International Advisory Council on Global Bioeconomy (IACGB) a few weeks before GBS2020 started. The IACGB was looking for creative start-ups, large-scale established companies and publicly funded research programs that wanted to present their work in the bioeconomy during the virtual Summit in form of a short video clip. The Jury (IACGB steering Group) was very impressed by the sixty entries and selected twenty of them as infotainment elements to be shown in the plenary on the 19th and 20th November. The selection reflected both the international character and the interdisciplinary nature of the bioeconomy.

Evening Reception

The Evening Reception was held at the end of the first plenary day (19th November) and consisted of four parts. It all started with the four innovative food companies, Cell Farm, Knaerzje, Solar Foods, Yolele that presented one course of a virtual biobased dinner menu.

This was followed by a round of discussions with five of the eight Bioeconomy Youth Champions. Within this framework, they presented their results and impressions of their workshop, which they had previously held on their own initiative with about 100 participants from all over the world. You can find a detailed summary of the Bioeconomy Youth Champions' work during GBS2020 on page 50. The evening program continued with a digital tour through the Berlin and Paris Museum of Natural History before all participants could meet at virtual roundtables for relaxed networking and discussions.



Networking Area

The GBS2020 included a virtual networking area on the GBS2020 website. Participants could meet here in differently themed rooms during the entire conference or for special occasions.

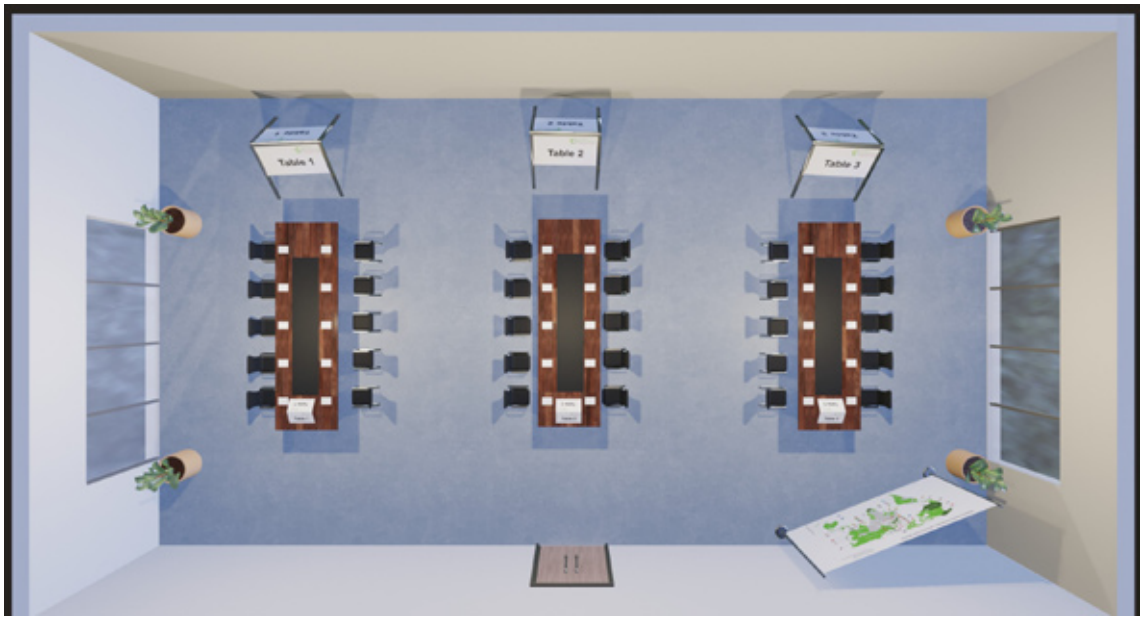
The following rooms where featured:

› GBS2020 Lounge
The lounge was an open networking area, without any predefined discussions. Participants could meet here with others in a relaxed atmosphere and discuss in one of the seating areas or have a chat at the bar or on the terrace.

› Bioeconomy Youth Coworking Space
This room was meant for young bioeconomy enthusiasts, to exchange ideas about a biobased future, work on projects or meet with the Bioeconomy Youth Champions of GBS2020. The latter also used this room as a meeting area after their kick-off workshop on November 19.

› Workshop networking rooms

There were three rooms dedicated to the topics of the current workshops. Participants who could not make it into the workshops could meet here to network and discuss with others interested in the same topics. Each room offered three tables which made it easier to form groups.



Launched Publications

Global Bioeconomy Policy Report (IV) Presentation

Participants

- Mary Maxon, Associate Laboratory Director for Biosciences, Lawrence Berkeley National Laboratory
- Christian Patermann, International Bioeconomy Advisor
- Lily Teitelbaum, Research & Policy Analyst, Conference Office of the Global Bioeconomy Summit 2020

The authors of the Global Bioeconomy Policy Report (VI) presented the most important take-aways of the new report as well as major trends that became visible over a decade of bioeconomy policy development. Key findings included, 1) that the number of countries with dedicated strategies continues to rise, 2) that the bioeconomy continues to be advanced in many other bioeconomy-related strategies, 3) that there is a clear increase in macro-regional and regional strategies and activities and, 4) that an increasing number of policy strategies are accompanied by respective action plans. In addition, it became clear that the political landscape in which the development of biobased economies is embedded is becoming more and more complex and complicated across the world. This is reflected, e.g. by more comprehensive and complex definitions and understanding of the bioeconomy due to the integration of topics such as sustainability, climate, and circular economy and the close proximity to converging technologies. The authors also see this complexity reflected in more recent strategies which consider a wider range of goals, and there is no longer a clear hierarchy of objectives and political motivations. In particular, the relationship between the SDGs and the bioeconomy has solidified since the adoption of the 2030 Agenda for Sustainable Development in 2015. This also goes hand in hand with the trend of thematic prioritization and specialization of bioeconomy topics and priorities in strategies and a heightened role for the circular economy, health, resilience, and biodiversity. The new report shows that in quite a few cases the discourse in academia and the scientific community are clearly ahead of political-strategical discussions. For example, critical topics are missing such as demonstrating the strong links between the bioeconomy and additive manufacturing, the role of biofoundries, E-mobility and critical raw materials safety, the use of CO^2, the potentials of Hydrogen and electrification or bioprincipled cities.

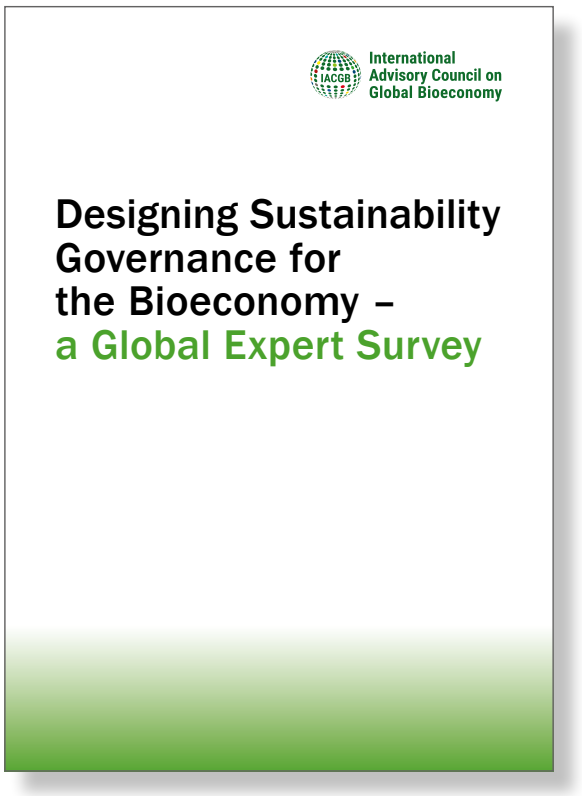
Global Bioeconomy Policy Report (IV) ➔
https://gbs2020.net/wp-content/uploads/2020/11/GBS-2020_Global-Bioeconomy-Policy-Report_IV_web.pdf

Global Expert Survey Presentation

Participants

- Jan Börner, Professor for Economics of Sustainable Land Use and Bioeconomy at the University of Bonn
- Thomas Dietz, Professor for International Relations and Law at University of Muenster
- Karla Rubio, PhD candidate at the University of Münster

Authors of the Global Expert Survey presented their findings on future bioeconomy development paths and appropriate political support measures. Key findings included the low implementation effectiveness of both regulatory governance and enabling governance and key recommendations for policy makers to address issues at the national level including, 1) the lack of capital for startups, 2) lack of commercialization support, 3) lack of policy coordination/harmonization and at the international level including: 4) the lack of binding international laws and regulations, 5) the unequal distribution of institutional capacities, and the 6) unequal distribution of knowledge and technology.



Global Expert Survey ➔
https://gbs2020.net/wp-content/uploads/2020/11/GBS-2020_Expert-Survey_web.pdf

About the International Advisory Council on Global Bioeconomy (IACGB)

The IACGB was initially formed to support the Global Bioeconomy Summit 2015 and has been maintained and extended since. The IACGB is composed of about forty high-level policy experts and drivers of the bioeconomy in all hemispheres. IACGB members act in their personal capacity as experts and do not represent an official government or organizational position. The members combine a broad range of expertise and backgrounds and they are actively involved in different international bioeconomy-related policy and research fora. While currently being an informal mechanism, the IACGB has gained credibility and legitimacy as an expert think tank and are actively working to develop further in the coming years. The IACGB is significantly involved in the development of the GBS2020 plenary agenda and workshop program to ensure its global spirit and its non-commercial nature. The IACGB develops and approves policy recommendations on how to promote the development of a sustainable bioeconomy globally. These recommendations have been summarized in the Communiqués of GBS2015, GBS2018 and GBS2020. Furthermore, IACGB members act as important multipliers and take the GBS messages and the policy recommendations to other global and international bioeconomy networks and policy fora. Documents download and further information is available at https://gbs2020.net

About this report

Authors of this report are Christin Boldt, Kristin Kambach, Martin Reich, and Lily Teitelbaum

Imprint

Published by the Secretariat of the Global Bioeconomy Summit 2020.
c/o BIOCOM AG,
Lützowstrasse 33–36,
10785 Berlin

Design: Michaela Reblin

Pictures: Title: Kjpargeter - Freepik.com; p. 4: Stefan Zeitz; p. 5: Stefan Zeitz; p. 6: Stefan Zeitz; S. 10: Stefan Zeitz; S. 14: Stefan Zeitz; S.19: Stefan Zeitz; S.23: ArtushFoto; S. 24: ©saicle stock.adobe.com; S. 25: Magalice; S. 26: chiradech; S. 27: peach100; S. 28: fizkes; S. 29: BluePlanetStudio/istockphoto.com; S. 30: Prostock-Studio/istockphoto.com; S. 32: nicolas/istockphoto.com; S. 34: wngarden/istockphoto.com; S. 36: skynesher/istockphoto.com; S. 37: pixdeluxe/istockphoto.com; S. 38: shironosov/istockphoto.com; S. 40: gorodenkoff/istockphoto.com; S. 41: PeopleImages/istockphoto.com; S. 42: Prostock-Studio/istockphoto.com; S. 44: Daniel Balakov/istockphoto.com; S. 45: Ratnakorn Piyasirisorost/istockphoto.com; S. 47: andresr/istockphoto.com; S. 49: Alessandro Biascioli; S. 51: RichLegg; S. 52: Kristin Kambach/BIOCOM AG; S. 53: Kristin Kambach/BIOCOM AG; S. 54: Kristin Kambach/BIOCOM AG; S. 55: Markus und Martin Reich; S. 56: Markus und Martin Reich; S. 57: PeopleImages/istockphoto.com; S. 58: Stefan Zeitz

Berlin, November 2020

www.gbs2020.net