

GBEP Working Group on Capacity Building for Sustainable Bioenergy

Draft Proposal for an Activity Group on Advanced Liquid Biofuels

At the 8th Meeting of the Working Group on Capacity Building (WGCB) held in Rome on 1 December 2016, the Partners and Observers agreed that advanced biofuels was an area that GBEP should further explore. This short note has been prepared by the GBEP Secretariat, with input from several Partners and Observers, as was agreed at the meeting, in order to explore the potential for GBEP in this area and to highlight activities that could be carried out in a possible Scope of Work of a new WGCB Activity Group (AG). Discussions among Partners and Observers could be held electronically and, if considered appropriate, an Activity Group could be approved remotely and start working prior to the GBEP regular meetings in November 2018.

Background

Relatively recent advancements in biofuel production have caused an evolution of terminology for classification, which seeks to describe and cluster new approaches, technologies or other enhanced properties of partly improved or entirely new biofuel pathways. In light of these developments, the term *advanced biofuels* can refer to a variety of aspects within the field of biofuel production alongside all or parts of the production chain. Currently, no consistent use of the term advanced biofuel is observable internationally, neither in academic research nor in biofuel-related regulation; however, many GBEP Partners and Observers have defined the term within their national laws and regulations. *Advanced biofuels* is often used as a general term for all ‘second’ and ‘third’ generation biofuels, as well as those that may arise in the future. Although similar to the term advanced biofuels, the terms 2nd and 3rd generation biofuels are not used consistently.

This activity group will focus on advanced liquid biofuels. The distinction between advanced and conventional biofuels can be classified by two different approaches, each possibly subdivided by different focal aspects:

- Feedstock-dependent approaches:
 - **The type of feedstock used.** Advanced biofuels are produced from lignocellulosic material such as dedicated crops, grasses, municipal solid waste, and agricultural and forest residues (second generation biofuels) as well as from algae (third generation biofuels)¹. For instance, the European Union (EU) defines advanced biofuels based on

¹ IRENA, 2016. Innovation Outlook: Advanced Liquid Biofuels. p. 12. (Available at: http://www.irena.org/DocumentDownloads/Publications/IRENA_Innovation_Outlook_Advanced_Liquid_Biofuels_2016.pdf)

a list of feedstocks². These feedstocks can be further sub-divided into ‘primary’ material from dedicated agricultural and forest crops, as appropriate, and ‘secondary’ material from waste and residues.

- **The impact on the sustainability of agro- and forestry-ecosystems.** This includes Indirect Land Use Change (ILUC) impacts. For example, the EU describes advanced biofuels as those that “provide high GHG emission savings with a low risk of causing indirect land-use change, and do not compete directly for agricultural land for the food and feed markets”³.
- Feedstock-independent approaches:
 - **The type of technology used.** The IEA defines advanced biofuels as those which use “technologies which are still in the research and development (R&D), pilot or demonstration phase”⁴, as opposed to conventional biofuels, which use technologies that are well established at the commercial scale. Advanced biofuels use improved production processes to achieve superior sustainability performance in producing a given fuel than is possible by conventional routes (e.g. enabling production with substantially reduced net carbon/GHG emissions).
 - **The type of fuel produced.** Advanced biofuels also sometimes refer to new biofuel molecules/blends that are not yet fully commercialized, e.g. butanol, isobutanol, and drop-in hydrocarbons that are more energy dense and more fungible in the existing (petroleum-based) fuel distribution and use infrastructure (engines) than conventional biofuels (e.g. ethanol and FAME biodiesel).
 - **The amount of greenhouse gas (GHG) emissions savings** compared with fossil fuels. For example, the Renewable Fuel Standard of the USA includes the advanced biofuel standard that is comprised of biofuels that achieve at least a 50 percent reduction in lifecycle greenhouse gas emissions⁵.

It is within the framework of either feedstock-dependent or independent approaches of defining advanced biofuels, while recognising GBEP Partners and Observers who have defined advanced biofuels within their national laws and regulations, that this working group will perform its scope of work.

² The EU definition of advanced biofuels is biofuels that are listed in Part A of Annex IX of Directive 2015/1513 (an amendment to Directive 2009/28/EC). Pp 28-29 (Available online: <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32015L1513&from=EN>)

³ EC, 2015. Directive 2015/1513. p. 2 (Available at: <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32015L1513&from=EN>)

⁴ IEA, 2017. Technology Roadmap: Delivering Sustainable Bioenergy. p.8. (Available at: http://www.iea.org/publications/freepublications/publication/Technology_Roadmap_Delivering_Sustainable_Bioenergy.pdf)

⁵ EPA, 2016. Final Renewable Fuel Standards for 2017, and the Biomass-Based Diesel Volume for 2018. (Available at: <https://www.epa.gov/renewable-fuel-standard-program/final-renewable-fuel-standards-2017-and-biomass-based-diesel-volume#rule-history>) (note that the 50% GHG reduction is LCA-based and includes emissions from iLUC)

Bioenergy represents an important component of the energy mix of several countries, particularly developing ones, and demand for biofuels is expected to grow in the future, e.g. with growing populations, expansion of the transport sector and improvements in biofuel technology. According to the most recent projections and climate-energy scenarios by IEA and IRENA, bioenergy share in general, and particularly in transport, will have to grow significantly in the next decade if international climate change mitigation goals are to be met⁶.

Biofuels can at least partly substitute fossil fuels in transport (e.g. road, shipping and aviation), and may play a longer-term role also in industry, households (cooking) and for remote mini-grids, although this will depend on price competitiveness. Advanced biofuels are often intended to reduce the lifecycle GHG emissions associated with the production and use of fuels. Furthermore, they can contribute to socioeconomic improvements by generating income and bringing development to generally less favoured rural areas.

There are a number of technical and policy barriers that need to be overcome for advanced biofuels to become competitive in the market place, both through technology improvements and reduced costs. Many see policy support instruments as necessary to increase investment attractiveness and ensure enhanced uptake of advanced biofuels technology at the commercial scale. These may include tax exemptions, grants, blending mandates and subsidies, among others. Furthermore, it has been noted that regulatory certainty is required to maintain investment in the industry⁷.

As the use of advanced biofuels continues to grow, GBEP's sustainability indicators will be a useful tool for countries to evaluate the progress they have made towards or away from a sustainable development path, as determined nationally.

Other International Initiatives

There are a number of international organisations and initiatives that are working in the field of advanced biofuels where collaboration could be promoted with GBEP in order to utilise diverse expertise and seeking complementarity. Some of these initiatives are:

- **IEA Bioenergy's** Task 39, aiming to commercialize conventional and advanced liquid biofuels; and the new Sustainability Task, which will investigate climate effects and other sustainability effects of bioenergy, including advanced biofuels, and its governance, over the next triennium⁸.

⁶ IEA, 2017. Technology Roadmap: Delivering Sustainable Bioenergy. (Available at: http://www.iea.org/publications/freepublications/publication/Technology_Roadmap_Delivering_Sustainable_Bioenergy.pdf); and IRENA, 2018. Global Energy Transformation: A Roadmap to 2050. (Available at: http://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Apr/IRENA_Report_GET_2018.pdf)

⁷ UNCTAD, 2015. Second Generation Biofuel Markets: state of play, trade and developing country perspectives. p.29 (Available at: http://unctad.org/en/PublicationsLibrary/ditcted2015d8_en.pdf)

⁸ Further information available at: www.ieabioenergy.com

- **Biofuture Platform**, which is a 20-nation country-led coalition whose mission is to promote international collaboration and policy dialogue to accelerate development and scale up deployment of modern sustainable low carbon alternatives to fossil based solutions in transport, chemicals, plastics and other sectors⁹.
- **Mission Innovation** Sustainable Biofuels Innovation Challenge, which “aims to accelerate biofuels research, development, and demonstration in order to achieve performance breakthroughs and cost reductions with the potential to substantially lower GHG emissions”¹⁰.
- **Below 50**, an international private sector-led collaboration aiming to increase demand for sustainable fuels for transport that have less than 50 percent of the GHG emissions of fossil fuels¹¹.

Potential Scope of Work

The objective of the Activity Group, taking into account other international activities, is to facilitate the exchange of knowledge, experiences and technologies, and to undertake capacity building related to the development of advanced biofuels and their applications, including their evaluation according to the GBEP's Sustainability Indicators taking advantage of the global outreach of GBEP.

According to this objective, the Advanced Biofuels Activity Group could have the following scope:

1. Convene international stakeholders and experts to: identify barriers and opportunities to the uptake of advanced biofuels technologies, and ways to improve their viability and implementation; compare experiences and best practices; and inform about ways to solve open issues.
2. Collaborate with the GBEP Task Force on Sustainability (TFS) to identify and include aspects relevant to advanced biofuels production into the Implementation Guide on GSIs. This could be conducted through seminars, conferences and other working sessions.
3. Facilitate the exploration of applying the GBEP Sustainability Indicators (GSIs) for advanced biofuels as voluntary activities within the sector, possibly in collaboration with other initiatives, taking into account that the GSIs are formulated for the national level. The activities could explore how the GSI may be used as a tool to identify and assess both potential benefits and risks associated with national strategies for advanced biofuels, and to inform respective decision-making¹². This would help promote feedstocks and technologies that meet carbon

⁹ Further information available at: www.biofutureplatform.org

¹⁰ Further information available at: <http://mission-innovation.net/our-work/innovation-challenges/sustainable-biofuels-challenge/>

¹¹ Further information available at: <https://below50.org/>

¹² Examples of how the GSIs have been used for sustainability assessment of advanced biofuel projects already exist, see, for example, several EU projects (<http://www.forbio-project.eu>; <http://magic-h2020.eu>; <http://www.seemla.eu/en>) and see workshop/session organized back-to-back with the GBEP regular meetings in November 2018 to discuss ways

reduction targets compared to fossil alternatives, whilst ensuring that they do not negatively affect meeting the SDGs, but contribute positively.

4. Collaborate with other international bioenergy fora to develop and disseminate scientific information on new aspects and findings on sustainability analyses for advanced biofuels.
5. In collaboration with other initiatives, analyse the relationship and potential synergies between advanced and conventional biofuels, e.g. between technologies and business models, to improve the viability and uptake of advanced biofuel technologies. This could include a dialogue between the public and private sector on economic and non-economic barriers faced by advanced biofuels, and ways to remove or at least reduce such barriers, for example, exchanging views on how using conventional biofuels might serve as a bridge to advanced biofuels.

Deliverables could include:

- In collaboration with related efforts, a workshop/webinar could be organized and a report prepared in order to address the topic of the relationship and potential integration between the first generation biofuels and advanced biofuels technologies and business models with a focus on displaying good practices/success stories and identifying effective policy instruments to foster the aforementioned integration and to promote the uptake of advanced biofuels technologies.
- Develop policy briefings to inform about sustainable production and use of advanced biofuels, as well as guidelines and manuals of best practices.
- Workshop(s)/webinar(s) planned in conjunction with other international bioenergy fora to disseminate the latest scientific information on metrics, methods, and tools for assessing sustainability of advanced biofuels, with appropriate targeting of different levels of decision-makers: from national-level policymakers to project-level operators.

This AG should be led by a GBEP Partner: U.S.A. will be leading for the first two year period. The role of the AG leader is to contribute to the coordination of the work of the AG, starting from the discussion and definition of the Scope of Work, to participate in the organization of meetings and events, to chair and moderate the discussions during said events, and to report to the GBEP WGCB on the implemented activities. The (co)chairmanship of the Activity Group will be discussed every two years. ***The activities proposed above represent potential opportunities for GBEP to contribute to the advanced biofuel sector and should be seen as a list from which activities can be selected depending on available funding.***

that GBEP can contribute to ensuring advanced biofuels meet their potential to enhance the low-carbon economy in line with the UNFCCC Paris Agreement, the SDGs and national objectives.