The 9th Bioenergy Week of the Global Bioenergy Partnership (GBEP) was successfully held in Asunción, Paraguay from 26 to 29 September 2022 as part of efforts of the GBEP Working Group on Capacity Building for Sustainable Bioenergy (WGCB) to facilitate cooperation and capacity building on the potential benefits of sustainable modern bioenergy. The event was organized by GBEP in collaboration with the Ministry of Agriculture and Livestock (MAG) and the Ministry of Industry and Trade (MIC) of the Government of Paraguay, along with the United Nations Food and Agriculture Organization (FAO), and thanks to financial support from U.S. Grains Council. Additional appreciated support was also provided by MERCOSUR and IICA by leading some important sessions.

The event was the most recent in the series of GBEP Bioenergy Weeks that have been held every year since 2013. This year’s Bioenergy Week focused on Americas, including discussions on the status of the bioenergy sector as well as highlighting positive experiences and initiatives in the sustainable production and use of bioenergy that could guide the design and implementation of bioenergy policies on the continent. The event also provided a platform to further the dialogue with the private sector and stakeholders on ways to improve mutual cooperation towards a more sustainable production and use of bioenergy.
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Opening Session

The Ninth Bioenergy Week was opened with welcome remarks from Mr. Santiago Moisés Bertoni, Minister of Agriculture and Livestock of Paraguay; Mr. Luis Alberto Castiglioni, Minister of Industry and Trade of Paraguay; Mr. Mario Lubetkin, FAO Assistant Director-General, Regional Representative for Latin America and the Caribbean; as well as Amb. Jose Antonio Marcondes de Carvalho, Ambassador of the Federative Republic of Brazil in Paraguay and Ms. Emily Marthaler, U.S. Department of Agriculture, representing the GBEP Co-Chairs.

H.E. Santiago Moisés Bertoni, Minister of Agriculture and Livestock of Paraguay, welcomed participants at the 9th Bioenergy Week. He mentioned that in Paraguay there is a high level of electricity production covering the entire country and that the government is currently working to increase the production of biofuels, so that sustainable agriculture could bring multiple positive benefits, including in terms of fighting climate change. He emphasized that bioenergy has been used in Paraguay in the last more than 23 years, and that the current biofuels share is of 25% in the energy mix including fossil fuels. Mr Bertoni expressed his appreciation for Paraguay being a member of the Global Bioenergy Partnership since November 2008 and wishes a continuation of this important cooperation.

H.E. Luis Alberto Castiglioni, Minister of Industry and Trade of Paraguay, welcomed participants and stressed the role of the Ministry in the national process for the development of a sustainable economy. 20 years ago Paraguay started mixing bioethanol with gasoline and today’s mix is up to 25%. 10 years ago Paraguay started focusing on biodiesel and there is a firm decision to continue promoting its use. He particularly mentioned the current cooperation with Korea on the development of an electric mobility plan in Paraguay.

H.E. Mario Lubetkin, FAO Assistant Director-General and Regional Representative for Latin America and the Caribbean, welcomed participants and expressed his pleasure that the 9th Bioenergy Week focuses in particular on Latin America and the Caribbean. Mr Lubetkin emphasized the importance of the event in strengthening cooperation and dialogue at various levels towards a more sustainable production and use of bioenergy, and stressed the continued commitment of FAO to GBEP, both as a founding member and hosting its Secretariat at the headquarters in Rome. He concluded by emphasizing the key role of the GBEP Bioenergy Week as an excellent example of concrete willingness to work together in partnership to further the global goal of sustainable energy development for all and the sustainable development goals.

Amb. Jose Antonio Marcondes de Carvalho, Ambassador of the Federative Republic of Brazil and GBEP co-Chair, reminded participants that access to affordable, reliable, sustainable, and modern energy is a key driver of socioeconomic development, well reflected in SDG 7. According to projections of the International Energy Agency, the world use of modern bioenergy has to double by 2030 and even triple in the transport sector, if we want to achieve the goal of limiting global warming to 1.5°C. Amb. Carvalho concluded that blending levels of ethanol into gasoline is much higher in Paraguay and Brazil than in many other countries around the world, which is helping reducing greenhouse gases (GHG) and, at the same time, increasing gender employment and wealth, while also allowing cities to have cleaner air.

Ms. Emily Marthaler, Expert of the U.S. Department of Agriculture and GBEP co-Chair, highlighted that biofuels brought several positive impacts, including economic benefits to world’s economies. She also underlined the important common objective to reach net zero growth and the important role of biofuels’ in this transition. Ms. Marthaler concluded that this Bioenergy Week is a
great opportunity also for her to learn more about how Paraguay and other countries in Latin America and the Caribbean are developing and deploying bioenergy.

Session 1: Global, regional and national policies

The session was moderated by Mr Guillermo Parra, Director at Fuel and Associates Distributor of Paraguay (DICAPAR), who introduced the different speakers of the session as well as their respective topics.

Mr. Ilkka Hannula, International Energy Agency (IEA), presented on the IEA global vision for the role of bioenergy in clean energy transition. He highlighted that for the first time the governments have come forward with targets of sufficient ambition (net zero emissions pledges of EU and US till 2050, China till 2060 and India till 2070) to hold global warming to 1.8 °C by the end of the century. IEA developed a roadmap to net-zero emissions by 2050 with more than 400 milestones that should be set at a global level to ensure that the long-term target is being met. Out of the four traditional energy sectors (electricity, heat, industry and transport) electricity needs to be decarbonised first to ensure the switch from fossil fuels. By 2050 almost 70% of electricity generation globally should be based on wind and solar. Achieving Net Zero Emissions (NZE) by 2050 requires unlocking the next-generation of low-carbon technologies in this decade. In the NZE scenario modern bioenergy use is meeting 20% of total energy needs and becoming the second largest source of energy supply globally, after solar. Advanced biofuels play an essential role in achieving net zero, being increasingly in connection with Carbon Capture Utilization and Storage (CCUS). Traditional use of biomass, which is unsustainable, should be fully phased out by 2030 and replaced by modern bioenergy, which utilisation should double by 2050, mostly coming from wastes and residues. Bioenergy needs a lot of more efforts to be on track with the NZE scenario, and urgent, strong and credible actions from governments, underpinned by much greater international cooperation, are needed to attract investments at scale and foster required innovation.

Dr. Ricardo Gorini, International Renewable Energy Agency (IRENA), presented the bioenergy’s role in the World Energy Transition Outlook (WETO). He reminded the key goals and drivers towards energy transition to the cleaner energy mix and highlighted the importance of the energy security aspect in the current energy crisis. Reducing emissions to net zero by 2050 will require a portfolio of joint solutions. It’s a combination of renewable energy generation through direct supply of low-cost power, efficiency, electrification, bioenergy with CCS and green hydrogen. Use of bioenergy and biofuels is very critical in achieving Key Performance Indicators (KPIs) of the 1.5°C Scenario by 2030 and 2050. The share of renewable energy should increase by 20% in 2030 and be 80% in 2050. Bioenergy considered in the WETO scenario includes agricultural residues, forestry products, energy crops and post-consumer waste. Bioenergy plays an increasingly important role in most energy scenarios compatible with 1.5°C climate goal and according to IRENA 1.5°C Scenario sustainable bioenergy can bring 153 EJ in primary energy supply via accelerated use in three WETO pathways: industry, transport and power. The use of biomass needs to rise in industry sectors as cement, metal, and chemical production. Growth of biofuels in transport requires an increasing role also in aviation and shipping. Biomass has an important role to play in power sector with opportunities in cogeneration, increasing efficiency and also dedicated crops, amongst the others. Biomass supplied from sustainable sources will need to rise from current levels of 30 EJ by a factor of five-fold by 2050 [~150 EJ] that will require huge investments, of about 120 USD billions per year needed for the end use and district heating. Dr Gorini highlighted the need of overcoming barriers to energy deployment including through coordinated bioenergy policy and ensured market access to bioenergy.

Ms. Carlolina Centurión, Vice Ministry of Industry and Trade of Paraguay, presented an overview of the bioenergy regulatory framework in the country. Ms. Centurión emphasized that one of
the most important axes of the industrial policy in Paraguay is based on the development of biofuels and on the attraction of investments to the national industry, with a view to make it competitive. Furthermore, support of exports resulted in significant growth in the last twenty years that contributed to have access to new markets and shift from export of primarily raw materials to the industrialization of these primary raw materials.

Session 2: Promotion of Bioenergy in Paraguay
The session was moderated by Ms. Cecilia Llamosas, National University of Asunción (UNA), and covered two main topics: Bioenergy development in Paraguay and Results of the Rapid implementation of the GBEP sustainability indicators on soy based biodiesel in Paraguay.

Ms. Antonella Piacentini, Ministry of the Environment and Sustainable Development of Paraguay, started her presentation by referring to the Paraguayan Nationally Determined Contributions (NDC) related to GHG and energy. The objectives in the NDC cover seven sectors, including the energy one, which is the focus of three main goals and fourteen mitigation measures with a strong focus on bioenergy. Laws and projects that are currently in place tackle, among others, cooking and forestry practices, as well as fuels. Within the sector of forest and land use change, a plan is underway to install plants that allow to monitor mitigations and to gather related data to be evaluated every five years. In essence, Paraguay introduced a calculator used to estimate biomass use, to identify other efficient utilizations as well as to monitor the mitigation process of GHG. In addition, a great potential to develop the country in terms of green energy is identified. Hereby, necessary steps include strengthening involved institutions, generating information, and investigating and mobilizing financial tools, both in the public and private sector.

Mr. José Kim, Ministry of Industry and Trade of Paraguay, commenced by asking the audience whether they possessed an electric means of transport, followed by a brief presentation on Paraguay’s status quo and potentials in terms of electric means of transport and renewable energy. He noted that Paraguay is strategically located, in the middle of South America and in the centre of logistic paths such as those of biofuels. Economically, Paraguay faced a GDP increase since 2021 and remains an exporter of renewable energy, namely hydroelectric energy. In 2003, hydroelectric energy was the country’s greatest export. Currently, primary products are mostly exported, which includes renewable energy. In terms of electric mobility, a strategy has already been established, entailing a technological, environmental, social and economic sustainable transition towards a reduction in the use of fossil fuels for climate mitigation, with a view to ameliorate the quality of life in Paraguay. The country is a strong competitor in the sector of renewable energy, producing and exporting fully renewable hydroelectric energy. In addition, renewable energy is sold at the most competitive price, namely $6 kw/h. However, Paraguay is an importer of fossil fuels, solely utilized for transportation purposes. Thus, fluctuation in oil prices have huge consequences on the country’s economy. In addition, fossil fuel prices are high compared to the country’s GDP. As such, clean generation of energy and independence from fossil fuels would improve macroeconomic and social stability, competitiveness, and health. Paraguay aims to be a regional example and reference for electric mobility. For this scope, a Council for electric mobility has been established to coordinate activities among institutions. Furthermore, a pilot plan will be implemented in 2023, which comprehends: introduction of electric trucks and a light transit electric railway; fostering production of green hydrogen; building infrastructure for inventory and charging of electric buses; preparation of firemen and first responders regarding electric transport hazards, fires or accidents; cooperation with South Korea to develop a technological centre of car parts in Paraguay with focus on electric mobility; preparation of qualified workers; and increasing information and techniques.
Mr. Gustavo Cazal, Vice Ministry of Mines and Energy of Paraguay, presented the electrical matrix of Paraguay, of which 39% is from biomass and the remaining share relies on imported fossil fuel energy. However, biomass and fossil fuel energy are consumed in equal amounts. Green energy is composed by 44% of firewood from residential and industrial use, showing potential for biomass use in the industrial, residential and commercial sector. In addition, he referred to various projects in progress to combat and address deforestation. While, as the Latin American Energy Organization (OLADE) confirms, Paraguay is leader in production of renewable energy, it is fundamental to look for other sources besides hydroelectricity, as the only source of hydroelectricity is the Paraná River, which is vulnerable to climate conditions and droughts. He also added various initiatives that the Government is promoting with the objective to facilitate the use of bioenergy and these include credit lines to face the high prices of biomass; pilot trials and projects in Universities; a national programme for education regarding cooking practices, for example in rural families, and production of temporary kitchens; and sanitary and safety measures amongst the others.

Mr. Amado Insfran and Mr. Héctor Corvalán, CEAMSO, presented the results of the rapid sustainability assessment of the soy-bean biodiesel sector using the GBEP indicators; project that was implemented towards the end of 2021. Mr Corvalán gave an overview on production, processing and use of biodiesel obtained from soy in the country. First, he highlighted the efficiency of the technology, whereby productivity increases exponentially compared to land use. Industrialization in this sector increased by 180% from 2006. Regarding its utilization, 90% is used for combustion in diesel motors, while the rest is employed for other scopes such as herbicides or insecticides. Finally, the demand for biodiesel is increasing drastically compared to oil type III, which is decreasing. Mr. Insfran concluded presenting challenges and strengths related to the biodiesel sector in Paraguay as a result of the measurement of the GBEP indicators. He highlighted the lack of data as one of the main constraints that need to be addressed. Furthermore, the stressed that the price of soy-bean biodiesel is very high. He connected this latter and other issues as positively related to the upscaling potential of the country: 63.5% of soy is exported and only 3.8% is kept and processed into biodiesel. Finally, while Paraguay has different institutional and legal strong points, several weaknesses should be addressed, such as the lack of a price policy, as well as fiscal benefits for consumers.

Session 3: Wood energy and land restoration

The session was moderated by Mr Enrique Benitez León, National University of Asunción (UNA) and looked at the potential for positive linkages between wood energy and land restoration.

Annette Cowie, University of New England of Australia, made a presentation highlighting the potential contribution of bioenergy, as part of the broader bioeconomy, to the UN Decade on Ecosystem Restoration. Bioenergy could represent a valuable contribution to reach the Paris Agreement and the SDGs, as it is available now, versatile in applications (e.g. heat, power, heavy transport, marine, aviation), storable, dispatchable, and readily integrated with existing infrastructure. Moreover, bioenergy can provide environmental and agricultural benefits and rural employment, as well as positively contribute to waste management. The presentation analyzed risks and opportunities of bioenergy in three different scenarios, i.e. (i) bioenergy and BECCS (Bioenergy with carbon capture and storage), (ii) biochar addition to soil, and (iii) afforestation. Strategically-placed and well-managed biomass crops for bioenergy and biochar can simultaneously contribute to land restoration, climate change mitigation, biodiversity conservation, as well as sustain livelihoods. The presentation gave particular emphasis on the UN Decade on Ecosystem Restoration, which provides impetus for the adoption of SLM (Sustainable Land Management) and the restoration/rehabilitation of degraded land.
Moreover, the UNCCD’s goal of land degradation neutrality (LDN) provides a framework to support integrated landscape management that can incorporate biomass crops to enable multiple benefits to people and environment.

Ronald Zalesny, USDA Forest Service, presented on short rotation woody crops and their contribution to land restoration. Short Rotation Woody Crops (SRWCs) are fast-growing trees (e.g. poplars, willows, eucalypts, pines) dedicated to provision of biomass feedstocks for energy, pulp, and solid wood products, as well as ecosystem services associated with restoration, environmental remediation, and community livelihoods. There are several broad economic and environmental benefits associated to SRWCs, such as harvest throughout the year with minimal fertilization, extended haul distances, elevated rates of soil carbon storage, energy returned on energy invested (EROEI), they can be used in crop rotations to improve soil tilth and they grow on marginal lands not suitable for agriculture. Moreover, they can be employed for phytoremediation. Mr. Zalesny also presented some cases of applications: Whitelaw, Wisconsin, USA (Groundwater Recycling, Phytoremediation); Manitowoc, Wisconsin, USA (hytoremediation, Phytostabilization, Phytovolatilization); Menomonee Falls, Wisconsin, USA (Stormwater Management, Runoff Reduction, Phytoremediation).

Christian Rakos, President of the World Bioenergy Association, made a presentation on Green Cooking which consists on the use of processed biomass in gasification cookstoves as an alternative to open fires. He highlighted the several opportunities that this cooking solution may bring such as affordable cooking, without smoke, avoiding deforestation like for the case of charcoal. At the same time he highlighted the availability of a vast range of raw materials for pellet or briquette production that could be used for green cooking like rice husks, nut shells (peanuts, coconut, and palm kernel), straw, sugar cane bagasse, elephant grass, and sawdust. He finally stressed that in all cases the production of green cooking fuels will support local economy and create value from residues that would have little value or no value otherwise.

Prof. Evelyne Thiffault, Natural Resource Canada, presented on the integration of forest biomass procurement as a silvicultural tool for forest restoration in Quebec (Canada). In Quebec there is a large forest area that falls under the national regulations and in this context there is a strong concept of Ecosystem Forest Management, which strongly relies on natural regeneration after harvesting and where plantation is involved only when necessary. Thus, there is a high level of diversity in the forest, and where natural disturbances (e.g. fires, worms, fungi, illnesses of the trees, etc.) shape forest landscapes. In some cases, interventions on such natural disturbances are necessary to avoid unpleasant scenarios, for example propagation of wood degradation and in such occasions harvesting is made, e.g. for pulp mills or sawn wood. The high variability in wood quality is often in contrast with the strict requirements of conventional forest industries, which needs to find ways to adapt. Therefore, different opportunities have been tested, for example employing the more degraded/lower quality part of the trees for bioenergy purposes. Prof. Thiffault provided an example of a study on Boreal balsam fir stand. This kind of plant is particularly susceptible to worms. The study compared two different scenarios: (i) sound trees harvested for sawnwood and degraded trees left on the ground as residues, and (ii) sound trees harvested for sawnwood and degraded trees serving as feedstock for bioenergy. It turned out that the residues laying on the ground reduce the natural regeneration, whilst removing such residues and using them as feedstock for bioenergy would provide several benefits in terms of carbon balance, facilitation of natural regeneration and also energy production.

Mr. Adilio Celle Infrán, Vice Minister of General Economic and Social Coordination of Paraguay, made a presentation on the Green Climate Fund (GCF) funded project PROEZA in Paraguay. PROEZA is a project that seeks to improve the resilience of poor household vulnerable to the impacts
of climate change, and increases forest cover in struggling areas in the eastern region of Paraguay. The project is based on the transformation of the social protection system, with a social and environmental focus, aimed at increasing the consumption of renewable energies, reducing the consumption of fossil energy, restoring degraded ecosystems, increasing forest cover and protected biomass, and reducing greenhouse gas emissions. While rendering households self-sufficient in energy, bioenergy markets will be fostered and ecosystems protected. The project will also introduce 7,500 efficient kitchen stoves that will reduce domestic use of wood while decreasing emissions and improving indoor air quality.

Session 4: GBEP Youth Award

This Session was moderated by Dr María Michela Morese, GBEP Executive Secretary, that gave the floor to Mr Rafael Obregón, Representative of UNICEF in Paraguay, who intervened to stress the importance of Youth involvement in all sectors, including and in particular that related to environment and energy, and confirmed the strong commitment of UNICEF in this sense. Further to that, Ms Viviana Limpias, Vice- Representative of UNICEF in Paraguay, awarded the winner of the 2022 GBEP Youth Award in recognition of the most remarkable and outstanding research work carried out by a student in the Americas, in the field of bioenergy.

Ms. Karla Jared Azcorra May, Yucatan Center for Scientific Research, Mexico, presented her award-winning research concerning opportunities to process sargassum to amend its environmental, social and economic impacts in the Caribbean. Her project deals with the use of sargassum in a biorefinery scheme for its sustainable use and development of affected regions. First, sargassum is characterized in terms of its chemical composition and content of phenols, with infrared spectrometry and fourier transform. Phenolic compounds associated with lignin can serve as precursors in the green synthesis of chemical compounds. Next, the extraction of alginate aims to reduce the content of metals in the substance, to obtain a residue that can be utilized to produce biofuel. In fact, 50% of alginate is glucose, which can be used for biofuel production. To address the sargassum problem, an interdisciplinary approach is required. The presence of metals limits the use of sargassum. As such, traceable steps are needed in the processing of sargassum. Biorefineries allow the utilization of sargassum using residues left after processing. Thus, development of biorefineries would contribute to mitigating its negative impacts and to the sustainable growth of the region.
Day 2 – Tuesday 27 September 2022

Session 5: Role of biofuels in the energy transition

The session was moderated by Prof. Suani Coelho from the University of San Paolo of Brazil. Prof. Coelho stressed the importance of biofuels and bioenergy for sustainable energy transition. She particularly highlighted the transport sector, where high carbon emissions are challenging to reduce, and biofuels are an excellent option to reduce carbon emissions since their carbon balance is almost zero. She moderated the interventions of speakers for introductory remarks and then also the following Panel.

Mr. Miguel Almada, Coordinator of Bioenergy at the Secretariat of Agriculture, Livestock and Fisheries of Argentina, gave a general overview of the role of biofuels in energy transition in Argentina. He mentioned the promotion of biofuels in the country since 2006 and growth of the share of biodiesel and bioethanol in blending with diesel and gasoline, from 5% to 12.5% for biodiesel and 12% for bioethanol. Mr. Almada also mentioned that Argentina is among the main exporters of biodiesel globally with European countries as main importers. With 1.7 million tons of annual production of biodiesel he stressed a potential for growth as installed capacities of the 33 biodiesel plants in Argentina would amount to 4 million tons annually. Bioethanol produced in the country is based on sugar cane and maize, where use of maize is below 3% of the total annual production in the country. 1 million m³ of bioethanol is produced in 24 plants in Argentina with potential to grow up to 1.5 million m³. All the bioethanol produced in Argentina is for the internal market. One of the challenges that Argentina is facing in this energy transition process is the diversification of energy sources, where biofuels can play an important role, particularly in local economies. Furthermore, Argentina is exporter of agricultural raw materials.

Mr. Marlon Arraes, Ministry of Mines and Energy of Brazil, accentuated the importance of the Bioenergy Week as a traditional event that facilitates international bioenergy cooperation in public policies, as well as technical training, and particularly underlined the importance of this year’s theme, which matches with the Mercosur working group on biofuels. Mr Arraes emphasized that Brazil looks at biofuels as a strategic and regional vocation for bioenergy production, as decarbonization of the energy mix is at the centre of the international debate, and biofuels play a crucial role. He mentioned that Brazil has significant bioethanol and biodiesel production, being 2nd and 3rd producer in the world respectively. Also, the country has an important biomethane production from landfills, animal manure, and using waste and residues produced from the sugar cane sector; and this biomethane is interchangeable with natural gas. Mr Arraes particularly highlighted the national biofuels policy, namely RenovaBio, with the main objective to reduce GHG emissions in the transport sector by the expansion of production and use of biofuels. In RenovaBio biofuel producers certify voluntarily their production and sell certification accounts for GHG emissions in the entire value chains. As a result, biofuels producers issue the decarbonisation credits (CBIO) that are sold at the Brazilian stock exchange market. One CBIO is equivalent to 1 ton of avoided CO2 emissions. On the other side, fuel producers must buy CBIOs to comply with their individual targets, given as a function of the amount of fossil fuels traded and commercialized in the previous year. Brazil also started the development of the legal framework for sustainable aviation fuels, which will be discussed also at one of the sessions of this Bioenergy Week. He concluded that further to the challenges of the post-pandemic period and the current Ukrainian conflict, medium- and long-term strategic decisions are necessary to ensure the competitiveness of the region’s economy. Progressive integration of the biofuels market within Mercosur will be crucial for the consolidation of public policies in the region.
Mr. Victorio Oxilia, National University of Asunción (UNA), gave an overview of the carbon cycle and existing main challenges on the way to make the full use of carbon in biomass. Talking about challenges, the main one is represented by the technological challenge, however nowadays thanks to the availability of several technologies, this challenge can be considered overcome. The second challenge is related to the environment and in particular is connected to water and soil. Today’s share of biofuels in the transport sector is only 5% with 70 million hectares used for the production of its related feedstock. An increase of the share of biofuels will imply more arable land, that while is not critical at the global level, it becomes so at a country level, in particular when it relates to a country with limited arable lands. The third challenge is social, as the increase of biofuel production will produce changes in the labor sector in rural areas. These issues must be taken into account when we are promoting biofuels. Challenges related to soil can be addressed by introducing more efficient crops. For the social challenge the case of Brazil in the State of San Paolo and other ethanol producing regions can be used as a reference to identify and replicate the benefits.

Mr. Wilson Sierra, Director of Renewable Energies at the Ministry of Industry, Energy and Mining of Uruguay, gave an overview of the role of biofuels in the energy transition. He started by stressing that the efforts made by world countries towards defossilization are not enough. Energy demand continues to increase and fossil fuels continue to respond to that, with all the impacts that we all know. He pointed out that implementation of renewable energies is not uniform throughout the world, bringing more positive results in some areas than in others, for example, in the transport sector. Mr. Sierra referred to the local perspective of energy consumption in the transport sector, which showed significant growth in recent years with an increased use of electricity and biofuels in transport vehicles. The roadmap for the development of hydrogen in Uruguay has been prepared. Implementation of the biofuels in the energy metrics started since 2005 and Uruguay reached almost 10% of ethanol and 7% of biodiesel in the blending with fossil fuels in transports. The newest legislation that came into force at the beginning of 2022 establishes the mandatory mix from 5% to 8% for ethanol and removes the mandatory mix for biodiesel. Although the environmental impact is completely acknowledged in the public opinion, the performance of the biodiesel at the local level requires additional costs, which implies constraints for the society. Finally he underlined that Uruguay is working on the inclusion of all kinds of biofuels from industrial waste with a view to promote this sector further.

Session 6: Panel I - Role of biofuels in the energy transition - Long-term planning and biofuel’s role in the face of market oscillations in Latin America

Prof. Suani Coelho, continued moderating also this Panel I to discuss the role of biofuels in the energy transition in Latin America and the existing challenges and perspectives.

Ms Gilda Arrellaga, REDIEX of Paraguay, described the framework for biofuels at the international and national levels. At the national level it includes a National plan for development till 2030, with the aims to increase the use of renewable energy by 60% and to reduce the use of fossil fuels by 20%. At the international level, Paraguay has recently updated its Nationally Determined Contributions (NDCs) with a commitment to reduce emissions by 20% and support development of renewable energy sources. The energy mix of Paraguay is dominated by clean energy sources, with hydroelectric power representing more than 95% of the installed capacity. In terms of energy demand the main energy source is biomass (44%), mainly firewood, followed by fuel derived from oil (40% of the energy mix), with the third place belonging to electricity (16%). Almost all oil is imported and represents a negative impact in the commercial balance of the country. Oil derivatives are mainly responsible for GHG emissions, coming predominantly from transport (88.33% of GHG emissions).
Latin American countries are going to be an important part of world biofuels’ sector, but still need to establish policies considering the environmental aspect, as a strong geopolitical component. Environmental and social benefits of biofuels’ development in Paraguay come from the fight against climate change and from the commitments of the country as a Party of the Kyoto Protocol, aimed to develop policies that reduce CO2 emissions, as well as strategies to produce renewable energy that contributes to nature conservation and human health. This includes new renewable sources of energy, technologies for carbon capture and advanced technologies for renewable sources. However, production of biofuels can influence the increase of food prices, the competition for water, and deforestation. Paraguay has developed necessary regulation for biofuels production and introduced measures that attracted investments and empowered the sector. Paraguay became a leader in the decarbonisation of energy transition by inviting innovating companies to produce advanced biofuels to be used for military and air transport, such as the Omega Green project. In his conclusion Ms Arrellaga stressed the importance of legislation that covers administrative and regulatory frameworks in the management of biofuels, with a view to stimulate investments in the development and use of energy sources. She also highlighted that Paraguay is committed to promote sustainable biofuels, covering financial, environmental, and social impacts.

Mr. Massimiliano Corsi, President BIOCAP of Paraguay, started by recalling that biodiesel and bioethanol are the only substitutes for diesel and gasoline, respectively, on a global scale, as they do not require structural changes in a vehicle, which helps their introduction on the market. Strengths of using biofuels include environmental friendliness and also the possibility to use local raw materials. Analysing the world production and consumption of biofuels since 2010, Mr Corsi explained the influence of public policies on their development, including forcing the blending in some countries. He also highlighted that growth in biofuels production is dependent on clear and stable public policies, essential for long-term investments in technology that would increase efficiency and competitiveness of biofuels production. Growth of biofuels sector depends on public policies and raw materials. Mr Corsi highlighted the significant potential for biofuel production in the American countries, mainly United States and Brazil, which cover more than 60% of the world’s biofuels production. He also presented trends in biodiesel and bioethanol production at a global scale. On one side, global biodiesel production showed an accumulated growth of 140% in the last decade (2010-2019). The annual change rate in that period ranged between -6% and 21%, with a clear upward trend in production, which reached 50 million cubic meters in 2019. On the other side, global bioethanol production showed an accumulated growth of 31% in the last decade. The annual change rate ranged between -1% and 15%, with a clear upward trend in production, which reached 112 million cubic meters in 2019. In conclusion, Mr Corsi compared mandatory blending mandates at the regional level in Brazil, Argentina and Paraguay. He highlighted that biodiesel use in Paraguay is the lowest and should be increased from the present blending share of 1% considering novel products.

Mr Diego Roger, Director of Biofuels, Ministry of Energy and Mines of Argentina, gave an overview of bioenergy in the perspective of global transitions. Mr Roger explained that biofuels considerations shouldn’t be reduced only to the financial sector and prices, as energy and technology are profoundly connected. He emphasized that the energy systems of each country have singularities derived from their natural resources stock, from the institutional, industrial, and technological capacities, from the trajectories of sectoral policies, as well as from the positioning of the country within the world economy. Mr Roger underlined the necessity to synergize energy and development within the country, with a view to develop sustainable energy policies. The transition process must be managed on the real conditions and on country’s structural restrictions, including also consideration on exchange rate volatility, inflation, external restrictions, deficit of local financing in the energy sector, high dollarization of energy value chains, and structural energy deficit. The primary energy supply in
Argentina is 85% fossil-based, mainly oil and natural gas, and bioenergy from different sources reaches 6%. Mr Roger highlighted that biofuels are a great alternative for the fast and efficient decarbonisation potential towards an energy transition of the national economy. Mr Rogers concluded that taking advantage of the current opportunities is time-limited but realistic because of the existence of capacities and resources. Still, issues such as the local financing of energy projects must be resolved. The biofuels sector development agenda is a structural change plan for the countries when energetic, productive, industrial and technological policies must be defined to see the whole picture. Focus on sustainable development requires harmonising the energy sector’s development policies, which will contribute to structural changes.

Dr. Plinio Nastari, President of DATAGRO of Brazil, spoke about the role of biofuels in energy transition and long-term planning, as well as on the biofuel’s role in the face of market oscillations in Latin America. In the beginning Dr Nastari listed the attributes of biofuels, which describe benefits of their production and use. He followed by presenting Brazil’s experience in biofuels production. Bioethanol from sugarcane is the 2nd largest source in Primary Energy Supply of the country after petroleum (33.1%) and amounts 19.1% (2020). Ethanol is substituting 48% of gasoline in Brazil through the blending of 27% ethanol in gasoline and the use of 100% in flex-fuel vehicles, which account for 86% of total fleet of light vehicles. Ethanol is distributed in +41,700 retail stations that should be considered as a network of hydrogen already in place. Sugarcane for ethanol that displaces almost half of its gasoline occupies only 0.6% of Brazil’s territory, or just 1.5% of its total arable land. Critical success factors are the interaction with the automobile sector; precise and stable regulations, including fiscal rules; and the avoidance of unforeseen market intervention; as well as the promotion and reward of innovation and efficiency (such as done by the Brazil’s RenovaBio). Dr Nastari stressed that the world is increasingly interested in green hydrogen, but it is expensive and poses a hurdle to store and distribute. Biofuels should be seen as hydrogen carriers, as they represent a simple, practical, and economical way to capture, store, transport and distribute hydrogen. Dr Nastari summarized that moving towards the age of hydrogen should consider not just hydrogen captured and stored in high-pressure costly and risky titanium tanks, but hydrogen in high-density, low carbon footprint, sustainably produced advanced biofuels such as ethanol, biomethane and biodiesel.

Presentations of speakers were followed by a Panel discussion moderated by Prof. Suani Coelho (USP, Brazil) with participation of Miguel Almada (Secretariat of Agriculture, Livestock and Fisheries, Argentina), Marlon Arraes (Ministry of Mines and Energy, Brazil), and Wilson Sierra (Director of Renewable Energies, Ministry of Industry, Energy and Mining, Uruguay). Among the main points highlighted by the panellists discussion there were the necessity of long-term, predictable policies for biofuels in the context of energy transition and with strategical attention to energy security. The great potential of the Mercosur region was mentioned to supply the demanding markets looking to reduce their carbon footprints. In the case of Uruguay, where the renewable energy mix has a significant share of solar and wind, biofuels and electricity for transport can complement.

Session 7: Panel II - Role of biofuels in the energy transition - Biofuels, batteries or both? The future profile of sustainable low-carbon mobility in Latin America

Mr. Renato Domith Godinho, Head of Renewable Energy Resources in the Ministry of External Relations of Brazil, moderated the session.

Mr. Marlon Arraes, Ministry of Mines and Energy (MME) of Brazil, presented mitigation strategies in the automotive market in Latin America. He started by introducing the national biofuel
policy “RenovaBio” of the Biofuels Department of MME, which promotes the utilization of ethanol, biodiesel, biogas and biomethane, and biojet. The three main pillars of the programme are assessing emissions, introducing efficiency standards and sending signals to the automotive industry regarding the medium to long-run energy matrix, where renewable fuels play a key role. Hereby, the policy aims to promote investments (up to R$ 1.3 trillion until 2030) while securing a smooth transition within the petroleum and automotive industries (through ethanol electrification) in Brazil. Together, the transition to a low carbon economy will give a new shape to the energy sector. Furthermore, increasing productivity in generating biofuel entails capturing increasing amounts of carbon. Finally, the policy has positive effects on the growing national deficit related to fuel imports and lowers fuel prices by stimulating competition in the fuel market, thus benefitting consumers. By 2031, fuel demand for light duty vehicles is set to increase by 80% for ethanol and 21% for LDV, with a decrease by 14% in total gasoline demand. In terms of technologies, apart from electric vehicles, hybrid combustion engines using biofuels are proven to be key mitigation options for climate change, significantly reducing GHG emissions while maintaining a high energy efficiency. The performance of hybrid vehicles in Brazil using ethanol is comparable to that of electric vehicles anywhere else in the world. Compared to the scenario before 2019, the sustainable development scenario depicts an average annual 10% increase in the production of biofuels, reaching 300 Mtoe in 2030. Though, currently, powertrain costs of internal combustion engines are significantly lower compared to those of electric vehicles (USD 6,500 compared to USD 16,500). In addition, Latin America, is facing small increases in sales of electric vehicle cars, as percentage of passenger cars, compared to the rest of the world. Nevertheless, biofuels continue playing an important role in the Latin American market of passenger cars, being the third most demanded car fuel after gas and oil. A key aspect is the attractiveness of electric vehicles. However, a positive societal perception has to be accompanied by policies that lower the costs around electric vehicles. “RenovaBio” is only one of four main national initiatives in the “Fuel Of The Future Program”: “Proconve”, the “Brazilian Automotive Regime” and “PBE vehicular” each playing a role in promoting the use of low-carbon fuels to decarbonize the Brazilian energy matrix. The programme’s main motives are to develop a more energy-efficient (high-octane and low-carbon) fuel specification to meet higher air quality standards, and 2nd Generation ethanol to sell at commercial levels; promoting public policies to encourage the use and development of sustainable fuel sources; and eliminating the need for consideration of CO2 emissions in evaluating vehicle efficiency.

Mr. Fitzgerald Cantero, Director, Directorate of Energy, Ministry of Industry, Energy and Mining (MME) of Uruguay, gave a presentation on biofuels and electric mobility in Uruguay. Introducing Uruguay’s energy matrix, it is highlighted that the transport industry is the main consumer of fossil fuel and greatest CO2 emitter. In light of the national policy of climate change and their NDC, Uruguay has established a long-term climate strategy, and participates to several international projects to promote sustainable mobility. In Uruguay, past milestones related to biofuels include the installation of biodiesel and ethanol plants and the shutting down of all petroleum plants. Furthermore, different laws and regulations have been introduced in favour of agro-fuels, covering production, commercialization and exportation of renewable liquid fuels. In addition, the obligation to blend biodiesel was lifted, and the percentage of mixture for alcohol fuels raised from 5% to 8.5%. Analysing the socio-economic impact of biofuel production in Paraguay, it emerged that domestic production saves emissions and fossil energy, while generating an annual increase in employment. In terms of electric mobility, thousands of electric vehicles are currently used in the country, covering more than 3 million kilometres. Actions to reduce fossil fuel consumption and emissions also comprise introducing incentives to try, buy and operate electric vehicles, work on institutional and normative aspects (with the two main institutional groups of the Investigation Group on Tourist Economies and Statistics, GIEET, and MME), establishing a charging infrastructure and a training centre related to electric
Financial incentives entail zero taxes on the purchase of electric vehicles and tariffs in transporting or importing related equipment, machinery, batteries and chargers, as well as reducing costs for businesses switching to electric vehicles. In addition, the “subite” programme entails a number of incentives like a 10% reimbursement after the purchase of electric motorbikes and bikes, included insurance and financing of the electric energy used within two years; incentives to promote the use of pedal assist bicycle and for governmental departments to employ electric buses; and financial rewards for energy savings through electric mobility. Furthermore, tariffs for charging, buying and restructuring public electric buses are to be lowered and a charging net infrastructure is being set up and strengthened. In addition to educational actions across the country, other initiatives are meant to aid the international “Movés” project, to promote and ease sustainable mobility such as walking, cycling and electric transport such as in public transport. In conclusion, moving towards electric mobility would allow to mitigate emissions while saving money to the country and rendering it less dependent from imported fossil fuels.

Presentations of speakers were followed by a Panel discussion moderated by Mr. Renato Domith Godinho and involving Mr. Wilson Sierra (Director of Renewable Energies, Directorate of Energy, Ministry of Industry, Energy and Mining, Uruguay), Mr. Marlon Arraes, and Mr. Miguel Almada (Coordinator of Bioenergy, Secretariat of Agriculture, Livestock and Fisheries, Argentina). The discussion covered the variety of solutions within the biofuel sector while stressing the complementarity of different technologies, the positive effects of biofuels on agriculture and food, and its role in the agro-industrial sector, as well as the life-cycle analysis in the electric mobility infrastructure, highlighting the importance to signal to producers as to where efficiency will lie in the future, and which will achieved through continuous improvements over the next year.

Session 8: Panel III - Role of biofuels in the energy transition - Global market opportunities in sustainable aviation fuels and other new biofuels

Mr. Jaime Escobar, Latin American and Caribbean Air Transport Association (ALTA), moderated the session.

Mr. Jonathan Vacari, Specialist in Sustainable Feedstock for biofuels at Omega Green/BSBIOS group, introduced the Omega Green project, dedicated to produce biofuels, which will undergo 60% of the road towards net zero. The same technology is used the USA and Paraguay, where $1000 mln are invested, 3000 tonnes are processed a year, and several jobs generated. Raw materials include oil from soy, pongamia tree, used oil from cooking, animal fats, and the brassica carinata plant. To do so, the Omega Green project is strategically located in the heart of the Cono Sur, where most raw materials are produced. Omega Green counts on several international certifications proving its sustainability across the entire production chain.

Mr. Renato Dutra, Coordinator of Biodiesel, Ministry of Mines and Energy of Brazil, highlighted four important points on the public policy development for SAF in Brazil. The first point refers to the SAF market potential in Brazil, both in terms of demand and supply: the country has consolidated experience in bioenergy, and a great potential as SAF consumer, as well as exporter of excessive production (with a potential production of 9 million liters of SAF per year). The second point relates to the rapid acceleration of the country’s SAF debates in both academic and academic terms: in 2021 the theme of the SAF was little diffused, but the scenario had quickly changed thanks to academic publications on the great potential of the country, which led to the publication of the first federal law that created the national program of biokerosene (with the establishment of a framework and incentives
for financing investigation, production and commercialization and use of SAF produced from biomass), and the creation of a programme for new fuels (with the establishment of a dedicated technical board). The third point builds upon the mentioned programme for new fuels: there have been lots of meetings, especially between August 2021 and May 2022, among governmental institutions and representatives of aviation, fossil fuels, biofuels industries, as well as airplanes constructors, universities and distribution sector, with the approval of 27 preconditions for future public policy divided into 5 pillars (SAF demand regulation in Brazil; financing projects for investigation, production and commercialization and use of SAF; CORSIA scheme achievement of Brazilian aviation; certification; and taxation). The fourth point refers to translating such debates into initiatives and projects that see Brazil as the main protagonist.

Mr. Augustín Torroba, International Expert on Bioenergy at the Inter-American Institute for Cooperation on Agriculture (OEA-IICA), gave a presentation about the global market opportunities of biofuels for sustainable aviation. Biofuels have the potential to provide multiple benefits, from the energetic aspect to the economic and agricultural questions, but also as concerns environmental aspects and human health. In fact, there is an increasing international concern around climate change, and thus reducing emissions is crucial. Decarbonisation of all sectors of the economy lies within the NDCs of countries, but there are two sectors that have remained outside the national commitments of decarbonization, i.e. aviation and maritime. SAF will be the main innovation to decarbonize the aviation transport and will account for a high percentage of total biofuels. If electromobility increases strongly in the EU and the US, alcohol, oils and fats may be conveyed to the SAF production sector. In this context, scaling up oil refineries and agro-industries, the conversion of refineries into biorefineries, coordination with private and public sectors would be paramount.

Mr. Diego Wassner, Professor, Faculty of Agricultural Engineering, University of Buenos Aires in Argentina, presented on the environmental advantages of a native palm as new oilseed crop: the Acrocomia tani that best grows in the north-east of Argentina. This zone is characterized by problems of social development and unemployment, many small agricultural producers, and a yet small contribution to the country’s oil production, which shows an opportunity for development of an agro-industrial bioenergy value-chain. Compared to the Argentinian palm, Acrocomia aculeata, the Brazilian species, has higher oil concentrations in the fruits, and similar ones in the seeds, with high percentages of fatty acid. Each component of the palm fruit has economic value, with the seeds of the Argentinian species accounting for 44.8% of total revenue from peel, pulp, endocarp and seed. Revenue depends on the quality of the fruit.

Presentations of speakers were followed by a Panel discussion moderated by Mr. Jaime Escobar that involved Mr. Marlon Arraes (Ministry of Mines and Energy, Brazil) and Mr. Victor Oxilia (Lecturer/Researcher at UNA, Paraguay). Mr. Arraes highlighted the importance to employing life-cycle analysis not to priviledge any raw material or technology a-priory, to guarantee a neutral policy. Also, life-cycle can be discussed for aviation fuels to enable a strong development of the market. Mr. Victor Oxilia expressed the cruciality of guaranteeing purchase power agreements - insurances to have guaranteed market transactions - in the realm of biofuels. Next, Omega Green’s production of biofuels is covered. The market is increasing, as the increase in demand for bio jet-fuel shows. While technology and quality of the products do not constitute a limit, energy security needs to be secured and developed. Hereby, a variety in raw materials is a very important asset, and access to those needs to be secured. Finally, regulations independent of single countries, such as those around SAF, guarantee further stability and security.
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Session 9: Exchange of experiences and opportunities on biogas and biomethane

The session was moderated by Mr Shaun Patrick McGahan, FACEN-UNA of Paraguay.

Prof. Suani Coelho, University of San Paolo of Brazil, briefly introduced the Brazilian sugar cane industry and further explained why hydrogen is highly considered in Brazil, mentioning two bottlenecks related to energy security. One is the security of supply for fertilizers, predominantly imported (more than 80%). The second bottleneck is the need to decarbonize Brazil’s freight, which is mainly road-based and uses diesel, which is hard to decarbonize. She also presented several examples of existing plants, where low-carbon hydrogen is planned or can be produced, including Yara’s fertilizer plant and GNR Fortaleza at Caucaia landfill, where biomethane is currently produced. Potential of hydrogen production at Caucaia landfill is 18 t/day. Prof. Coelho also presented an estimate of hydrogen potential based on a variety of products that can be produced from sugarcane with application of such technologies as ethanol reforming (1G/2G), electrolysis from surplus electricity generation, and biogas reforming. Total estimated hydrogen potential based on sugarcane production in 2020/2021 (654 million tons of cane) amounts to 6.54 million tons of hydrogen, and still requires adequate policies and regulations to use it. Global hydrogen potential only from ethanol reforming amounts to 13.6 million tons, based on 2021 ethanol production of 103.2 million m3 of ethanol, with the biggest potential in the United States and Brazil. She also presented a new pilot project to convert ethanol into renewable hydrogen, which will start in 2023 and is established within Shell, Raízen, Hytron and USP partnership.

Ms. Tamar Roitman, Brazilian Biogas Association (ABIOGAS), presented the work of the association that unites 130 companies covering the whole supply chain, as well as neighbouring sectors and consumers. Biogas in Brazil is produced only from residues and can be further used to produce heat and power or purified to produce biomethane and further used for hydrogen production. Biogas potential in Brazil is 120.8 million Nm3/day with more than 50% in sugarcane industry (57.6 million Nm3/day) and animal manure being the second part of the potential (38.9 million Nm3/day). The sanitation is the smallest share of the potential, but is the first where investments came, representing now 80% of all biogas production, mainly from municipal solid waste and sewage treatment. This potential can cover 18% of the country’s electricity consumption or cover in form of biomethane 34% of diesel demand, or two times replace liquified petroleum in Brazil. Ms Roitman recalled biogas advantages and emphasized that methane reforming for hydrogen production has higher conversion efficiency compared to water electrolysis.

Ms. Mirjam Röder, Energy and Bioproducts Research Institute at Aston University in the UK, talked about enabling the positive sustainability trade-offs from rice straw biogas, from a project implemented in the Philippines. Ms Röder shared results of the research, where non-market benefits associated with rice straw biogas were analysed, including climate change mitigation with GHG emissions reduced by up to 60%; health risk reduction by air pollution reduced by over 80%, as well as employment benefits with creation of new jobs in harvesting, drying and energy conversion, and providing food security with reducing losses by 50%, which in turn reduces need for rice imports from currently 3 million t/year to two million tons. Qualitative modelling around improving energy access in small-scale community-based settings showed improved energy access in off-grid settings. Regarding energy provision, up-scaling of rice straw biogas could improve self-sufficiency on a national scale from 50% to 54%. Ms Röder summarized that benefits of bioenergy systems not only include energy access and environmental improvements, but also cover socio-economic benefits. She also highlighted that community-based intervention with stakeholder participation provides in-depth understanding of
community needs and perception, and that wider sustainability benefits should be part of the informed decision-making.

Mr Craig Jamieson, Director of Straw Innovation Ltd, gave an overview on rice straw use for biofuels purposes. Rice straw left on the filed after rice production is about 750 ml tons in Asia, every year; but instead of being used as a resource for bioenergy it is used for other two main options: ploughing in which creates main agronomic problems for the farmers or burning, despite it is banned. The third option that Mr Jamieson’s company is exploring is to “remove and sell”, by harvesting the grain and remove the straw at the same time, leaving the field cleaned and ready for the following rice production. The business model of the company is to provide technology from the harvesting service, to the straw sale, up to the bioenergy production.

Mr. José Krauch, ITAIPU Paraguay, presented the mission and vision of the Itaipu Technological Park (PTI), strategic objectives, as well biogas potential of Paraguay. Paraguay is producing around 1 kg of waste per person per day. The positive side of this is that there is a potential to transform this waste into energy. Bioenergy potential is reached by integrated and diversified solutions. Paraguay is following the global movement of raising awareness for this kind of technology. Mr. Krauch showed the specific example of biogas development in Germany, emphasizing that this development reflects the national policies that influence and determine the possibilities of growth in this market. The installed capacity worldwide of biogas plants also increases every year, which can serve as an incentive to adopt necessary policies in Paraguay to face the situation. Waste energy potential (urban, organic) in Paraguay represents about 27 million MWh. Mr Krauch mentioned that PTI is a promoter of circular economy systems in the bioenergy sector, with such lines of action as use of biogas in cereal drying systems; use of biogas for domestic use (especially in communities where electricity is not available); use of biogas in biomass-producing industries (abattoirs-fridges, oil factories, dairy sector), institutional restaurants; and agri-food sector. Among challenges in the sector Mr Krauch highlighted the change of habits; increase of education and awareness; and investment in sustainable business model, as well as alignment of cooperation with the various energy sectors to strengthen synergies and concentrate efforts on achieving sustainable development goals in an economically viable way. Although biogas market in Paraguay is at its beginning, the global overview shows that this sector is where investments are going to go, and return of investments is going to be greater than any other alternative.

Mr. Jorge Hilbert, INTA Argentina, presented experience of biogas done right in Argentina. Mr Hilbert mentioned the enormous resources of residues and crops in the country and mentioned several studies based on Geographical Observation System (GIS), where it is possible to spot out where is residue available for biogas operation. He highlighted that there are 52 biogas plants developed in the last 5-7 years in Argentina, mostly related to production of electricity. He also presented several examples of how to integrate a biogas plant in agricultural and agro-industrial system. Mr Hilbert shared the results of the recent study on an integration of bioethanol refinery with the three biogas plants in the province of Cordova. He also presented the Dibicoo project results and results obtained under the Global Methane Initiative (GMI).

Ms. Liliana Castro, Universidad de Santander de Colombia, presented the results of research of anaerobic digesters of sugarcane, bagasse, cheese whey and pig manure in rural communities in Colombia. Ms Castro underlined that Colombia is a pioneer in the implementation of tubular digesters, which were introduce in 1984 by Tomas Preston. She also mentioned key points of domestic digesters in the country and tests performed with different residues (figure bagasse, coffee husk, poultry manure, food waste) to assess their biomethane potential. In 2017, in cooperation with Colombia and Latin
America Digestion Association, first tubular digesters in rural areas were installed. Ms Castro described the evolution of tubular reactors of own production and practical results obtained from installations, including levels of biogas production with different feedstocks and at different sites. In terms of energy, heat energy of biogas from the digester could supply 80% of energy requirements for a family of five people. Ms Castro also mentioned strategies for digesters for cold climates.

At the end of the session, speakers were invited to add short message: Prof. Suani Coelho highlighted that hydrogen is an important source of energy that still needs policy and regulations for its use; Mr. José Krauch underlined that Paraguay has potential for biogas production, which is financially viable, but direct approach is needed to address the farmers; and Ms. Mirjam Röder stressed that confidence is needed to capture the whole graph of sustainability, understand the co-benefits and address the risks.

Session 10: Bioenergy in the context of the broader bioeconomy

The session was moderated by Mr. Agustín Torroba from the Inter-American Institute for Cooperation on Agriculture (IICA), who introduced the topic of the session mentioning three countries that already have national bioeconomy strategies and policies, namely Costa Rica, Colombia and Brazil. Mr Torroba also mentioned four key points relative to bioeconomy development that include: working on regulatory framework, consistent to the reality of the country; working in technological and scientific capacities; creating and promoting markets for biofuels; and promoting research and development.

Mr. Carlos Graterón, Technical Director of Fedebiocombustibles in Colombia, presented the role of biofuels in the framework of the national bioeconomy strategy. Mr Grateron started with introduction of the national federation of biofuels in Colombia. He also showed the distribution of the production capacities and described regulation for blending biofuels with fossil fuels. Colombia is one of the leaders in promoting electricity for transport with 9 000 registered electric vehicles and 40 000 hybrid vehicles, and the goal is to have 600 000 vehicles in 2030. Mr Graterón compared bioethanol and biodiesel production with the petroleum oil fields in the country explaining that opposite to oil, resources of biofuels is unlikely to deplete. Bioethanol production trend in Colombia shows decline after the pick of 715 million litres in 2019 because of the global trend of reduction on transport influenced by the reduced use of vehicles during the pandemics. Biodiesel production is increasing, and 700 thousand tons are expected to be produced in 2022, mainly due to the demand of fossil fuels to which biodiesel is blended. As for environmental benefits he referred to around 3 million tons of CO2 that will be saved because of the use of biofuels. Biofuels don’t have sulphur in the composition and their use reduces the particle matter in the air. Mr Graterón also highlighted a programme of voluntary blending as an initiative of citizens to improve the quality of air in cities. He also stated that South America can become a powerhouse in production and trading of sustainable aviation fuels (SAF). Mr Graterón finished his presentation by referring to carbon footprint applied to SAF: according to Carbon Offset and Reduction Scheme for International Aviation (CORSIA), the baseline values for jet fuels is 80 gCO2e/MJ.

Mr. Patrick Adam, Executive Director, Chamber of Corn Bioethanol in Argentina, shared with participants on economic, social, and environmental development of biofuels in rural territories. Evolution of bioethanol mandatory blending started from 5% in 2010 and currently amounts to 12%. Mr Adam stressed the importance in the stability of the “rules of the game”, hence of policies, and to the need to advance on legal frameworks. Bioethanol allowed to create more than 65 000 jobs in the countryside, where 24 bioethanol plants are located. New law for biofuels in Argentina in 2021 reduced obligatory blends with fossil fuels, namely from 10% to 5% for biodiesel and from 12% with a
possibility of being reduced to 9% for ethanol. Current exports of Argentina are mainly focused on raw materials without exporting value added, which is unsustainable and represents underdevelopment. Another motivation for bioethanol in Argentina was chronic deficit in the production of gasoline, which required imports to cover the gap. Ethanol offers the opportunity to replace imports that are expensive for local production. The strongest economic point is that in the period from January to July 2022 Argentina have imported 620 million USD of gasoline which could have been avoided through increasing the blend of bioethanol. Import of expensive gas is another motivation to keep growing ethanol. Increased blends of bioethanol with gasoline will reduce gasoline imports. Argentina has international commitments connected to climate change and considering that transportation takes a key part in GHG emissions, without biodiesel and bioethanol there is no opportunity to reach those commitments. Mr Adam highlighted the health issues associated with the use of fossil fuels and benefits that bioethanol can offer, including high octane rating of bioethanol that allows refiners to replace the use of benzene and flavouring agents, generating a very favourable impact on air quality and the health of the population. Argentina produces 60 million of corn in the country, which is enough for bioethanol production and for blending it by 15% with gasoline and to develop regional economies by building processing plants in the deep countryside, however there is still lack of political will to facilitate the implementation of bioethanol production.

Mr. Pedro Mancuello, Vice Minister of Industry and Trade of Paraguay, presented the role of biofuels in the framework of the national bioeconomy strategy. Mr Mancuello highlighted success regarding bioethanol development in the country, while biodiesel blend accounts to 1% that was reduced from 2%. There are eight industrial bioethanol plants which produce 540,000 m3 for the mix of 25% of 1,300,000 m3/year of gasoline. This allows to save up to 500 million dollars per year through substituting imports. Since 2016 Paraguay has been exporting bioethanol mainly produced from sugar cane and cereals (corn). For biodiesel production there are six industrial plants with production of 21,000 m3/mix of 1% of 1,800,000 m3/year of diesel. Biodiesel is produced mainly from soybean oil and corn oil, and export is expected to start since 2023. There are new projects in the installation phase, starting from the company CREMER OLEO that will begin producing and exporting biodiesel from 2023. Its main raw material will be soybean oil through the transesterification process for mixing with type III diesel, with an installed capacity of 100,000 m3/year. The OMEGA GREEN project in Paraguay plans to produce HVO (Hydrogenated Vegetable Oil), which is a perfect substitute for diesel, with an estimated production of 1,000,000 m3/year. Additionally, such products as Synthetic Paraffinic Kerosen (SPK) and Naphtha will be produced. Mr Mancuello also mentioned the National Bioeconomy Strategy under development in cooperation with IICA, and which will include the construction of a Pilot Plant for the Paraguayan Chaco. As a conclusion, Mr Mancuello highlighted several benefits of bioeconomy, including biofuels production in a more sustainable way, more efficient articulation between the public-private-academic sectors, increase and diversification of exports of goods and services, and also capitalization on the value of knowledge and human capital.

Dr. Maria Michela Morese, GBEP Executive Secretary, gave an overview on the role of bioenergy in the context of bioeconomy. Dr. Morese emphasized the importance of sustainability for modern bioenergy, with a view to take out the best of opportunities that appear. She refers to the background of GBEP and presented the set of the 24 sustainability indicators that GBEP members agreed for all types of bioenergy. The objective of the indicators is to see positive and negative aspects of any bioenergy value chains, and to see what policies need to be introduced or improved in the country with a view to further strengthen the sustainability of the related value chain. These indicators have been implemented in different countries, including Paraguay, Colombia, Argentina, Jamaica, State of San Paolo in Brazil, amongst the others. Indicators serve also as a tool to measure, notify, and verify the achievement of Nationally Determined Contributions (NDCs), Sustainable Development Goals.
(SDGs) and Bioeconomy. Sustainable bioenergy has the potential to contribute to sustainable development when also considered part of the broader bioeconomy. The use of the GBEP indicators is an important tool to be used as a reference to guarantee a sustainable bioeconomy approach that can be applied to agriculture, forestry and bioeconomy approaches.

At the end of the session each speaker had the opportunity to give the final reflections to the topics discussed at the session. Dr. Morese highlighted that one of the advantages of the GBEP indicators is their voluntariness that facilitated their agreement (within the more than 80 members in GBEP) and their use, which is contributing to harmonize sustainability assessment at the global level. She also stressed that while environmental and economic indicators are always considered within the sustainability considerations for example in the European Community, social indicators are less considered and more attention on this is needed.

Session 11: Roundtable discussions – Challenges and opportunities for the development of bioenergy

Mr. Guillermo Parra, DICAPAR, Paraguay, moderated the session and introduced the speakers.

Ms. Aida Lorenzo, Renewable Fuel Association of Guatemala, covered the biofuel blending programme in the Central American region. She started by explaining the cultural variety in Central America. However, one common feature is that each country imports fossil fuel and exports ethanol. Most of the fuel in Central America is imported from the US, and predominantly by Guatemala. Thus, the Central American region faces expensive oil bills, in total USD 5 million in fuel. Especially after the pandemic, the demand has grown. Half of the gas stations of Central America are located in Guatemala, which shows the potential for the biofuel blending programme in Guatemala, but also the possible extent of its opposition. In addition, she highlighted the importance of regulating taxation within the blending programme to ease its implementation. Ms. Lorenzo gave an overview of the status-quo in Central American countries: in Panama, the blending programme was implemented within two years but fell through after the government change. Now the country is trying again to promote bioethanol; Costa Rica’s green policy is under way but faces price issues; Nicaragua has a limited legal framework although the country has great capabilities, similar to El Salvador; Honduras has existing laws but non-existent capacity; and finally, Guatemala has laws and production capabilities but no projects underway. In Central America, the ethanol industry consists of 16 distilleries using molasses and exporting more than 90% of their production, as the quality meets high standards. Regarding biodiesel, it is believed that the potential raw material is African palm oil, but no capability exists, and 60% of all raw oil is exported. In Guatemala, 65 million gallons of molasses are used for the production of ethanol, where all fuel is exported. In fact, the government has prioritized the use of bioethanol, but an update to the legal framework is necessary. The goal in Central America is to promote blending programmes, establishing production in each country while increasing capabilities, creating jobs while saving money spent in importing, and reducing emissions of greenhouse gases, particularly in the transport sector. In Guatemala, a great capability in terms of sugar cane exists, as well as the potential to use the positive side of the energy matrix. Though, the challenges are to establish long-term policies that are independent from government changes, thus building stable legislation. In conclusion, blending programmes in Central America are aimed at reducing emissions and dependency from foreign fossil fuels.

Before introducing the next speaker, Mr. Guillermo Parra referred to the existing myths regarding blends, for example, dealing with cars inability to adapt to biofuels, and the importance to fight such misconceptions.
Ms. Mackenzie Boubin, U.S. Grains Council, USA, spoke about the role of biofuels in the road towards a net zero goal, and increasing bioethanol consumption in the transportation sector. She started by presenting the US Grains Council, based in Washington. One of the Council’s aims is to identify new opportunities for market access abroad, such as those represented by ethanol. The biofuels industry is now a stable sector, secured by sound policies. Biofuel producers follow the market, and policies send strong signals. Still, extensive education regarding the potentials related to ethanol is needed. Next, the potential of electric vehicles is highlighted. Nevertheless, by 2050, 70% of the vehicles are still projected to be internal combustion engines. As a global industry, biofuel is a very powerful industry, especially in the western hemisphere, which possesses a huge export potential. Several countries are increasing their ethanol standards and consumption. In terms of supply and land use, the USA has an excess capacity. In addition, the USA are one of the cheapest and highest octane sources, globally. Ethanol is one of the very few pathways that can go net negative. Five carbon capture pipelines have been installed, and by 2025, 50% of US facilities are projected to be connected. In conclusion, bioethanol is abundant in the US and compatible with E10, and 10% ethanol is compatible with all existing vehicles.

Mr. Miguel Hernández, Bonsucro, started by asking whether the term “bonsucro” was known to the audience. Bonsucro is the leading platform for sugarcane, aiming to promote the sustainable utilization and production of sugarcane. Sugarcane is produced in over 100 countries, and its factories provide job opportunities and development, while producing a commodity for biomass. Derivatives of sugarcane are countless. Bonsucro is partner of several alliances and governments. Furthermore, it possesses a certification system of sugar cane fields, where the mill chooses what derivatives to certify depending on the market’s demand. Lastly, the certified product can reach the consumer. Apart from generating jobs, sugarcane can be used to produce ethanol sustainably, given that several standards are met, such as zero deforestation, efficient use of water and agrochemicals. On a social level, implementations by Bonsucro have reduced accident rates of workers, improved minimum wages at farms, decreased GHG emissions as well as usage of water. In fact, compared to the year of initial certification, after 8 years of activities emissions have decreased by 55%. Lastly, the platform created a strong and vast network across all continents.

Mr. Pierluigi Picciotti, Versalis, Italy, presented on advanced biofuel projects. He started by introducing Versalis, as part of the ENI’s chemical company. Since 2018, increased focus has been placed on biochemicals. Advanced ethanol will be protagonist in future scenarios, with the aim to decarbonize the transportation industry. Cellulosic ethanol, a 2nd generation ethanol, brings along several opportunities: fostering socio-economic growth of local communities or playing an intermediate role for green chemicals of cellulosic sugars, which can be used in biorefineries. On the other hand, challenges are still present. For example, government support is needed to develop projects. In addition, only few technologies have been proven valid at the industrial level, and the future scenario around global mobility is unknown. Finally, biorefineries require a change in mindset. The current priority to optimize investments prevents the development of several small-size cellulosic ethanol plants. Production of sugar from cellulose residuals in biomass has four main stages: biomass pre-treatment - simply using steam and water -, hydrolysis using enzymes, fermentation, and recovery of product. In doing so, sugar is processed, and then ferments into alcohol. Hereby, lignin is produced, which can be used as an intermediate for other chemicals, representing an additional opportunity for the future. Lastly, key benefits in implementing cellulosic ethanol projects include reduction of gasoline import and development of agro-industries while fostering employment and being compatible with food chains. In fact, the production cost of 2G ethanol is potentially competitive as long as biomass residues are available, which proves its validity at a commercial scale. To do so, a regulatory framework for 2G biofuels is necessary, as in the USA and Europe. Finally, such ethanol plants require to be tailored to
the local context and project, for example by integrating existing infrastructure or fulfilling local regulations, while generating revenues from all possible sources related to the plants to build a circular and sustainable project.

Mr. Jaime Escobar, Latin American and Caribbean Air Transport Association (ALTA), gave an overview on the programme of work, activities and membership of ALTA, and focuses on the high attention recognized to sustainability of SAF.

Mr Enzo Olmedo, INPASA Paraguay, showed a video summarizing the activities of the company. INPASA is a Brazilian owned company that established its first plant in Paraguay in 2008 and as of today there are two INPASA plants in Paraguay. They produce both biodiesel and bioethanol mainly from corn, and use woody residues, like eucalyptus, as biomass to power the plant operations. Here are some data of the two INPASA plants in Paraguay: 3 ml ton of corn processed every day, and transformed in 1.3 ml liters of ethanol, 720 ton of distillers dried grain with soluble (DDGS), 100 000 litres of biodiesel, 85 ton of corn oil, 20 000 litres of Initial Oil in Place (IOIP), and 450 t of sugar. The objective of INPASA is to produce, from all its plants, more than 10 ml litres of corn based ethanol a day.

After the presentations, Mr Guillermo Parra moderated a roundtable discussion. First, Ms. Lorenzo referred that, in other countries similar to Guatemala, for example in the Dominican Republic, the potential of the biofuel industry has to be met with sound public policies to achieve a successful transition. She acknowledged the possibility to develop the production and use of biofuels in the aviation sector but stressed the priority to start by securing higher environmental standards and air quality. Ms. Lorenzo addressed an additional question, regarding the possibility of Latin American countries to consume domestic fuels rather than imported ones, by highlighting the importance of the free-market regulations that govern those countries, which, despite its attractiveness, does not limit consumption to domestically produced fuels. Ms. Boubin was asked about the total cost of ownership of vehicles employing biofuels. Acknowledging the importance of the subject, she emphasized the importance of consumer choice. Being asked regarding incentives around cellulosic ethanol in Europe, Mr. Picciotti explained the RED II, a directive of the EU. For the first time, a mandate has been dedicated to advanced biofuels. Mr. Escobar was asked about the blending process of SAF with fossil fuel. This happens in the fuel farm, or sometimes directly outside of the airport, using splash blending. In light of SAF guidelines in other countries, he explains that a plane flying with SAF from South America to Europe should find the same standards and mixture of fuel, but this occurrence needs additional regulations to be stipulated for all countries. Additionally, there is an option to directly distribute an already mixed product. Together with engagement by political entities, a huge growth can take place while securing a synergy among fuel and biofuel industries. Nevertheless, economic considerations are primary drivers in the decision to mix ethanol with gasoline, besides regulations and laws. Finally, Mr. Hernández compared Bonsucro’s voluntary certifications to similar alternative in the US, which also rely on a private agreement of consumer and producer. Again, market opportunities dictate the decision to acquire licenses. As such, financial incentives are huge motivators.

Conclusions and Closing Remarks

Dr. Maria Michela Morese, GBEP Executive Secretary, in her concluding remarks expressed appreciation for the success of this 9th GBEP Bioenergy Week, third one organized in the Latin American region (2013 in Brazil, 2018 in Argentina and 2022 in Paraguay). She stressed once again
the importance of sustainability that plays a key role, and this is the reason behind the high importance attached to sustainability both in FAO and in GBEP.

Mr. Óscar Cáceres, Director General at Ministry of Industry and Trade (MIC) of Paraguay, stressed the central role of biofuel in the country and the effort to establish strategies to promote electric mobility.

Eng. Letizia Torres Barbona, Director General at Ministry of Agriculture and Livestock (MAG) of Paraguay, concluded with an appreciation of the opportunity to discuss and collaborate over sustainable biofuel solutions for Paraguay.

Day 4 – Thursday 29 September 2022
The 9th GBEP Bioenergy Week concluded its works with a field visit at the INPASA biofuel plant in Guayaibi. INPASA, is a Brazilian owned company that established its first plant in Paraguay in 2008 and as of today there are two INPASA plants in Paraguay. They produce both biodiesel and bioethanol mainly from corn, and use woody residues, like eucalyptus, as biomass to power the plant operations. Here are some data of the two INPASA plants in Paraguay: 3 ml ton of corn processed every day, and transformed in 1.3 ml liters of ethanol, 720 ton of distillers dried grain with soluble (DDGS), 100 000 litres of biodiesel, 85 ton of corn oil, 20 000 litres of Initial Oil in Place (IOIP), and 450 t of sugar.