EU-INDIA
CLEAN ENERGY & CLIMATE PARTNERSHIP

REPORT ON THE KICK-OFF MEETING FOR EU-INDIA STAKEHOLDER GROUP ON ADVANCED BIOFUELS

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Executive Summary

During the Energy Panel on 1 December 2021, as activity 42 of the EU-India Clean Energy and Climate Partnership Work Programme, it was agreed upon both sides for ***Establishment of an EU-India Expert Stakeholder Group on Advanced Biofuels (SGAB)*** *comprising of 10 – 15 members.*

This report covers the activities and actions undertaken for the establishment of the EU-India Stakeholder Group on Advanced Biofuels (SGAB) and the minutes of its first meeting held on 8 February 2023 at "Hyatt Centric, MG Road, Bangalore". The SGAB consists of 16 members, 8 each from Europe and India. It is managed by 2 Co-Chairs, MM Kyriakos Maniatis (Independent Consultant, former EC officer) and S. Bharathan (Director of Hindustan Petroleum).

The key objective of the SGAB is to exchange information and work together to promote sustainable advanced biofuels in both India and EU in support of national and EU policies. The experts identified 8 Tasks which need to be addressed as a first step to provide clarity of the present situation not only in the EU and India but globally. Furthermore, the co-chairs and the experts discussed the operational modalities and identified the experts to work on the different tasks and the next meetings.

The meeting for the establishment of the EU-India SGAB was successful and the work among the experts has been planned and agreed upon.

Key messages from the SGAB are:

The output from SGAB meeting is expected to facilitate the implementation of policies both in India and the EU. In particular for the EU, the SGAB shall contribute towards the Renewable Energy directive targets to decarbonise transport while it will also impact the *Fit for 55 Package* and the *ReFuelEU Aviation* & *FuelEU Maritime* initiatives.

The SGAB, among other topics, raised the opportunity of developing technologies for small to medium size applications for distributed production of bioenergy carriers and/or advanced biofuels to avoid transporting low energy density biomass over long distances.

The SGAB will develop approaches for harmonised GHG accounting.

The key issue remains the availability of sustainable biomass resources as well as setting up efficient supply chains. Technology has progressed sufficiently to warrantee stronger financial support for deployment.

Introduction

In the past, three EU-India Conferences on Advanced Biofuels were organized annually from March 2018-2020 between the European Commission (EC) and the Ministry of Petroleum and Natural Gas (MoPNG) of India under the "EU-India Clean Energy and Climate Partnership". Also, the subsequent conference on EU-India-BCE: Progress on Advanced Biofuels in March 2022 was held under this framework.

During these conferences technology developers, oil companies and market stakeholders from both sides expressed a strong willingness to work together closely. The business-to-business meetings that took place at each of the three physical events provided an excellent framework to understand the competences, experiences and needs of the other side. The business representatives suggested that a formal working group shall be established with technology experts that shall meet periodically to brief and inform each other on the developments in the sector addressing research and innovation needs as well as policy developments.

During the EU-India Energy Panel on 1 December 2021, it was agreed by both sides to establish the ***EU-India Expert Stakeholder Group on Advanced Biofuels (SGAB)*** as activity 42 of the EU-India Clean Energy and Climate Partnership Work Programme.

The SGAB discussed priority topics for enhanced EU-India cooperation in view of addressing barriers for further deployment of advanced biofuels, promoting innovation, ensuring feedstock supply and identify research areas of mutual interest. This offered a framework to work on deliverables in the context of EU-India Conferences on Advanced Biofuels.

The key objective of such a working group was to exchange information and work together to promote sustainable advanced biofuels in both India and the EU in support of national and EU policies.

Further details on aims, deliverables and experience of the experts are given in Annex 1.

The experts selected to represent the EU are listed in Annex 2.1 and those to represent India are listed in Annex 2.2.

Within the framework of their mission, the EU SGAB Experts also attended:

- a coordination session amongst the EU SGAB experts, on 06/02/2023
- the India Energy Week Exhibition (biomass and biofuels section) where they met several EU participants and Indian stakeholders, on 07/02/2023
- the meeting on "EU India Cooperation on Sustainable Biofuels: Scaling the Biofuel Supply Chain for Aviation" organised at the Bengaluru International Airport Limited by the Research & Innovation, EU Delegation in India, on 07/02/2023
- a visit to the HP Green R&D Centre of the Hindustan Petroleum Corporation at KIADB Industrial Area, Bengaluru, on 09/02/2023.

Stakeholder Group on Advanced Biofuels (SGAB) first meeting, 8-Feb-2023

The agenda of the meeting is given in Annex 3.

After an introduction of participants Mr Edwin Koekkoek introduced the EU-India Clean Energy and Climate Partnership Work Programme and the general cooperation with the Ministry of Petroleum and Natural Gas on renewables. He concluded his welcome with reference to the established cooperation on Advanced Biofuels based on the 3 conferences organised in 2018-2020 under the auspices of DG ENER and the Ministry of Petroleum and Natural Gas of India.

This was followed by an intervention by Mr S. Bharathan on the national policies of India in decarbonising transport and the specific targets the Indian Government has placed on advanced biofuels. Particular attention was given to the targets for bioethanol and to Sustainable Aviation Fuels. The issue of the availability of sustainable resources was also raised. He then asked the Members of the Indian SGAB to make a series of short presentation on the key topics they were interested to raise. The list of tasks agreed are listed below. The tasks can be updated as the project progresses by the agreement of the co-chairs.

The proceedings of the meeting, are given in Annex 4.

List of Tasks agreed/Proposed						
N°	**Tasks**	**Objective and/or deliverable**	**EU Lead Contributor**	**India Lead Contributor**	**Support**	**Expected completion**
1	Lexicon	List key words to understand low GHG impact fuels (including biofuels) in the EU and India policy context, spot potential mis understanding/ confusion, propose language that could facilitate common understanding for all stakeholders	PwC		Hervouet	31 March
2	Calls for proposals/projects.	Description of the call structure, timing and options for funding for external parties	Christou	Ray	N/A	30 June
3	GHG	Understanding carbon accounting and the complexity of dealing with H2	Van den Heuvel	Dasappa	Hervouet Ray	31 July
4	Training	Outreach & funding for training	Christou	Shastri	N/A	30 April
5	Diversity and complementarity of options to	Outline the diversity and complementarity of options for deployment of lower GHG impact fuels:	Hervouet Van den Heuvel	Ray Desappa	Teixeira-Pinto	31 July

	manage the transition	• contribution of existing fossil fuel infrastructure to lower the cost and accelerate deployment • Distributed vs centralised production. Different solutions are needed, specific for the local conditions				
6	Lipids and other types of biomass supply chains	Assessment on the availability of waste lipids and other types of biomass. Approach to structure supply chains, expanding the collection and improving the complete value chain. Hydrogenation and Hydrocracking of vegetable Oils (HVO) technology to be studied in detail	Corvo	Ray	Angel Christou Goh	31 July
7	CCU and Bio e-fuels	Key areas for research and new concepts	Goh	Dassapa	N/A	30 September
8	Research needs	Status of the art on technologies and large-scale demonstration/commercial projects, innovation aspects and development of a research agenda	Teixeira-Pinto		Christou	30 September

- Tasks 2 to 7 were discussed during the meeting and agreed upon by all experts.
- Task 8 was discussed extensively during the meeting, however, inadvertently, it was not included as a stand-alone task.
- Task 1 was proposed by Mrs Véronique Hervouet to avoid any ambiguity in the discussions among the experts. This was agreed by the other 7 EU SGAB experts.

The above tasks have indicative expected completion dates. However, this doesn't mean that the tasks will stop operating after the completion date and it is expected that they will continue functioning since their topics are not ending but will continue developing due the changes, modifications and progress in policy, technology and market uptake. The reports generated by the tasks by the expected completion date should be considered as first deliverables while the final deliverables should be expected by the end of the 2 year's period.

Annex 1: Overall objectives of the EU SGAB, expectations, and key outcomes

A.1.1 Structure of the SGAB

The SGAB comprised of small team of experts with equal representation from the EU and India. It is envisaged that as a first step and to ensure a frictionless establishment and initial cooperation, each side shall nominate 8 experts. One of the experts shall be the leader of the team of experts from each side. At a later stage and upon agreement from both the European Commission, Directorate General for Energy (DG ENER) and the Ministry of Petroleum and Natural Gas, the number of experts can be increased. The experts participate in the SGAB on personal title.

The two leaders shall report directly to DG ENER and the EU Delegation in India and the MoPNG respectively.

A.1.2 Competences of the experts

The area of sustainable advanced biofuels requires the participation of experts from several disciplines and technical background. It was therefore mandatory to nominate experts who have past experience and can cover a wider range of issues rather than a singular topic of the Sustainable Advanced Biofuels Matrix (SABM).

The expertise required for the SGAB are:

1. **Co-Chair**: wide expertise covering practically all aspects of the SABM.
2. **Expert on resources**: in depth knowledge and expertise on several types of biomass resources, traditional agricultural residues, energy crops, forestry etc.
3. **Expert on sustainability and policy**: excellent understanding of the issues related to sustainability and policy development.
4. **Expert on biofuel value chain**: widespread awareness and appreciation of the interfaces and complexity for the complete value chain of advanced biofuels and understanding between the biomass producers (farmers, foresters, waste managers), the advanced biofuel producers and the market uptake actors, understanding innovation, and identifying gaps in knowledge and research needs.
5. **Expert of the oil sector**: in dept awareness of the oil sector and appreciation of the interfaces and understanding between the market uptake actors and the advanced biofuel producers while understanding innovation and identifying gaps in knowledge and research needs.
6. **Expert on advanced biofuel technology**: comprehensive know-how in the advanced biofuels technologies under development (cellulosic ethanol, hydrotreated oils, hydrothermal pyrolysis, Fischer-Tropsh drop-in, etc.).
7. **Expert on advanced biofuels uptake in aviation and shipping markets**: competent knowledge of the uptake of sustainable biofuels in these two critical sectors for decarbonising transport.

A.1.3 Meetings

The SGAB shall meet twice a year, with the initial kick-off planned in Bangalore during the Energy Transition Working Group Meetings (ETWG) scheduled for 5-7 February 2023.

During this meeting the SGAB was formally established, and the various modalities of its operation were discussed, addressed, and decided under the patronages of the EC, the EU Delegation in India and the MoPNG. The draft Agenda of the first meeting of SGAB is given in Annex I.

During these meetings all topics on the cooperation shall be addressed and discussed. One of these two meetings can take the form of an annual conference on EU-India Conference on Advanced Biofuels providing continuity with the previous conferences.

Two more meetings can be organised, if needed online, to address and discuss more specific issues. The topics and agenda of the meetings shall be decided by the two leaders after consultation with their team members, the EC and the MoPNG.

Subject to the decision of the two leaders, these meetings or certain sessions of them, can be open to third parties. This will also depend on the general guidance by the EC, EU Delegation in India and the MoPNG. External speakers can be invited by the two team leaders to present and discuss dedicated issues of common interest.

Efforts shall be made to organise the physical meetings back-to-back or during other events and conferences to minimise operational costs of the SGAB.

Annex 2.1 EU SGAB Members

Name of Speaker	Designation	Topic	Email
Dr Kyriakos Maniatis	Independent Consultant, former DG ENER Officer	Advanced biofuel technologies, policy and market uptake issues	Kyriakos.Maniatis@outlook.com
Mrs Myrsini Christou	Head of Biomass Department, CRES	Sustainable Biomass availability in the EU, abandoned and degraded land	mchrist@cres.gr
Mr Angel Alvarez Alberdi	Secretary General, EWABA	Advanced biofuels from sustainable waste & residue streams.	angel.alberdi@ewaba.eu
Mrs Véronique Hervouet	Strategy, New business Models, TotalEnergies Refining & Chemicals	Integrating advanced biofuels with refineries, policy, sustainability & energy transition	veronique.hervouet@totalenergies.com
Mr Paolo Corvo	Partner, BF Partners	Development of sustainable value chains for advanced biofuels, financing issues	pc@bfpartners.net
Mr Rodrigo Teixeira-Pinto	Renewables Product Line, Axens	Overview on the various pathways for Advanced Biofuels production (cellulosic ethanol, gasification, FT, etc.)	rodrigo.teixeira-pinto@axens.net
Mr Eric van den Heuvel	CEO, studio Gear Up	Policy, sustainability, energy transition & communications with stakeholders	eric.vandenheuvel@studiogearup.com
Mr Tor Kit Goh	Commercial Director, Shell	Commercial considerations pertaining to advanced biofuels	t-k.goh@shell.com

Annex 2.2 India SGAB Member

Name of Speaker	Designation	Topic	Email
S Bharathan	Director- Refineries, Hindustan Petroleum Corporation Limited	Charting advanced biofuel roadmap for energy transition for India	sbharathan@hpcl.in
Dr Anjan Ray	Director- Indian Institute of Petroleum	Availability of Biomass in India	anjan.ray@iip.res.in
Dr. Yogendra Shastri	Prof Chemical Engineering Dept, Indian Institute of Technology Bombay	LCA of biomass	yshastri@iitb.ac.in
Prof. S Dasappa	Prof Centre for Sustainable Technologies, Indian Institute of Science, Bangalore	Biomass resource and biofuel sustainability using gasification route	dasappa@iisc.ac.in
Pramod Kumar	Head- Catalytic Cracking Lab, Hindustan Petroleum Corporation Limited	Thermo-catalytic conversion of biomass : A promising route	pramodkumar@hpcl.in
Dr. Harshad Ravindra Velankar	Head- Bio Lab, Hindustan Petroleum Corporation Limited	Addressing technological challenges for 2G biofuel production in India	harshadrv@hpcl.in
R P Gupta	Head- Bio Energy Research Centre, Indian Oil Corporation Limited R&D	Biofuel scale-up and commercialisation and experience of Indian Oil	guptarp1@indianoil.in
Dr Bharat Newalkar	Head – Alternate Energy Bharat Petroleum Corporation Limited R&D	Biofuel refinery and BPCL's experience	newalkarbl@bharatpetroleum.in

Annex 3 Agenda for the EU-India Stakeholders Group on Advanced Biofuels

8 February 2023 (11:00 AM IST)

Venue: Centric 2, 3rd Floor, Hyatt Centric, MG Road, Bangalore

Time (IST)	**Agenda**
11.00	Welcome by representatives of MoPNG and objectives of the SGAB for India
11.10	Welcome by Edwin Koekkoek, First Counsellor, Energy and Climate Action, EU Delegation to India and objectives of the SGAB for the EU
11.20	Welcome by Indian co-chair and aims of the SGAB for the stakeholders
11.30	Welcome by EU Co-chair and aims of the SGAB for the stakeholders
11.40	Short presentation of the experience and background of the 14 experts, 5 min each
12.50	Coffee Break
13.00	Cooperation on innovation, research calls, participation in financing programmes of both sides (Horizon Europe calls but also similar calls by Indian Ministries & institutions)
13.20	Patrick Crehan: Presentation of the roadmap study commissioned by RTD
13.40	Discussion on working modalities, meetings, etc.
14.00	Planning for next meeting
14.15	Closing remarks
14:30	Lunch

Annex 4: Proceedings of the SGAB Meeting

- EU-India Stakeholder Group on Advanced Biofuels –
- Event Proceedings
- and visit to HPCL Green R&D Centre, Bangalore

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EU-India Stakeholder Group on Advanced Biofuels

On 8th February 2023, EU-India Clean Energy & Climate Partnership (CECP) project in collaboration with Ministry of Petroleum and Natural Gas (MoPNG) organized the kickoff meeting for the Stakeholder Group on Advanced Biofuel (SGAB) workshop at "Hyatt Centric, MG Road, Bangalore". The SGAB comprised a small team of experts with equal representation from the EU and India and discussed priority topics for enhanced EU-India cooperation in view of addressing barriers for further deployment of advanced biofuels, promoting innovation, feedstock supply and identified research areas of mutual interest. The group involved experts from HPCL, BPCL, IOCL, IISC, IIT Bombay, Total Energies, Axens, Shell, CRES and Individual consultants.

Opening Remarks & Context Setting (Moderator: Dr. Kyriakos Maniatis, Independent Consultant, former DG ENER Officer)

Mr. Edwin Koekkoek, First Counsellor – Energy and Climate Action, EU Delegation to India welcomed the participants in the kick-off meeting on advanced biofuels. He shared that EU-India climate and energy relations are guided by the India-EU Clean Energy and Climate Partnership, as agreed at the EU-India Summit on 30 March 2016 with the aim of reinforcing cooperation on the clean energy transition and implementation of the Paris Agreement. In the Joint Statement and the EU-India Strategic Partnership: A Roadmap to 2025 agreed at the EU-India Summit on 15 July 2020, as well as the EU-India Leaders Meeting on 8 May 2021, it was agreed that the partnership should be further strengthened. The partnership includes collaboration on energy efficiency in buildings (Energy Conservation Building Code, nearly zero energy buildings, smart readiness indicators and cooling) and industry, cold chain, development and deployment of renewable energy, including solar and offshore wind, integration of renewable energy in the grid, smart grid applications, energy storage, green hydrogen, biofuels, climate mitigation and adaptation initiatives and sustainable financing. He also shared that with the European Green Deal, the Commission proposes to become climate neutral by 2050 and raise the EU's ambition on reducing greenhouse gas emissions to at least 55% below 1990 levels by 2030 from target of 40% earlier. Both targets are enshrined in the climate law and all climate and energy legislation is being updated through the Fit for 55 proposals, in order to meet the -55%.

He mentioned that with ongoing war in Ukraine, there is a need to become independent from fossil fuels from Russia. The EU therefore proposed the REPowerEU proposal which focuses on increasing the energy efficiency targets and savings even more, acceleration of the transition to renewable energy and diversifying the EU supply chain. In very basic terms the clean energy transition can be summarized by focusing on energy efficiency first and then aiming at electrifying our economy as much as possible through electricity being produced through renewable energy. Hydrogen and advances biofuels is to be used where electrification is not possible.

He thanked MoPNG and Dr. Kyriakos for this focused group of stakeholders on advanced biofuels that will promote innovation, knowledge sharing and relevant research in the area of advanced biofuels which has been agreed in the EU-India Energy Panel as one of the

activities in the work programme implementing the EU-India Clean Energy and Climate Partnership.

Mr. S Bharathan, Director- Refineries, Hindustan Petroleum Corporation Limited, welcomed everyone and shared his views on biofuels being one of the most important alternate source of energy which will significantly contribute towards our goal for achieving net zero. This fuel is economically viable and hence in the forefront of emerging fuels. He shared that India generates 350 MMT of agricultural waste every year which is equal to about 18 GW of power and more than 160,000 tons per day of municipal waste is generated. One of the most important and successful program which India has achieved is blending of ethanol in petrol where India achieved 10% blending till 2022 and the objective of going to 20% blending has been advanced to 2025 from 2030.

In addition, he also discussed the Government of India initiative Sustainable Alternative Towards Affordable Transportation (SATAT). Under this scheme about 5000 plants are being put-up all-over India converting municipal waste and agricultural residue into Compressed BioGas (CBG) and bio-manure. So far, 38 CBG plants have been commissioned and more than 9000 MT CBG is being sold in India. To penetrate SATAT programme more effectively, Government of India (GoI) has taken initiatives like priority sector lending, environmental clearance for the manure generated from CBG plants and mandating minimum selling price for CBG etc. GoI is also working on to create enabling mechanism for establishing biomass supply chain to ensure sustainable supply of biomass at a stable price for at least a period of 10 years. He also discussed that another major biofuel source envisioned in the national policy on biofuels is biodiesel, where the country is targeting to achieve blending of 5% by 2030. But right now, it is only 0.1% so this area is lagging behind.

Apart from proven biofuels like biodiesel, bio ethanol and CBG, other advanced biofuels produced from pyrolysis and hydrothermal liquefaction of lignocellulosic biomass are gaining significant research importance in India. There are many labs and pilot scale demonstrations being carried out on these advanced biocrudes for processing into in refinery assets to produce drop-in-fuel. India is also making remarkable steps in building indigenous technology for production of sustainable aviation fuels (SAF) from used cooking oils or non-edible oils. There are challenges in biodiesel on which very good research interest is there and few pilots are already running in India.

In conclusion, India has made crucial steps in biofuels by nationwide implementation of National Biofuels Policy. This policy has created right ecosystem in terms of price security, environmental norms, funding to encourage India's energy sector and young entrepreneurs to implement 2G ethanol and CBG plants in mission mode. Tremendous efforts and integrated sector approach being put up in ensuring uninterrupted feedstock availability for biofuels production. Innovation, research, and development is taking place at faster pace for developing indigenous technologies for advanced biofuels. With all these collective efforts, India is in the right path in achieving its biofuels goals towards its journey of sustainable growth and development which will help in achieving net zero goal set-up by Government of India.

Dr. Kyriakos Maniatis, Independent Consultant, former DG ENER Officer thanked the Delegation of the EU to India and MoPNG for this initiative. He expressed satisfaction that

the kick off meeting on advanced biofuels is taking place in person and both India and European side shall work together with a common priority on promoting and working on advanced biofuels area as a team.

Presentations from European and Indian companies (Moderator: Dr. Kyriakos Maniatis, Independent Consultant, former DG ENER Officer)

Mr. R P Gupta, Head- Bio Energy Research Centre, Indian Oil Corporation Limited presented about Asia's first 2 G ethanol plant inaugurated by Prime Minister of India in August 2022 located in Panipat, Haryana. The plant is of 100 KL/day capacity and commissioning is underway. He discussed about the technologies being used, supply chain, major issues and drivers. The key issues highlighted with this plant are:

- Sustained Feedstock supply
- Cost economics
- Availability of skilled manpower
- Ecosystem for bioprocess in energy domain

The detailed presentation can be assessed here.

Dr. Harshad Ravindra Velankar, Head- Bio Lab, Hindustan Petroleum Corporation Limited presented on the topic "Addressing Technological Challenges for operating 2G Ethanol biorefineries". He discussed about HPCL's Agricultural Residue Conversion Plant at Hindustan Petroleum Green Research & Development Centre, (HPGRDC) Bangalore, India and highlighted the need of working together in this area. The detailed presentation can be assessed here.

Mr. Pramod Kumar, Head- Catalytic Cracking Lab, Hindustan Petroleum Corporation Limited discussed about Thermo-catalytic conversion of biomass. He discussed about the Thermo-catalytic route available at HPGRDC that includes

- Pyrolysis
- Hydro Pyrolysis
- Hydrothermal Liquefaction
- Pyrolysis of Oil Upgradation
- Co processing of Pyrolysis Oil

He also highlighted possible collaboration opportunities between EU & India on:

- Reactor Design
- Biochar application
- HTL Bio Crude Upgradation
- Catalyst for higher bio-oil Yield
- Analytical methods development
- Lignin conversion to Fuel and Chemicals
- Supply chain models and policy framework for thermochemical bio crude/biofuel

The detailed presentation can be assessed here

Dr. Bharat Newalkar, Head – Alternate Energy Bharat Petroleum Corporation Limited R&D mentioned that BPCL is setting up ethanol refinery at Bargarh, Odisha. The plant will

produce 100 KL/day of 2G ethanol using rice straw and rice grains. He also discussed about the challenges involved in the process such as biomass aggregation and high cost of enzymes. He shared that India needs technological support and knowledge sharing from EU companies.

Dr. Anjan Ray, Director- Indian Institute of Petroleum presented on "Mapping India's Biomass Resources". He discussed on two-pronged mandates of Council of Scientific and Industrial Research (CSIR, India) to reduce India's dependence on imported fuels and decarbonize India's energy footprint. He also discussed on the partnership opportunities for real-time mapping of India's biomass and a database of all available biomass properties, technology collaborations for conversion of biomass to fuels and chemicals, especially at decentralized levels and joint IP creation projects for value addition to biofuels by-products. The detailed presentation can be assessed here.

Dr. Kyriakos Maniatis, Independent Consultant, former DG ENER Officer discussed long term ideas to accelerate technology from research to commercial deployment. He also discussed on several international actions such as Mission Innovation, Biofuture Initiative, Biofuel Alliance, etc

Mrs. Véronique Hervouet, Strategy, New business Models, Total Energies Refining & Chemicals discussed the scope to cover all types of sustainable fuels, including advanced biofuels, e-fuels, e-biofuels, recycled carbon fuels. She also discussed on short term and longterm drivers for sustainable fuels development for marine and aviation and harmonization of sustainability criteria for transportation fuels consumed in an international environment, in particular for GHG methodologies.

Mr. Eric Van Den Heuvel, CEO, Studio Gear Up discussed on ideas to develop a well-integrated strategy for investment security for industrial scale up by setting a long-term policy framework with a vision to bring back the use of fossil fuels in all transport sectors. He also highlighted the need for new strategic thinking on how to build up a biogenic and regenerative biomass (waste) feedstock base, that is coupled to the need of expanding primary biomass needed for other functions in the biobased economy.

Mrs. Myrsini Christou, Head of Biomass Department, CRES discussed on ways to mobilize biomass waste streams, ways to mobilize bioenergy carriers, ways to grow non-food crops sustainably and support needed for market uptake / policy framework.

Mr. Angel Alvarez Alberdi, Secretary General, European Waste-based & Advanced Biofuels Association (EWABA) discussed on the policy promotion for the Indian economy, tax incentives, GHG reduction obligations and blending mandates.

Mr. Paolo Corvo, Partner, BF Partners discussed about the status of announced cellulosic ethanol projects/plants, lipid availability and potential expansion, export of vegetable oils/UCO/tallow etc and export of advanced biofuels.

Mr Rodrigo Teixeira-Pinto, Renewables Product Line, AXENS discussed about the existing technologies highlighting that they are ready for industrial deployment.

Dr. Patrick Crehan, Founder CKA Consulting presented on ways to develop a road map for EU-India cooperation on biofuels from biomass for uptake by aviation and maritime

transport. He highlighted that the current focus is on fuel technologies and refinery technologies, but the key issues go beyond refineries. There is need to accelerate the adoption of technologies which is really interesting and an important problem. Apart from innovative financing and commercial viability there is a need to look at alternative uses of bi products and for this EU & India must work together.

Mr. Tor Kit Goh, Commercial Director, Shell Catalysts and Technologies discussed about the effective options in place to move sustainably forward in the area of biofuels i.e.

- availability of different technologies from the European side as well as from the Indian side
- developing the know how in commercializing the available technologies.

The presentations can be assessed here

Consolidation of thoughts & vote of thanks

Dr. Kyriakos Maniatis, Independent Consultant, former DG ENER Officer summarized the discussion and thanked all the speakers and the participants for sharing key insights around the biofuels sector between Europe and India. He also mentioned that we should continue to have regular discussions on the topic as a team and invited thoughts on next 3 meetings on the topic to be held virtually in the span of next 2 years.

Visit to HPCL Green R&D Centre, Bangalore, India

On 9th February 2023, the European delegates visited HPCL Green R&D Centre, Bangalore, India. The visit was hosted by Mr. Pramod Kumar, Head- Catalytic Cracking Lab, Hindustan Petroleum Corporation Limited and Dr. Harshad Ravindra Velankar, Head- Bio Lab, Hindustan Petroleum Corporation Limited in presence of Mr. S. Sriram, Head, R&D Centre, Hindustan Petroleum Corporation Limited.

The HPCL green R&D centre is recognized by the Department of Scientific and Industrial Research (DSIR) and has collaborations with research institutes in India and abroad. Currently, HPCL R&D has a dedicated team of about 120 scientists. The HPCL team gave European delegates a tour to the R&D centre including a detailed tour to various labs such as:

1. Bio Process Lab
2. 2G ethanol plant
3. CBG pilot plant
4. Catalyst cracking lab
5. Solar thermal Plant
6. Battery test lab
7. Engine test lab

A glimpse of the visit below: