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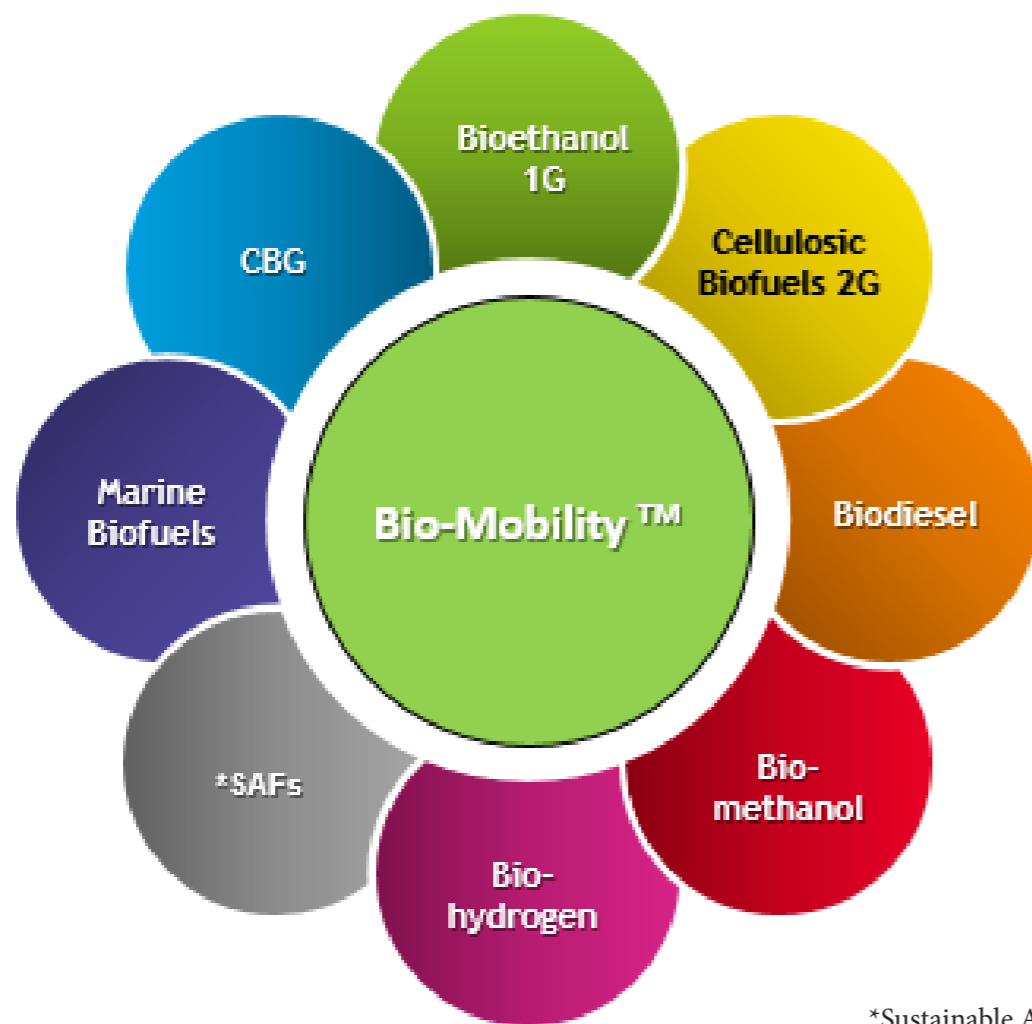
The magazine of bioenergy and the bioeconomy

April 2021



Biotechnology driving innovation in the French biobased Industry

Tripling biogas production by 2030 | Hydrogen from biomass
Biomobility™ in India | Relay cropping | HTL | SAF



*Sustainable Aviation fuels

USHERING AN ERA OF BIO-MOBILITY™ IN INDIA

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Being an economic, social, and environmental enabler, biofuels have the potential to make definitive contribution in ushering sustainable decarbonization through a circular bio-economy.

Mobility refers to the ability to move or be moved freely and easily. While transportation was the word used for getting people from point A to B, mobility is currently the term being adopted by policymakers and governments to describe the movement of people that is cheap, efficient, and most importantly sustainable.

According to a report by the Centre for Automotive Research, “Mobility is a user-centric concept

— recognizing that transportation products and services must be responsive to the needs, habits, and preferences of travelers and society.” This shift from usage of terms, from transportation to mobility is due to a variety of reasons.

Rapid urbanization, pollution, and congestion are just a few of the push forces that have prompted this wave of innovation in transportation. New mobility services are contributing to a mobility evolution.

Worldwide, this gradual change

will nudge transportation players, automotive manufacturers in particular, to move from the traditional means to more modern means to maintain their market position.

THE EVOLVING ENERGY LANDSCAPE IN INDIA

Our dependence on fossil fuels is creating a world-wide turmoil in regards to the sustainability of the human race. Fossils are the primary source of energy and resources,

and this is having a detrimental effect on our planet. As a result, we are witnessing major geo-political issues and energy security concerns due to the scarcity of our finite resources. India is a leading consumer of fossil fuels due to its population size. We as humans need to acknowledge the worry-some issue that our way of life revolves primarily around the exploitation of fossil fuels.

India has been seeing rapid industrialization as one of the world's fastest growing economies. The migration of people from villages to cities for employment and education opportunities, coupled with rapid industrialization and urbanization, have put a strain on the country's ever-growing energy needs.

All this has contributed in making India the world's third largest primary energy consumer. The country's energy mix today is dominated by conventional sources, mainly derived from fossil fuels. India is dependent on external resources, importing 80 percent of crude oil, while incurring high foreign expenditure.

MOBILITY CHALLENGES IN INDIA

Transportation fuel is a large part of our total energy consumption. These fuels namely petrol and diesel come from the mineral source and are highly polluting in nature. However, in the absence of easily accessible alternatives, the world has been inclined to use it liberally over the years.

The 60% increase in consumption of fossil fuels in the last three decades in India, as compared to the previous two decades is proof of this. The foreign exchange payout towards these imports in financial year 2019-2020 was three times our Defence outlay and 1.75 times the provision for annual interest payment on debt. From the geo-political perspective too,

this scenario can prove perilous since India relies on the Gulf and West Asian countries for 65% of the imports of fuel. In light of the political instability in this region, we might face severe irregularities in supply.

We need to strongly adopt the idea of relying on an alternate source for our resources and energy. This is the need of the hour and this is the way forward for the Indian economy.

SUSTAINABLE SOLUTIONS FOR MOBILITY CHALLENGES

The issue of finding sustainable alternatives to conventional fuel sources was underlined when fuel prices went through the roof in the 70s. After some lull it picked up again at the Rio Earth Summit in 1992 when concrete goals were set towards environment protection. However, the problem of environmental pollution continued unbridled over years until 2015, when the issue was brought to the table at the United Nations led Paris Convention.

The prime goal set during this meet was to bring down carbon emissions all over the world as early as possible and to keep the global temperature rise less than 2 degrees celcius. Country wise goals were determined. India accepted the ‘Nationally Determined Contribution’ of reducing carbon emissions by 33 to 35% and to create green cover adequate to absorb 2.5 to 3 crore tons of carbon dioxide, by the year 2030.

WHAT IS BIO-MOBILITY ?

Bio-mobility refers to utilizing captive renewable biological resources such as feedstock to produce carbon neutral transportation fuel that can be used across all modes of mobility namely, land, air and water. Bio-Mobility platform envisages utilization of Agri residues and organic waste derived both gaseous and liquid bio fuels in the form

of 1st generation Bioethanol, 2nd Generation cellulosic biofuels, renewable/bio diesel, renewable biogas, Bio-methanol, Bio-hydrogen, Sustainable Aviation Fuel (SAF) and Marine biofuel as primary energy source for driving mobility while retaining basic ICE technology. The conversion of biomass to biofuels can be achieved primarily via biochemical and thermochemical processes.

BENEFITS OF BIO-MOBILITY

In terms of economy, Biofuels helps reduce the country's high import bill and foreign exchange payout for crude oil. To that extent, it also helps mitigate spikes in volatile crude oil pricing.

AS AN ENVIRONMENTAL ENABLER

Climate change is affecting monsoon patterns, and consequently, the agriculture economy. Uninhibited industrialization is having a detrimental impact on ecological balance. Increasing traffic and associated rise in pollution levels, and the burning of agricultural waste are adversely affecting air quality and is a health hazard. Biofuels are carbon neutral and therefore combat these issues. Moreover, biofuels are renewable, cleaner in nature, are available as a captive feedstock in farms, and emit lesser toxic greenhouse gases.

AS AN ECONOMIC ENABLER

Being captive in nature, biofuels facilitate energy security. They also help reduce the country's high import bill and foreign exchange payout for crude oil. To that extent, they also help mitigate the spikes in pricing of crude oil in volatile situations caused by a mismatch in demand and supply.

AS A SOCIAL ENABLER

The exodus from rural areas in the pursuit of education and employment is putting additional



3. Facilitate energy security & save valuable foreign exchange
4. Carbon neutral on environmental issue of waste disposal
5. Inclusive growth- Boost rural economy by job creation
6. Stop farmers from torching the residues.
7. Uses existing infrastructure

VARIOUS BIO-MOBILITY TECHNOLOGIES

Biofuels can be derived from sugar and starch-based feedstock; and various technologies are available based on them.

1G TECHNOLOGIES

First generation biofuels, also known as conventional biofuels, are made from sugary feedstock (sugarcane juice, syrup, B heavy molasses, C molasses), starchy feedstock (grains like sweet sorghum, corn, etc.) or vegetable oil. First generation biofuels are produced through well-established technologies and processes like fermentation, distillation, and trans-esterification.

2G TECHNOLOGIES

2G technology for lingo-cellulosic feedstock like wheat straw, paddy straw, rice straw, Bagasse and various other agricultural residue. This technology converts agri-waste into fuel grade ethanol. They produce fuel grade ethanol, bio chemicals, bio CNG, liquid CO₂, bio fertilizers, and power that are exported to the grid.

COMPRESSED BIOGAS (CBG)

Agro-waste can be used as a raw material or feedstock to produce not just for biofuel such as ethanol, but also for compressed bio-gas (CBG) which can complement compressed natural gas (CNG). This technology solutions that help convert agrowaste into CBG which - unlike fossil fuels - are carbon neutral and therefore do not contribute to GHG emissions.

1. Fight pollution & Minimize GHG emissions
2. Combat Climate change; Help meet Cop 21 Obligations

SUSTAINABLE AVIATION FUELS (SAF)

SAF stands for sustainable aviation fuel. It's produced from sustainable feedstocks and is very similar in its chemistry to traditional fossil jet fuel. Using SAF results in a reduction in carbon emissions compared to the traditional jet fuel it replaces over the lifecycle of the fuel SAF has applications in commercial aviation as well as in the defence sector.

BIO-METHANOL

Biomethanol is one of such biochemicals, which can be produced from biomass and biogenic wastes through thermochemical and biological routes.

BIOHYDROGEN

The biological H₂ (biohydrogen) production process is an H₂ production technology that utilizes renewable energy resources, such as biomass.

MARINE BIOFUELS

Marine Biofuels produced from lignin-based feedstock.

BIO-REFINERIES- HOW WILL IT HELP?

Just like a petrochemical refinery transforms and refines crude oil into more useful products such as petroleum naphtha, gasoline, diesel fuel, jet fuel, etc, a Biorefinery converts biomass to biofuels, biochemicals, and other beneficial products.

CONCLUSION

Bio-mobility is all set to redefine the transportation energy portfolio where biofuels are poised to play a bigger role. Being an economic, social, and environmental enabler, biofuels have the potential to make definitive contribution in ushering sustainable decarbonization through a circular bio-economy.



MOBILIZING RESOURCES, ENABLING POLICIES AND INVESTMENTS FOR COST-COMPETITIVE RENEWABLE FUELS AND BIOENERGY

Summary of SET4BIO deliverables prepared by Elisa Magnanelli, Judit Sandquist, Kathrin Weber (SINTEF, Norway), Paola Mazzucchelli, Carlos Castellano Pellicena (CIRCE).

State of play of financing mechanisms and opportunities in the EU

Sustainable bioenergy has a key role to play in reducing GHG emissions in the EU energy mix, while at the same time decreasing fossil fuel dependence and building a circular economy, in line with the 2030 and 2050 targets of the EU Green Deal.

The Strategic Energy Technology (SET) Plan is a first step to establish an energy technology policy for Europe.

In 2016, representatives of the

European Commission, SET Plan countries and industry stakeholders agreed on a Declaration of Intent on strategic targets for bioenergy and renewable fuels, which was followed in 2017 by an Implementation Plan for Action 8 of the SET Plan “Bioenergy and renewable Fuels for Sustainable Transport”, whose goal is to translate key actions into specific recommendations for research and development, and policy measures. The Implementation Plan outlines 13 research and innovation activities

that need to be implemented to reach three common goals for bioenergy technologies: Improving the performance of production both in terms of yield and efficiency of processes (i), reduce GHG emissions along the value chain (ii) and reduce costs (iii).

SET4BIO is a Horizon 2020 project launched in 2020 to support the execution of the Implementation Plan of SET Plan Action 8, which aims to facilitate the mobilisation of