Global Trends in the Application of Biomass as Transportation Fuel

Regional Workshop on
Overcoming Critical Bottlenecks to Accelerate Renewable Energy Deployment in ASEAN+6 Countries
June 14-15, 2016, Bangkok, Thailand

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- Asian and Pacific Centre for Transfer of Technology (APCTT) was established in 1977 as a Regional Institution of the United Nations Economic and Social Commission for Asia and the Pacific (UN-ESCAP) by ESCAP member states
- Host facility is provided by India
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The APCTT building inauguration on 16th July, 1977 Bangalore.

The APCTT building inauguration on 18th November, 1993 New Delhi.

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Mandate:

To assist the member countries in enhancing their capacity to

a) Develop and manage national innovation systems (NIS);

b) Develop, transfer, adapt and apply technology; Improve the terms of transfer of technology; and

c) Identify and promote the development and transfer of technologies relevant to the region

Biomass as Transportation Fuel

- Biomass based transportation fuels can help to reduce the dependence on fossil fuel resources. Many of these biofuels have shown to be advantageous in terms of their carbon footprints

- Globally, there is an increased focus on a number of advanced second-generation biofuels made from non-food feedstock, such as cellulosic ethanol, bio-butanol, methanol and so on.

- Unless mass availability of electric vehicles that run on renewably-produced electricity become a reality, biofuels remain the only widely available source of clean, renewable transportation energy*

  (Source: Environmental and Energy Study Institute, Washington, DC)

- World ethanol production for transport fuel tripled between 2000 and 2007 from 17 billion to more than 52 billion liters, while biodiesel expanded eleven-fold from less than 1 billion to almost 11 billion liters (UNEP)

Biomass as Transportation Fuel (Contd.)

- By 2050, biofuels could provide 27% of total transport fuel. The projected use of biofuels could avoid around 2.1 gigatonnes (Gt) of CO2 emissions per year when produced sustainably. In a low-cost scenario, most biofuels could be competitive with fossil fuels by 2030 (Source: IEA)

  - **The Philippines**: Replace 15 per cent of diesel and 20 per cent of gasoline with biofuels by 2030
  - **Indonesia**: 5 per cent of the total energy mix with energy from biomass by 2025.
  - **Thailand:** 7% blend of biodiesel already effective (since Jan 2014) (Source: IRENA)

- Transport sector energy consumption projected to grow faster than any other sector (5.6 per cent) in ASEAN countries (Source: ESCAP)

Biofuel Technologies – First, Second and Third Generations

Conventional Biofuel Technologies

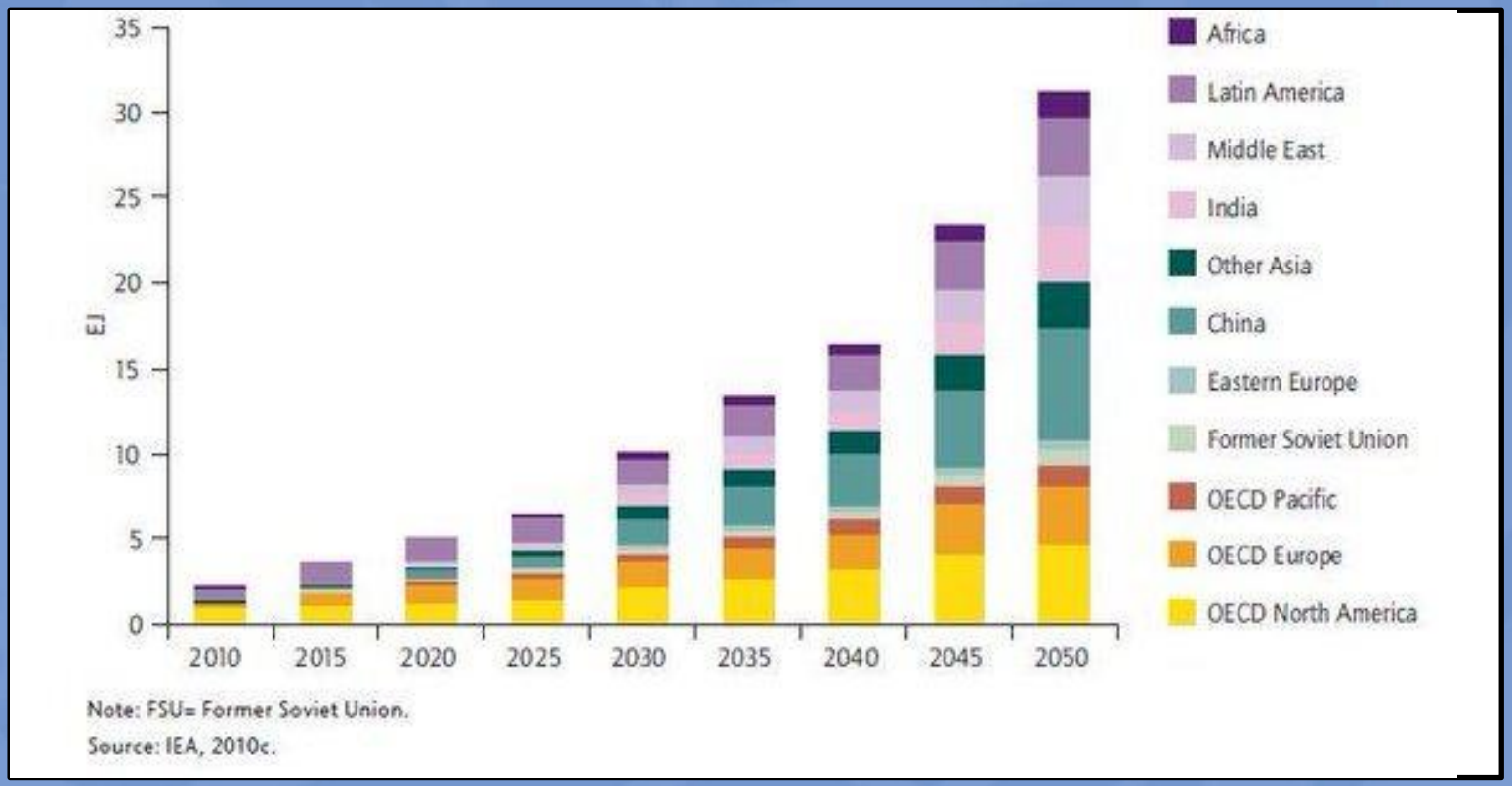
Well established processes that are already producing biofuels on a commercial scale (first-generation). Examples: Sugar and starch-based ethanol, oil-crop based biodiesel etc. Typical feedstocks used in these processes are starch bearing grains, sugarcane and sugar beet, oil crops like canola, soybean and so on.

Advanced Biofuel Technologies

Conversion technologies which are still under R&D. pilot or demonstration phase (second or third-generation). Examples include biofuels based on lignocellulosic biomass, hydro treated vegetable oil, algae-based biofuels, conversion of sugar into diesel-type biofuels using biological or chemical catalysis.

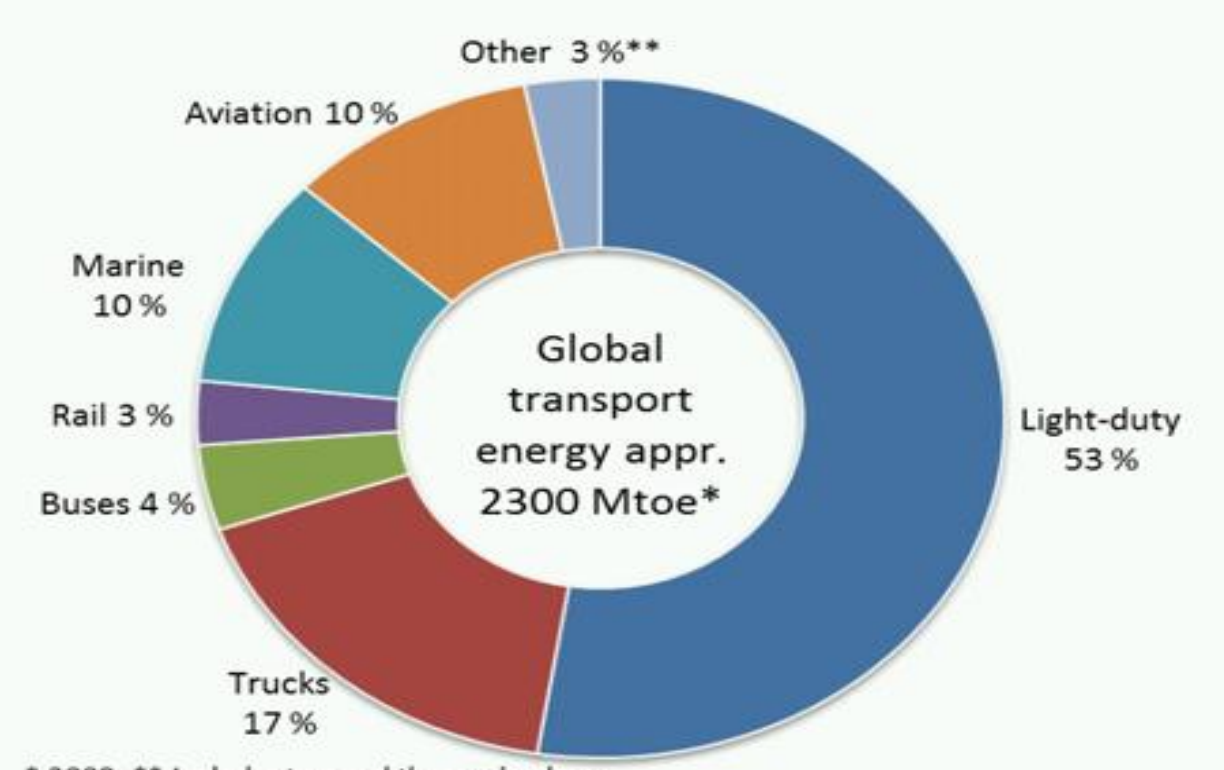
(Source: International Energy Agency)

Biofuel Demand (2010-2050)



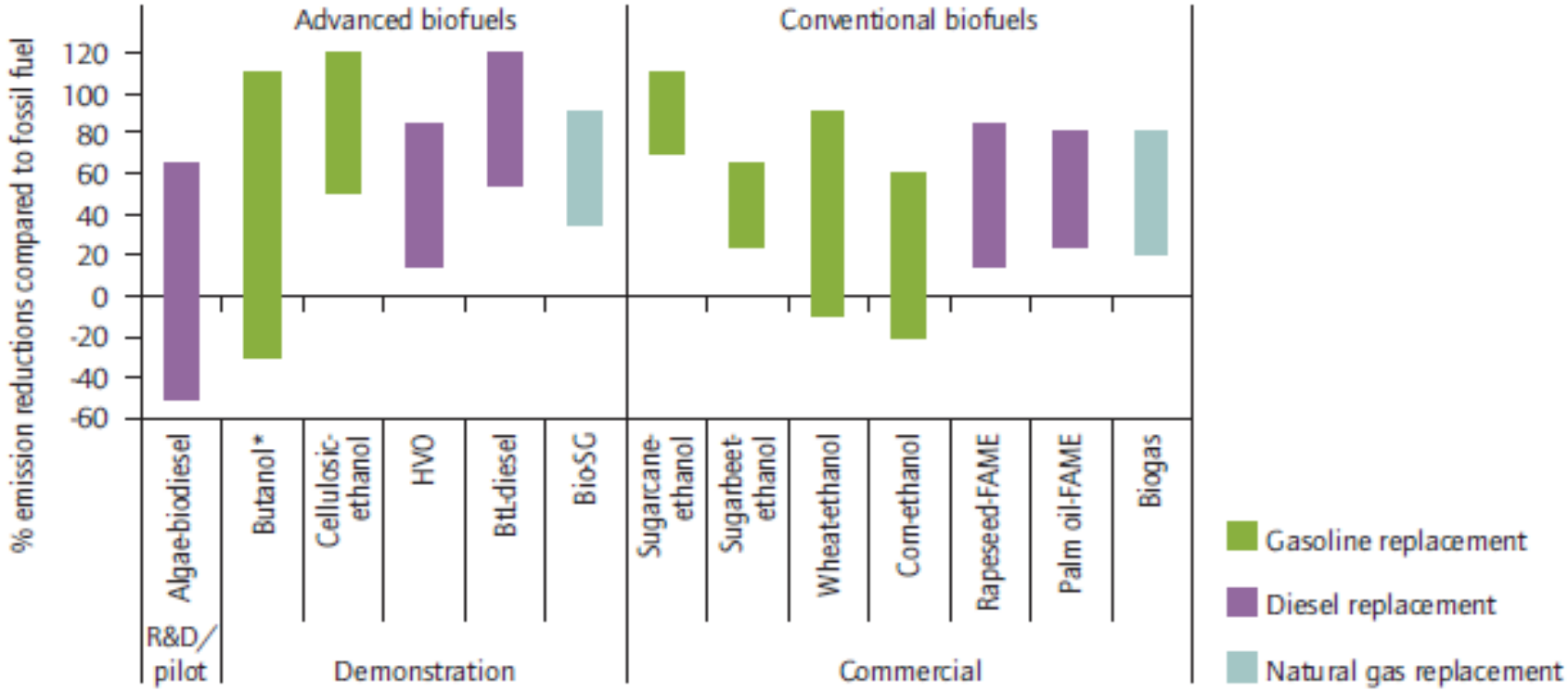
Source: IEA

Global Energy Consumption in the Transport Sector



* 2009 ** Includes two and three wheelers.
Data from World Economic Forum 2011 and IEA WEO 2011. Figure by IEA-AMF (A-S 2012).

Biofuels and Emission Reductions



Note: The assessments exclude emissions from indirect land-use change. Emission savings of more than 100% are possible through use of co-products. Bio-SG = bio-synthetic gas; BtL = biomass-to-liquids; FAME = fatty acid methyl esthers; HVO = hydrotreated vegetable oil.

Source: IEA analysis based on UNEP and IEA review of 60 LCA studies, published in OECD, 2008; IEA, 2009; DBFZ, 2009.

Biofuel Technologies – Barriers in Developing Countries

- Poor infrastructure, lack of skilled labour, lack of appropriate land use policies and mechanisms, limited financial resources
- Lack of adequate capacity to comply with sustainability requirements (market barrier for exports)
- Lack of adequate smallholder participation in the value chain
- Administrative and governance problems (business and regulatory approvals and time taken to obtain clearances from nodal agencies)
- Limited size of domestic markets that hamper foreign investment
- Lack of certification mechanisms

Concluding Remarks

- Most of the currently used crops for transport biofuels are also food crops
- Substantial investment in R&D in biofuels is needed to meet the ever increasing demand for transportation fuels
- In a study carried out between 2000 and 2007, the International Food Policy Research Institute found that biofuel demand resulted in a 30 per cent increase in the weighted average grain price
- There is a need to focus more on third-generation biofuels (algae based fuels) because it reduces the competition with food production for land and water.

Concluding Remarks

- Development of biofuels industry is largely driven by governments through mandates, targets, incentives, subsidies
- Second-generation biofuels also show positive results if produced from waste or residues or from wood, but their applicability in large scale production remains to be demonstrated
- Scale and efficiency improvements over time will be able to lower the costs for biofuel production

THANK YOU

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