



Impact of Global Bio-Fuel Alliance on Sustainable IC Engine and Emission Technology Development for New Family of Fuels

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G20: Global Biofuel Alliance

Agenda

- Objective of G20: Global Biofuel Alliance
- Government's approach for biofuels application in automotive Industry
- Bosch products and solution for a powerful mobility with low-carbon and carbon-neutral fuels

G20: Global Biofuel Alliance

Global collaboration for unlocking the true potential of biofuels

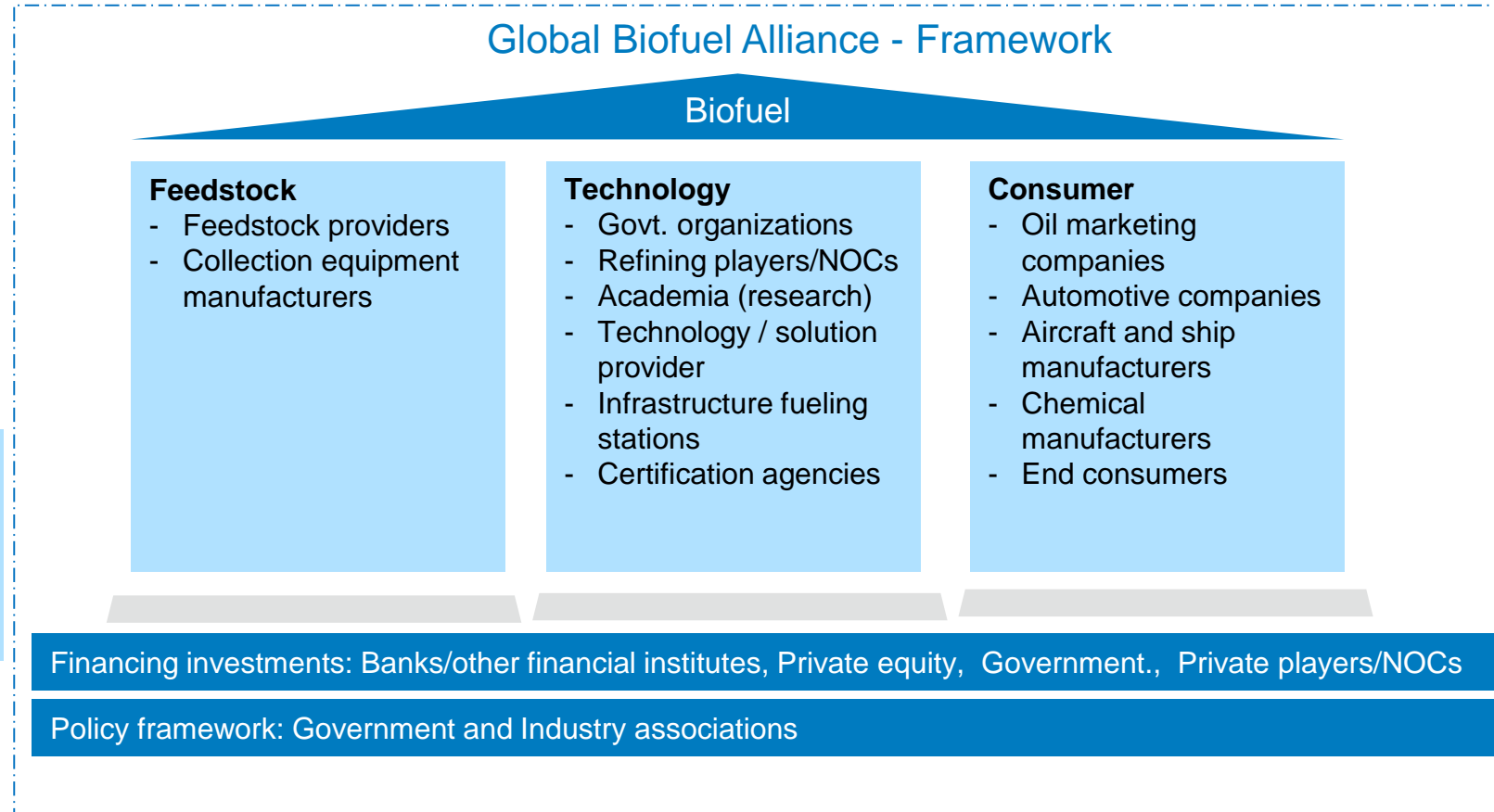
Why Biofuel for the world?

- Energy security
- Decarbonization
- Circular economy

Critical factors

- Feedstock availability
- Technological advancement (1G => 2G=> 3G)
- Biofuel economy and Infrastructure

Biofuel include ethanol, biodiesel,biomethane



G20: Global Biofuel Alliance

Blueprint for success

Objective of the alliance

- Expand biofuel market beyond Brazil, India, and the United States
- Promote synergies in biofuel research and development
- Coordinate a global framework of incentives to expedite cooperation among member countries to promote biofuel accessibility and sustainability
- Alliance would collaborate with stakeholders across the value chain on a series of vital initiatives

Five-year Outlook

- **Boost Supply:** Double production capacity
- **Encourage demand**, encourage cost parity for 2G technology and expedite commercialization of 3G
- USD 100 billion to be earmarked for biofuel R&D by 2030 to encourage wider adoption
- Coordinate biofuel incentives across G20 nations

Sustainable biofuel economy to be focus of global biofuel alliance

Bosch strategy for biofuel -Ethanol market in transport sector

Govt. discussing Flex fuel approach for gasoline applications

Industry Drivers for adopting biofuels



Sustainability

Challenges

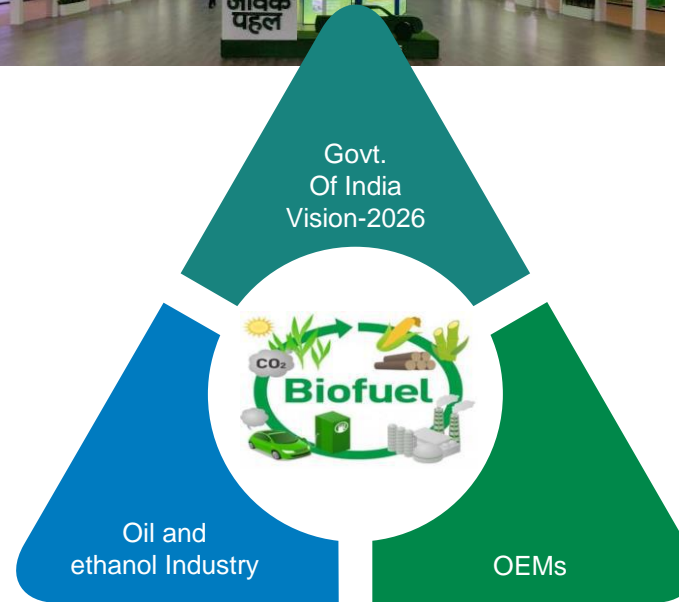


- Sugarcane based ethanol is not sustainable
- Scaling up 2G technology is inevitable
- Offering Flex-fuel at attractive prices at pump

Support requested



- Support for scaling up 2G technology w/ viability gap fund from Govt
- Subsidizing of flex-fuel to offer attractive TCO



Reduce Crude Oil Import



Achieve goals of Decarbonization



- Key drivers: Import bill reduction
- **E20 will be implemented by 2025** Pan India
- Flex fuel manufacturing is covered under Auto PLI
- 2G technology: Govt offering \$240 million viability fund
- **Regulation for flex-fuel vehicle beyond 2026 yet to be notified**

OEMs working w/ series intention



ICE technology w/ sustainable low carbon energy

E20: Bosch is fully ready for series
Flex-fuel: Govt. is promoting | Industries are preparing | Bosch is well prepared to offer solutions and products

Flex fuel drive systems

For a powerful mobility with low-carbon and carbon-neutral fuels



Ethanol

Flex fuel systems



For a powerful mobility with low-carbon and carbon-neutral fuels

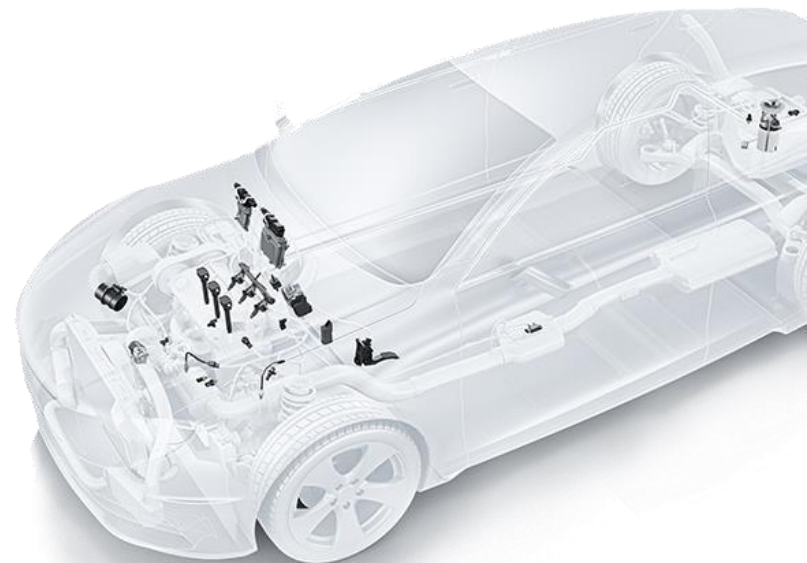
flexible

with the choice of fuel

more starting comfort

with the Flexstart system even at cold temperatures

- ▶ Flex fuel vehicles from Bosch have an injection system which can be operated with gasoline, with any mixture ratio of gasoline and ethanol or with pure ethanol.
- ▶ Bosch offers flex fuel systems for port fuel and direct injection.



Flex fuel drive systems



Heating control unit



Electronic engine control unit



Fuel rail for flex fuel applications



Fuel injectors



Thank you