



# Methanol Economy for India: Energy Security, Make in India and Zero Carbon foot print

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Shri Nitin Gadkari, Union Minister of Road Transport & Highways, Shipping, Water Resources, River Development & Ganga Rejuvenation made a statement on Methanol in Lok Sabha today. The following is a note on methanol economy in India.

India needs around 2900 cr litres of petrol and 9000 cr litres of diesel per year currently, the 6<sup>th</sup> highest consumer in the world and will double consumption and become 3<sup>rd</sup> largest consumer by 2030. Our import bill on account of crude stands at almost 6 lac crores.

Hydrocarbon Fuels have also adversely affected the environment with Green House Gas Emissions (GHG). India is the third highest energy related carbon dioxide emitter country in the world. Almost 30% pollution in cities like Delhi is from automobiles and the growing number of automobiles on the road will further worsen the pollution. It must be noted that the recent situation is alarming and time has come for the Govt to present a comprehensive road map to reduce the urban pollution in this country and stop pollution related deaths completely.

Hon'ble Prime Minister has set a goal for our Country to reduce the import bill by 10% by the year 2022. Crude oil imports drain our foreign exchange, putting enormous pressure on our currency & thereby weakening our bargaining power with the rest of the world. We need to have our own **"Indian Fuel of global relevance"**

## Why Methanol?

Methanol is a clean burning drop in fuel which can replace both petrol & diesel in transportation & LPG, Wood, Kerosene in cooking fuel. It can also replace diesel in Railways, Marine Sector, Gensets, Power Generation and Methanol based reformers could be the ideal compliment to Hybrid and Electric Mobility. Methanol Economy is the "Bridge" to the dream of a complete "Hydrogen based fuel systems".

Methanol burns efficiently in all internal combustion engines, produces no particulate matter, no soot, almost nil SOX and NOX emissions (**NEAR ZERO POLLUTION**). The gaseous version of Methanol - DME can be blended with LPG and can be excellent substitute for diesel in Large buses and trucks.

## **METHANOL 15 (M15) IN PETROL WILL REDUCE POLLUTION BY 33% & DIESEL REPLACEMENT BY METHANOL WILL REDUCE BY MORE THAN 80%**

Methanol can be produced from Natural Gas, Indian High Ash Coal, Bio-mass, MSW, stranded and flared gases and India can achieve (through right technology adaptation) to produce Methanol @ Rs.19 a litre from Indian coal and all other feedstock. The best part world is already moving towards renewable methanol from CO<sub>2</sub> and the perpetual recycling of CO<sub>2</sub> into Methanol, say CO<sub>2</sub> emitted from Steel plants, Geothermal energy or any other source of CO<sub>2</sub>, effectively "Air to Methanol"

During the last few years, the use of methanol and DME as fuel has increased significantly. Methanol demand is growing at a robust 6 to 8 % annually. World has installed capacity of 120 MT of Methanol and will be about 200 MT by 2025.

Currently Methanol accounts for almost 9% of transport fuel in China. They have converted millions of vehicles running on Methanol. China alone produces 65% of world Methanol and it uses its coal to produce Methanol. Israel, Italy have adopted the Methanol 15% blending program with Petrol and fast moving towards M85 & M100, Japan, Korea have extensive Methanol & DME usage and Australia has adopted GEM fuels (Gasoline, Ethanol & Methanol) and blends almost 56% Methanol. Methanol has become the choice of fuel in Marine Sector worldwide and countries like Sweden are at the forefront of usage. Large passenger ships carrying more than 1500 people are already running on 100% Methanol. 11 African and many Caribbean countries have adopted Methanol cooking fuel and across the world Gensets and industrial boilers are running on Methanol, instead of diesel.

Renewable Methanol by capturing CO<sub>2</sub> back from the atmosphere is becoming very popular and is seen by the world as the **"Enduring Energy Solution known to Mankind"**. **Methanol is a significant solution to the burning problem of Urban pollution worldwide.**

## What India Can do?

India has an installed Methanol Production capacity of 2 MT per annum. As per the plan prepared by NITI Aayog, using Indian High Ash coal, Stranded gas, and Biomass can produce 20MT of methanol annually by 2025. *India, with 125 Billion Tonnes of proven Coal reserves and 500 million tones of Biomass generated every year & the huge quantities of Stranded & Flared gases has a huge potential for ensuring energy security based on alternate feedstock and fuels.*

NITI Aayog has drawn out a road map to substitute 10% of Crude imports by 2030, by Methanol alone. This requires approximately 30MT of Methanol. Methanol & DME are substantially cheaper than Petrol and Diesel and India can look to reduce its fuel bill 30% by 2030.

NITI Aayog's road map for Methanol Economy comprises:

- Production of methanol from Indian high ash coal from **indigenous Technology**, in Large quantities and adopting regional production strategies and produce Methanol in large quantities @ Rs. 19 a litre. India will adopt Co2 capturing technology to make the use of coal fully environment friendly and our commitments to COP21
- Bio-mass, Stranded Gas & MSW for methanol production. Almost 40% of Methanol Production can be through these feed stocks.
- Utilization of methanol as well as DME in transportation – rail, road, marine and defence. Industrial Boilers, Diesel Gensets & Power generation & Mobile towers are other applications
- Utilization of methanol and DME as domestic cooking fuel- cook stoves . LPG = DME blending program.
- Utilization of methanol in fuel cell applications in Marine, Gensets and Transportation

### **Methanol Benefits in Transportation sector:**

With Very little modifications to existing engines (vehicles) and fuel distribution infrastructure. 15% of all vehicle fuels can be converted to Methanol & Di Methyl Ether (DME). India is shortly going to implement Methanol 15 % blending program with Petrol and cost of petrol is expected to come down immediately by 10% and M100 program for buses and trucks is also to be implemented shortly. My Ministry has already prepared the draft notification of M15, M100 & DME as transport fuel and is expecting a clearance from Law ministry to be notified officially. India has had extensive discussions with Israel , which has successfully implemented Methanol 15 (M15) blending program for Technology transfer.

Global engine manufactures like Volvo, caterpillar, Mercedes and in collaboration with Indian players can manufacture these engines under the Make in India and will result in big FDI investments. The development of this sector will bring jobs in the engineering sector.

### **Methanol Benefits in Marine Sector**

Worldwide due to emission regulations being implemented stringently by IMO (International Maritime Organisation), marine Sector is shifting to Methanol as fuel of choice. Being a very efficient in liquid form and practically generating no SOx or NOx, Methanol is much cheaper than LNG and Bunker / Heavy Oil. My ministry is preparing a road map to convert 500 barges into Methanol and a cabinet note is being prepared to adopt Methanol in Inland Waterways system. The first barge in India to run on Methanol will be achieved in the next 12 months. Sweden has already about 17 boats, ferrys, barges and a 1500 passengers cruise ship running on Methanol.

India will convert abt 50 Nos of vessels in the Port sector and various vessels owned by government entities to operate on Methanol. My Ministry is touch with all global and national players to bring all this technology in India, resulting in a massive modernization and transformation of the sector. This opportunity will also be used to standardise all the marine regulations both sea and inland in parity with International Maritime Organization rules and with global standards.

### **Methanol in Railways**

Indian Railways consumes about 3 billion litres a year and the annual diesel bill is in excess of Rs. 15000 Crores. A Methanol locomotive prototype is being implemented by Indian Railways under a grant by Department of Science & Technology and once all 6000 diesel engines are converted to methanol (at very minimal cost of less than 1 crore a engine), the annual diesel bill can be reduced by 50%. Methanol conversion program in railways is complimentary to the goals of electrification in Railways.

### **Methanol & DME in Cooking fuel program (Liquid fuel and LPG - DME blending program**

The cooking fuel program of Methanol liquid fuel and LPG-DME blending is a low hanging fruit for India. A 20% blending program with LPG, without any infrastructure modifications would result in a immediate savings of Rs.6000 Crores a year. Lakhs of rural women will cook healthy and Methanol supplied in canisters would ensure fuel supply in the remotest part of North East and Himalayas.

### **Thus Far:**

India has successfully converted a two wheeler engine, a Genset, power weeder (agriculture equipment) and is in process of converting many IC engines to Methanol, including railways and marine. Focus is on augmenting Methanol production capacity of existing producers like GNFC, RCF & Assam Petro and through various routes of production, India will target a Methanol production of at least 5 million tons by 2021. PSU's like BHEL, CIL &

SAIL are contemplating to produce Methanol through the coal route and Oil PSU's through the stranded gas route. BHEL at Trichy, the Talcher Fertilizer plant can also produce Methanol in Large quantities in a short period of time.

### Summary:

India by adopting Methanol can have its own indigenous fuel at the cost of approximately 19 Rs. A litre at least 30% cheaper than any available fuel. Methanol fuel can result in great environmental benefits and can be the answer to the burning Urban pollution issue. At least 20% diesel consumption can be reduced in next 5-7 years and will result in a savings of 26000 Crores annually. Rs. 6000 Crores can be annually saved from reduced bill in LPG in the next 3 years itself. The Methanol blending program with Gasoline will further reduce our fuel bill by at least 5000 Crores annually in next 3 years.

Make in India program will get a further boost by both producing fuel indigenously and associated growth in automobile sector adding engineering jobs and also investments in Methanol based industries (FDI and Indian). However, Coal and Stranded Gas linkages are import policy initiatives to be taken.

The final roadmap for '**Methanol Economy**' being worked out by NITI Aayog is targeting an annual reduction of 100 Billion \$ by 2030 in crude imports in line with our Hon PM's vision. To promote this renewable, alternate fuel a "**Methanol Economy Fund**" is also being contemplated. A cabinet note on Methanol in Inland Waterways and Marine Sector and overall adaptation of "**Methanol Economy**" will be moved shortly.

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