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OPINION

Relevant for: Indian Economy | Topic: Infrastructure: Energy incl. Renewable & Non-renewable

The Narendra Modi administration has set a target to increase energy efficiency in transport and, at the same time, abating the impact of energy on the environment. This is an objective shared by many other countries around the world. At MOVE, the first Global Mobility Summit held in New Delhi during the first week of September, discussions concentrated on the best ways to achieve this goal.

The logical and immediate solution was to invest intensively in mass public transport, shared vehicles and general habit changes. Beyond that, it was widely recognized by the scientific community that electrification was the way forward to reach higher efficiency levels. However, there are at least three forms of electrification: With electric power stored in batteries, with hydrogen, and with high-density, low-carbon liquid fuels.

Batteries have an intrinsic limitation related to their low energy density, currently less than 200 Wh per kg. The industry goal is to reach 330 Wh, and in the future, with new material, it is believed that it could reach 700-800 Wh. The low energy density restrains the range and determines the cost of this option.

Batteries require the use of power, and are environmentally sound only if the source of power is clean. There is still the issue of availability and sourcing of metals used in their manufacturing, their limited lifespan, and the economic and environmental costs of discard. A new infrastructure for power distribution is also needed and India must make massive investments in new forms of power generation, as 75.1% of its current generation is derived from coal, and another 4.2% from other fossil-based fuels such as gas and diesel.

Electrification with hydrogen is costly and risky to produce, store and distribute.

Electrification with low-carbon liquid and gaseous fuels, such as bioethanol and bio-CNG (compressed natural gas), takes advantage of their high energy density, 6,200 Wh per kg in the case of ethanol. Actually, biofuels must be perceived as high-density solar energy, or hydrogen, captured, stored and distributed in an efficient, economical and reliable manner.

Domestic support policies for sugarcane farmers have increased its production by over 30% in the past two years and stocks of sugar are mounting in large excess of demand—10.4 million tonnes in 2018 alone—bringing instability in the economic relationship between mills and farmers. There is ample example of the feasibility and success of this route. In 2018, Brazil is substituting 42% of its petrol with ethanol and, in the US, which uses nearly half of the world’s petrol, the level of substitution is 10%. Ethanol is economically competitive and its cost today is about $1.3 per gallon, while petrol has a wholesale price of $2.1 per gallon. Therefore, it helps alleviate the price pressure on consumers. But ethanol should be valued for its blend octane number of 116, compared to petrol’s 87 AKI. When this factor is considered, ethanol is valued as a substitute of toluene, or aromatics in general, which are around 30% higher than petrol prices.

The advantages of this route are the possibility of its immediate implementation as a blend component to petrol using the current distribution infrastructure, with a sizeable positive impact on agriculture, increasing farm income, providing diversification and greater price stability.

In the past 40 years, Brazil has saved more than 700 million tonnes of CO_2 emissions from ethanol used and over $420 billion in avoided petrol imports.

Ethanol and bio-CNG can be the source of energy for electrification adopted in hybrid, e-electric and fuel cell vehicles.

In urban areas, ethanol reduces emissions of carbon monoxide, reactive hydrocarbons, nitrogen oxides, formaldehydes and particulate matter. As a substitute to aromatics, it greatly contributes to reduction of cancer-related toxic emissions. On a global scale, its very low carbon intensity provides a very efficient solution to mitigate global warming.

At COP-23 in Bonn last November, 19 nations comprising over 50% of the world's population issued a Declaration of Vision supported by the International Energy Agency, and the International Renewable Energy Agency, indicating a mandate that the proportion of bioenergy in world energy demand doubles and that the proportion of biofuels in transport fuels triples until 2030, in order to reach the target of limiting global warming to 2 degrees Celsius.

By 2030, India's urban population will grow to more than 600 million people. Urgent policies must be implemented now to increase the efficiency of energy in transport, mitigate environmental impact at local and global scale, and control migration to large cities with a sensible farming strategy.

India has enormous potential for electricity generation with bioethanol and biogas. The same holds true when it comes to bio-CNG or biomethane from farming and agrindustrial residues for substitution of diesel fuel. With an annual expenditure of $105 billion in oil and oil product imports, it is a natural solution for India to produce and use more ethanol as the economy continues to grow 7% a year. In addition to affecting the economy, air pollution remains on the rise. Electrification with biofuels is the sensible, modern and long-term strategy for India and many other countries in similar circumstances.

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