



IC Engine Phase-out for Carbon Neutrality: Are we in right direction...??

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Abstract: As the world is facing climate change issues, many countries have joined their hand and targeting to achieve zero carbon emissions in the next few decades. A recent significant trend has been seen in shifting to new energy solutions such as battery electric vehicles (BEVs) and fuel cells. At the same time, several countries are discussing banning partially/fully internal combustion engines (ICEs) in the coming time which is the key source of the global transportation sector in the current stage. This decision is going to create a chock situation for transportation if timely resources are not facilitated on the ground. Of course, in the primary investigation, electrification and fuel cells hold promise for reducing carbon emissions but need to address challenges such as raw materials demand, infrastructure development, supply chain, etc. to ensure its implementation of a wider scale population. Moreover, limitations of EVs and fuel cells are still exists in the sense of heavy-duty transient operation on-road and off-road vehicles. On the other side, if IC engine can reinvestigate with alternative fuels such as hydrogen/ammonia/biodiesel/methanol/e-fuels etc., carbon neutrality can be achieved without compromising the power generation/millage with existing infrastructure and supply chain of energy fuels with minor retrofitting process. This can certainly save a lot of money and time for respective countries along with decarbonization goal achievement. With the view of above gaps and challenges, this presentation will explore the potential drawbacks of IC engines and examining alternative solutions for a more practical approach along with advanced technology development to eliminate IC engine sustainability threat.

Speaker Bio: Madan Kumar has been an Associate Professor of Mechanical Engineering (Robotics) at Guangdong Technion-Israel Institute of Technology since December 2022. He holds a B. Sc. Eng. in Mechanical Engineering (with distinction) from Magadh University (**India**), a Master of Science (M.S.) by research in Mechanical Engineering (Thermal) from the Indian Institute of Technology Madras (IIT Madras-**India**), and a Ph.D. in applied science and engineering from Sophia University (**Japan**). Madan worked as Researcher in Sophia Univ., AIST and Chiba Univ. Further served as assistant professor in Chiba Univ. Madan's main research interest is Engines and Powertrain performance development with steady and transient modeling-control analysis utilizing conventional and alternative fuels. Throughout his career, he has collaborated and worked with major leading automotive companies/organizations such as Toyota, SIP, AICE, NEDO-Japan, and FVV. He is member of Japan Society of Automotive Engineering (JSAE), Japan and Guangdong Provincial Key Laboratory of Material and Technologies for Energy Conversion (MATEC). He has been appointed as "Student Formula Car Project Academic Coordinator & Supervisor".