

Transitions to Alternative Vehicles and Fuels

9 September 2016 – ME Lecture Hall – 1300

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Dr. Robert Sawyer

Abstract:

We are in a time of transition from a century of conventional vehicles powered by internal combustion engines burning fossil fuels to a new generation that incorporates varying levels of electric drive and low carbon fuels.

The transition is being driven by regulatory policies with the objective of reducing fuel consumption and, more recently, reducing the greenhouse gas emissions of the vehicle-fuel combination. Fuel economy regulation, with the original objective of reducing petroleum consumption, was first adopted in 1975. The regulatory mechanism built upon the earlier regulation of conventional vehicle exhaust air pollutants authorized by the Clean Air Act. In 2011 the regulation of carbon dioxide emissions began in a program complementary to fuel economy regulation. The U.S. Environmental Agency and the California Air Resources were key agencies in policy establishment, regulatory development, and enforcement.

To meet goals of 50% reduction of petroleum use by 2030 and 80% reduction of petroleum use and greenhouse gas emissions by 2050, the vehicle and fuels industries are pursuing multiple approaches:

1. Very high efficiency combustion engines and drive trains
2. Very high efficiency vehicles
3. Low carbon fuels—biofuels, electricity, or hydrogen

The rate of development and deployment of these technologies is proceeding rapidly, primarily in response to regulatory demands.

Biography:

During his fifty-year career at the University of California, Berkeley as a professor of mechanical engineering, Dr. Sawyer's teaching and research included rocket propulsion, energy conversion, combustion, air pollution, and regulatory policy. He has authored or co-authored more than 360 publications including two books. He chaired the Energy and Resources Group and was selected to be the first Class of 1935 Professor of Energy at Berkeley. From 2003–2005 he headed the University of California Education Abroad Program in London. In January 2006, Dr. Sawyer left the University of California to accept the appointment by Governor Schwarzenegger to head the California Air Resources Board, a position he held through June 2007. Currently he is the Class of 1935 Professor of Energy Emeritus at UC Berkeley. He is a graduate of Stanford and Princeton universities, a fellow of the Society of Automotive Engineers, and a member of the United States National Academy of Engineering.



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