



The Dual-Fuel Strategy

An Energy Transition Plan

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Abstract The dual-fuel strategy is a plan to facilitate the transition from fossil to renewable and nuclear *sources* by first replacing fossil with renewable *fuels*. It stipulates that all energy sources (fossil, renewable and nuclear) will be most efficiently monetized by conversion to three energy vectors: electric power and two liquid renewable fuels, all compatible with existing infrastructure. One of the two renewable fuels is nitrogen-based and the other is carbon-based. An example of a dual-fuel pair is ammonia and methanol. Unlike hydrogen, these are *liquid* fuels and are therefore compatible with existing infrastructure, with only modest modification. The strategy enables global carbon emissions to be reduced significantly early in the transition, perhaps by as much as an order of magnitude by 2030 if, as expected, centralization of carbon dioxide generation promotes carbon capture sequestration and sale. At completion of the transition, fossil sources will be replaced by renewable (and perhaps nuclear) sources. Because liquid renewable fuels use the existing energy infrastructure, completion can be achieved within decades; perhaps by 2050.

Biography William Ahlgren is Associate Professor of Electrical Engineering in the California Polytechnic State University at San Luis Obispo. His degrees are S.B. in Physics (MIT), M.S. in Energy Systems Engineering (University of Arizona), and Ph. D. in Electric Power Engineering with thesis in Materials Science (USC). He has been involved in solar energy development since his undergraduate thesis research on shallow solar ponds for industrial process heat. His subsequent research has included development of photovoltaic devices in both silicon and II-VI materials; photo-electrochemical systems based on metal oxides for solar-assisted hydrogen production and electro-winning of copper; and electrochemical methods for the low-cost production of thin-film photovoltaic devices using II-VI and III-V materials. He is currently focused on the development of high-efficiency electrochemical energy conversion systems to promote the use of renewable energy.