

The Role of Science in Solving Our Planet's Energy Problems

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If we are to survive as a species on this planet, we must make major science and engineering breakthroughs in the way we harvest, store, transmit, and use energy. Science must play a dominant role in moving the planet onto a sustainable energy path and scientists must speak up so that the intellectual discourse regarding energy policy becomes an informed one, so that proper investments are made. About five years ago, I made a conscious decision to reorient my entire research program in directions designed to help. I'll give some examples selected from characterizing combustion of biodiesel fuels, optimizing mechanical properties of lightweight metal alloys for fuel-efficient vehicles, maximizing ion and electron transport in solid oxide fuel cells, and designing novel materials from abundant elements for photovoltaics and photoelectrodes to efficiently and cheaply convert sunlight into electricity and fuels. In addition to my own research, as of two years ago I became responsible for thinking more broadly about the intertwined problems of energy and environment at Princeton. I'll also discuss how I see the energy landscape for the 21st century, and what I hope the scientific community will be able to do to accelerate this essential transformation of our civilization.