Review: From the End of Energy: The Unmaking of America's Environment, Security and Independence
By Michael J. Gratz

Review: Unlocking Energy Innovation: How America Can Build a Low-Cost, Low-Carbon Energy System
By Richard K. Lester and David M. Hart

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Graetz, Michael J. *The End of Energy: The Unmaking of America's Environment, Security, and Independence*. Cambridge, MA: The MIT Press, 2011. 369 pp. ISBN 9780262015677. US$29.95 hardcover. Alkaline paper.

Lester, Richard K. and Hart, David M. *Unlocking Energy Innovation: How America Can Build a Low-Cost, Low-Carbon Energy System*. Cambridge, MA: The MIT Press, 2012. 216 pp. ISBN 9780262016773. US$24.95 hardcover. Alkaline paper.

The main title of Michael J. Graetz's book, *The End of Energy*, might mislead one to think that the author will present a Mad Max–type, post-apocalyptic vision where the remains of our civilization fight for droplets of oil. The subtitle might be less saleable, but tells exactly what the book is about: The Unmaking of America´s Environment, Security, and Independence. It provides a depressing story of fifty years of failure to develop any economically successful energy alternatives to oil and other non-renewable energy sources in the U.S. The book and the useful chronology at the end of the book list several missed chances for this much needed transformation, including, for example, the Santa Barbara oil spills and the burning of the Cuyahoga River in the 1960s, the discovery of "acid rain," the OPEC oil embargo and the partial nuclear meltdown at Three Mile Island in 1970s, and so forth trough the eighties and nineties. A more recent missed chance is the period following the attack on the World Trade Center on September 11, 2001, which could have been used to rally public opinion and Congress to support a substantial increase in gasoline taxes, an oil import fee, or perhaps even a broad-based energy tax to fund the military operations launched in Afghanistan and Iraq.

The message of this book is clear: there is a need for substantially higher taxes on fossil fuels, as their market price fails to reflect the costs of pollution, especially the emissions of carbon dioxide. Fossil fuel market prices also fail to reflect the costs of dependence on oil imports including national security costs, such as deploying the military to protect and secure the flow of oil from the Middle East. One researcher has estimated that the cost of this oil dependence was between $700 and $800 billion in 2008 alone. Graetz argues that a substantial fee or tax on petroleum products and on carbon would create financial incentives necessary to both decrease the consumption of energy from fossil fuels and to stimulate investments in nonfossil alternative fuels. These effects would in turn help move toward greater energy security and reduced carbon emissions.

The book is concluded by a seventy page long bibliographic essay, which is useful to anyone who wants to dig deeper into some particular issue dealt with in the book. As a whole, this book provides an enjoyable read about an important subject. It is a good example how one must know the past to understand the present, and thus, it is recommended to anyone who wants to understand current energy policy of the U.S.

The second book, *Unlocking Energy Innovation,* starts where the first one ends. Graetz tells a story of decades wasted in the search for a single solution that would guarantee energy security, and calls for much greater neutrality in the incentives for technological innovations and commercial development. In this book, Lester and Hart respond to this call with a concrete plan for a new institutional architecture for America's energy innovation system. They suggest that three waves of

innovation are needed as well as a system to drive them: the first wave, ramping up in this decade, must focus mainly on energy efficiency gains; the second wave will overlap with the first, but will have its largest impact between 2020 and 2050, and must focus on the large-scale deployment of known low-carbon technologies; and a possible third wave achieving scale only in the second half of the century, may result from radical technical advances generated by fundamental research in a broad range of scientific fields. The effort to accelerate all three waves must start right away. To unlock these waves of innovation, they suggest innovation surcharges on all retail sales of electricity which will be allocated to Regional Innovation Investment Boards.

In concordance with Graetz´s conclusions, Lester and Hart do not try to answer the question of which innovations or which companies will or should emerge as the dominant contributors to each wave. Instead, they focus on how to build an innovation system that will produce the best possible answers to this question. The public sector must be the primary instigator of institutional change as markets left to their own devices will not take climate change into account. The purpose of public action should be to unlock the immense skills and resources of America's private entrepreneurs, investors, producers, and energy users, so that they carry forward most of the innovation tasks. Thus the name of the book, *Unlocking Energy Innovation*, is right on spot. The reader will need to do some unlocking as well, as this book is rather repetitive and not as fluid to read as the first one. This does not, however, diminish the value of this book. On the contrary, I hope that all U.S. policy makers and legislators would read it, and most of all, implement it.

In its firm belief that America´s innovation system is one of its greatest assets, it is reminiscent of another book on the same subject: *Structuring an Energy Technology Revolution* by Charles Weiss and William B. Bonvillian [http://www.escholarship.org/uc/item/1hc4h270]. This book suggested a centralized innovation system, however, while Lester and Hart stress that America´s energy innovation potential will not be accomplished by a centralized government program.

The End of Energy provides a good historical overview of how the U.S. energy system ended up in its current state, where the United States, with only 4 percent of the world's population, consumes one-quarter of the energy the world uses each year. *Unlocking Energy Innovation* provides an action plan how to close the resulting big energy efficiency gap that the U.S. has to Europe and Japan.

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