

Energy and the Wealth of Nations

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An Introduction to Biophysical Economics

Second Edition

 Springer

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To Myrna, my wonderful companion on this and other journeys.

Charles A.S. Hall

To my children, Justin and Juliana Klitgaard Ellis, who have grown from wonderful children into fine adults, and to Deborah York who continues to make me a better person.

Kent A. Klitgaard

Preface

There are four books on our shelf that have the words, more or less, “wealth of nations” in their titles. They are Adam Smith’s 1776 pioneering work, *An Inquiry into the Nature and Causes of the Wealth of Nations*, and three of recent vintage, David Landes’ *The Wealth and Poverty of Nations*, David Warsh’s *Knowledge and the Wealth of Nations*, and Eric Beinhocker’s *The Origin of Wealth*. Warsh’s book is rather supportive of current approaches to economics while Beinhocker’s is critical, but all of these titles attempt to explain, in various ways, the origin of wealth and propose how it might be increased. Curiously, none have the word “energy” or “oil” in their glossary (one trivial exception), and none even have the words “natural resources.” Adam Smith might be excused given that, in 1776, there was essentially no science developed about what energy was or how it affected other things. In an age when some 80 million barrels of oil are used daily on a global basis, however, and when any time the price of oil goes up a recession follows, how can someone write a book about economics without mentioning energy? How can economists ignore what might be the most important issue in economics? In a 1982 letter to *Science* magazine, Nobel Prize economist Wassily Leontief asked, “How long will researchers working in adjoining fields ... abstain from expressing serious concern about the splendid isolation within which academic economics now finds itself?” We think Leontief’s question points to the heart of the matter. Economics, as a discipline, lives in a contrived world of its own, one connected only tangentially to what occurs in real economic systems. This book is a response to Leontief’s question and builds a completely different, and we think much more defensible, approach to economics.

For the past 130 years or so, economics has been treated as a social science in which economies are modeled as a circular flow

of income between producers and consumers where the most important questions pertain to consumer choice. In this “perpetual motion” of interactions between firms that produce and households that consume, little or no accounting is given of the necessity for the flow of energy and materials from the environment and back again. In the standard economic model, energy and matter are ignored or, at best, completely subsumed under the term “land,” or more recently “capital,” without any explicit treatment other than, occasionally, their price. In reality economics is about stuff, and the supplying of services, all of which are very much of the biophysical world, the world best understood from the perspective of natural, not social, sciences. But, within the discipline of economics, economic activity is seemingly exempt from the need for energy and matter to make economies happen, as well as the second law of thermodynamics.

Instead we hear of “substitutes” and “technological innovation,” as if there were indefinite substitutes for matter, energy, and the environment. As we enter the second half of the age of oil, and as energy supplies and the social, political, and environmental impacts of energy production and consumption become increasingly the major issues on the world stage, this exemption appears illusory at best. All forms of economic production and exchange involve the transformation of materials, which in turn requires energy. When students are exposed to this simple truth, they ask why are economics and energy still studied and taught separately? Indeed, why is economics construed and taught only as a social science, since in reality economies are as much, and perhaps even principally, about the transformation and movement of all manner of biophysical stuff in a world governed by physical laws?

Part of the answer lies in the recent era of cheap and seemingly limitless fossil energy which has allowed a large proportion of humans to basically ignore the biophysical world. Without significant energy or other resource constraints, economists have believed the rate-determining step in any economic transaction to be the choice of insatiable humans attempting to get maximum psychological satisfaction from the money at their disposal, and markets seemed to have an infinite capacity to serve these needs and wants. Indeed the abundance of cheap energy has allowed essentially any economic theory to “work” and economic growth to be a way of life. For the last century, all we had to do was to pump more and more oil out of the ground. However, as we enter a new era of “the end of cheap oil,” in the words of geologists and

peak oil theorists Colin Campbell and Jean Laherrere, energy has become a game changer for economics and anyone trying to balance a budget.

In brief, this book:

- Provides a fresh perspective on economics for those wondering “what’s next” after the crash of 2008 and the near cessation of economic growth for much of the Western world since then
- Summarizes the most important information needed to understand energy and our potential energy futures

In summary, this is an economics text like no other, and it introduces ideas that are extremely powerful and are likely to transform how you look at economics and your own life.

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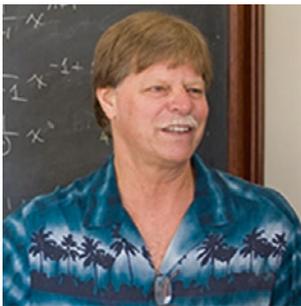
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Authors' Biographies



Charles Hall

is a systems ecologist who received his PhD under Howard T. Odum at the University of North Carolina at Chapel Hill. Charles Hall is the author or editor of 14 books and 300 articles. He is best known for his development of the concept of EROI, or energy return on investment, which is an examination of how organisms, including humans, invest energy into obtaining additional energy to improve biotic or social fitness. He has applied these approaches to fish migrations, carbon balance, tropical land use change, and the extraction of petroleum and other fuels in both natural and human-dominated ecosystems. Presently he is developing a new field, biophysical economics, as a supplement or alternative to conventional neoclassical economics, while applying systems and EROI thinking to a broad series of resource and economic issues.



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