Energy at the Crossroads: Global Perspectives and Uncertainties by Vaclav Smil. London: MIT Press, 2003. Pp xiv + 373; index. ISBN 0-262-19492-9

Vaclav Smil is the veritable Renaissance man of the energy world. In his 40 year career there are few topics he has not visited and written a book about. His field is the global study of energy, food and environmental issues, starting with some pioneering work in the 1970s on energy use in China, then on the nitrogen and carbon cycles in the 1980s, and energy flows and energy history in the 1990s. This book is thus a compilation of his life's work and is an unashamed expression of his views.

No one can accuse Smil of modesty - except in his frugal (by Canadian standards) lifestyle- and the book starts with a six page introduction to his career, his research and his 17 books. These books are well used as sources of data for the many useful figures that fill the pages of this encyclopedia on energy. For his range of sources is immense - there are 25 pages of references - and he equally at ease in discussing obscure Russian theories of non-conventional oil resources as the effect of ozone damage on crops.

Smil's objective in writing this book is to provide an examination of 'fundamental realities' which are 'imperative if we are to avoid fatal blunders and come close to reconciling our need for abundant and reliable energy supplies with the existential requirement of maintaining the integrity of irreplaceable biospheric services' (p. Ix). He thus takes a very undogmatic and tolerant attitude to all issues, seeking to rule no possible solution out, but also well aware of the physical limitations of most energy sources.

The first two chapters gives a history of energy trends and energy's linkage with economic growth, the quality of life and the environment.

The third chapter 'Against Forecasting' is an excellent critique of the dismal record of long-range energy forecasts. He is against quantitative forecasting so beloved in the 1970s, with its 'manifest record of failure' and argues that 'only two kinds of looking ahead are worthwhile, indeed essential' (p.121). The first is contingency scenarios 'preparing us for foreseeable outcomes that may deviate substantially, even catastrophically, from standard trend expectations or from consensus visions' (p 121). The second 'encompasses no-regret normative scenarios that should be prepared to guide our long term paths towards the reconciliation of human aspirations with biospheric imperatives' (p.122). This long chapter uses case studies of the failed forecasts for electric cars, breeder reactors and biomass schemes, and by Marchetti and Lovins (amongst many others) to illustrate the 'failures of imagination' and the 'excessive confidence in the potential of particular technical fixes that are seen to hold (often near-magical) solutions to our problems and whose early commercialization is forecast to bring prosperous futures' (p 122).

The fourth and fifth chapters are on fossil and non-fossil fuels, with a very clear and concise summary of their potential. Oil and gas are not running out, the future for coal is still bright particularly in China, most renewables are handicapped by their very low energy density and distance from urban centres, and the future for nuclear is very uncertain. Expect little change before 2050.

The final chapter is on Smil's prescription for an energy efficient and equitable world based on moderation of consumption. He argues that the affluent Western nations should

reduce their extraordinarily high per capita consumption by at least 25%-35%. He remarks (p 338):

> Such reductions would call for nothing more than a return to levels that prevailed just a decade or no more than a generation ago. How could one even use the term *sacrifice* in this connection? Did we live so unbearably 10 or 30 years ago that the return to those consumption levels cannot be even publicly contemplated by serious policy makers because they feel, I fear correctly, that the public would find such a suggestion unthinkable and utterly unacceptable?

Smil concludes that 'shaping the future energy use in the affluent world is primarily a moral issue, not a technical or economic matter' (p 370) and that we must, not only for our health, but for the health of the planet curb our excessive consumption.

Overall this book is a tour de force, crowning Smil's position as the premier writer on energy issues.

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