

more and more material came to light. Was it really a hoax that went too far to be admitted? Was it an attempt to make a fool of a rival? Was it a serious but fraudulent attempt to 'prove' Darwin's theory? The question of motive is just as intriguing as the identity of the forger.

Blinderman's inquiries range widely, even entering the realm of fantasy when Conan Doyle is considered suspect and Sherlock Holmes is brought in to help. Does he succeed? Which of the ten suspects is finally convicted? You'll have to read the book to find out. □

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## Energetic exercise

Ian Smart

**Energy 2000: A Reference Projection and Alternative Outlooks for the European Community and the World to the Year 2000.** By Jean-François Guilmot, David McGlue, Pierre Valette and Christian Waeterloos. *Cambridge University Press: 1986. Pp.261. £25, \$44.50.*

GIVEN the circumstances of the past 15 years, it takes courage to publish a projection of energy demand and supply. And only the brave would ever reveal the results of an exercise in formal modelling. What is ostensibly a dry discourse is thus doubly valorous.

Building on research promoted by the European Commission over a ten-year period, what we have are accurately described by the sponsors as "consistent energy projections on a country basis and at the level of the Community as a whole, using throughout the same methodological approach and harmonised energy data and balances" (p. viii). The methods are conventional, entailing the choice of a single socio-economic scenario for the latter-day Community of Ten (that is, excluding Spain and Portugal) and using that scenario to establish a reference projection of energy demand and supply until the end of the century, surrounded by less detailed 'high' and 'low' variants. What is less usual and more stimulating is that aggregated results for the Community have been assembled from a series of standardized and consistent sub-projections of national energy markets.

The result is a workmanlike job. Readers drawn by an interest in modelling will regret that there is little specific information about the algorithms employed. Those looking for a reference work will wish that, in the absence of an index, a detailed catalogue of contents and tables could at least have been included. And no

one is likely to cherish the text as light reading. Yet the exercise would still have justified itself had it done no more than coax and cudgel evidence from ten different energy economies into a common analytical frame.

In fact, the study attempts more — but not always so successfully. It necessarily has a good deal to say about energy costs and prices, for example. But the handling of how input costs are translated into consumer prices, or prices related to investment propensity, is too tentative and opaque to be convincing. That may be because the Commission is sensitive to how Community members will feel about a study of this sort. Repeating that the authors' energy projection is not a forecast but only "a plausible and consistent scenario" cannot conceal that it reflects what they take to be the probable evolution of policy as much as of economic circumstance. Indeed, their methods included consulting the views of national governments, and the effect is sometimes apparent. Even in 1985, for instance, few analysts would have wagered on Italy commissioning another ten nuclear power reactors before the end of the century, or Britain building not only Sizewell B by the year 2000 but six more similar units as well.

As it is, the plausibility of what is projected here was largely demolished in 1986 by the collapse of oil prices and the disaster at Chernobyl. Ironically, that is almost to the report's advantage, because it removes the temptation to consider it as anything but a valuable effort to make energy systems analysis in ten different countries more rigorous, transparent and consistent. But the extraordinary history of 1986 also throws into relief the study's most fundamental weakness, which lies in its treatment of uncertainty. Many inputs to the model are properly described as uncertain. The output projections, however, still seem to assume that policymakers will be confidently rational in choosing an optimal response for the long term. As a result, there is no allowance for how traumatic experiences undermine their confidence, and increase the pressure to reject long-term commitments in favour of more easily mutable short-term palliatives. They, too, are uncertain.

This report is testimony to a brave beginning. As good modelling studies should, it purports to give no answers, but only to help in asking progressively better questions. The European Commission should therefore be encouraged to repeat the exercise. If it does, however, it will need to take account not only of economic uncertainty in energy matters but also of nervous managers and frightened politicians. □

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## Star-like qualities

Malcolm G. Smith

**Quasar Astronomy.** By Daniel W. Weedman. *Cambridge University Press: 1986. Pp. 217. £25, \$39.50.*

*Quasar Astronomy* is an excellent observers' research guide to the violent universe of quasars and active galactic nuclei. Daniel Weedman has been observing Seyfert galaxies and quasars at a wide variety of wavelengths, using a wide variety of techniques, for the past 20 years. His teaching credentials in this field are equally impressive. As he reminds us in his preface:

I already owed a debt to the late Carl Seyfert, who had given me my first encouragement in astronomy when I was a high-school student... this book is a product of my attempts to explain [quasar astronomy] to students in various classes at the University of Texas, Vanderbilt University, University of Minnesota and Pennsylvania State University.

From the outset, Weedman makes it clear that technology has played an essential role in the study of these very distant sources of energy. He writes:

To be honest... most of the progress [in understanding quasars] should be credited to the engineers and physicists who have developed tools that allow our wide-ranging probes into the mysteries of quasars.

That point of view may be a little extreme, and could be contested by a few of the eminent theoreticians who have worked in this field, but the quotation serves to illustrate some of the flavour of Weedman's approach.

This is not a difficult book. Weedman's account is basic and straightforward, and is illustrated with simple worked examples. He takes the view that the complications stemming from the maze of unit conversions and cosmological formulae are important enough that most students of the subject would benefit from having the details explained and set out explicitly. He remembers that most of us took a number of years to become reasonably comfortable with all the practical corrections and conversions — and that most of us worked through many of the derivations essentially from scratch, and then kept the results in a notebook to save having to do them all again!

Weedman's treatment of the physics of quasars is highly simplified. Yet it shows the insight that his deceptively simple observational approach to research has brought to this field, and the book will be of great value to those embarking on the study of quasar astronomy. □

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