



**BEYOND SMOKE and MIRRORS – Climate Change and Energy in the 21<sup>st</sup> Century**  
*Burton Richter*, Cambridge University Press, New York, 2010, pp. xvi + 226; ISBN: 978-0-521-74781-3 (ppbk), 978-0-521-76384-4 (hdbk): CAN\$106.95 (hdbk), CAN\$31.95 (ppbk).

It is rare that a scientist with the credentials of the author, Burton Richter, 1976 Nobel Laureate in Physics, attempts to communicate to society in a way that makes such an intimidating and contentious topic as climate change and the complexity of the associated energy issues that must be tackled seem easy to understand. This is a brilliant book written in a very informal way yet packed with easily understood information. Richter's judgment is superb in assessing the role that the various possible solutions may play in averting a global warming catastrophe. His long experience as an energy advisor to US governments shows clearly in this discussion. He manages to communicate calmly but objectively the urgency of tackling the issues under discussion. Richter divides those who are currently talking about this contentious topic into three groups: the deniers, the greens and the ultra-greens that he calls the exaggerators and makes it clear that he considers himself as a green. The book uses primarily American data and examples but Canadian readers will not find this a problem. Technical Notes in some chapters provide supplementary information on various topics for readers with a scientific background.

The book is divided into three sections: Climate, Energy and Policy. The first section provides the reader the basic information necessary to understand and appreciate the greenhouse effect, climate modeling and historical climate information. The author is particularly effective in explaining what is not known as well as known and the discrepancies between the various models used to predict future global temperatures. He emphasizes the dangers of using these uncertainties to justify the "business as usual" outlook of most deniers. His discussion uses CO<sub>2</sub> equivalent quantities to take account of the contributions of the other important green house gases such as methane.

The second section discusses the various steps that must be taken to keep the global temperature within an acceptable limit. It discusses the economic issues involved in how to move from an economy based upon fossil fuels to one using a wide variety of renewable energy sources. He focuses attention on the Stern Report and the Nordhaus model used by many economists since they appear to be two extreme approaches. Richter shows that these complex models differ primarily in the discount rate that each uses by demonstrating that the Nordhaus model yields the same conclusions as those in the Stern Report if it uses the Stern discount rate and conversely. Discounting the future costs of present day actions is, fundamentally, a question of how much one values various economic diseconomies or intangibles such as the environment, the survival of various species, health effects, etc. The author is unaware of the valuable but frequently unstated or appreciated role that the concept of standing plays in determining the economic priorities of individuals, cities, provinces and countries. The discount rates used by these two authors differ by more than an order of magnitude. Stern chose a 0.1% discount rate because he placed a higher "value" on the impact decisions made today will have on the welfare of people in the future whereas Nordhaus used 4%.because he placed a lower "value" on these impacts. Most climate change

deniers are implicitly using a 100% discount rate because they do not believe we are doing anything globally today that will adversely affect the welfare of future generations.

The discussion of the total energy required and the various sources of non-fossil fuel energy available attempts to provide a balanced picture of the potential role that these sources can play. The author draws attention to the fact that the definition of so-called “green” sources is contentious because many ultra-green energy supporters focus only on wind, solar, geothermal and tidal sources and consider hydro or nuclear energy as unacceptable. He shows that it is impossible to provide the energy required to replace fossil fuel sources without using both of the latter even taking account of energy conservation and efficiency improvements. Very valuable information is provided in Fig. 10.2 about how “green” various energy sources are over their life cycle which takes into account the energy required to create the materials used in various green sources, to construct these sources as well as maintain and finally dispose of them. Such information is difficult to obtain and it is essential for any informed discussion on this subject. This table shows that wind, nuclear, geothermal and hydro emit the least amount of CO<sub>2</sub> equivalent per GWeh and that this amount increases slightly from wind to hydro. These numbers will probably surprise most readers. For example coal and natural gas, on this basis, emit 65 and 31 times as much, respectively, as wind. This is an approach that should provide the basis for all objective policy decisions concerning the choice of alternative energy sources and a fruitful area for future research and analysis. Richter emphasizes that “no one silver bullet will slay the climate-change dragon” and that we should be prepared to use all available non-fossil fuel energy sources. He directs this argument directly at those who oppose the use of nuclear energy.

The third section is a succinct discussion of how the US should develop a comprehensive green energy policy. He carefully discusses the various approaches that can be used to encourage both industrial and individual energy consumers to decrease their carbon emissions. At the national level, cap and trade and carbon taxes are the two alternative possible policies. Richter believes that the former tends to enrich the guilty and punish the innocent by which he means that inefficient energy generators and consumers gain far more than those who have already implemented low or zero carbon emission policies. Moreover, the latter is much easier to administer and avoids the problem of favouritism for some industries over others. The failure of the US federal government to enact any legislation designed to reduce carbon emissions has led California followed by other state governments to act on their own. The author feels that these initiatives are a form of balkanization that has harmed some industries including the US car makers and that some of these initiatives are counterproductive. He praises the introduction of demand side management techniques in California because it encourages energy utilities to make money by getting consumers to decrease rather than increase their consumption. Richter reviews the various steps that have been taken at the international level to reduce global carbon emissions as well as the problems at arriving at a consensus that is fair for both the developed, emerging and under developed nations that led to Kyoto-1. Its successor remains unsettled after the meetings in Copenhagen last December and Cancun in December of 2010. He closes with a Coda that summarizes what he hopes the reader will conclude from his book as well as a plea “If we do nothing, it is our grandchildren who will begin to see the worst effects of climate change, and it is our grandchildren for whom we should be working”.

This reviewer believes that Richter has been extremely successful in presenting the big picture about the implications of climate change and how the rise in global mean temperature can be minimized. His 2011 New Year's wish is that every politician in Canada and the United States would read this book. It should be on the reading list for 2011 of all concerned citizens. Physicists should read this book because it is a template for how they should proselytize about science to the general public. As Richter observes "I have learned one thing: politics – particularly international politics – is much harder than physics". This reviewer can only add that the effort to communicate to the political system is well worth the effort.

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