



Engineering Strategies for Greenhouse Gas Mitigation, *I. S. F. Jones*, Cambridge University Press, 2011. pp. xii + 170. ISBN: 978-0-521-51602-0 (hbk) US\$85.00; 978-0-521-73159-1 (pbk) US\$40.00.

Most books concerning climate change have been written by climate change scientists so this book is a refreshing change of mindset. This reviewer wears two hats since he is a physicist who is also a registered engineer with long interests and concerns about global warming. This book focuses on exploring potential methods for mitigating greenhouse gases with the emphasis on carbon dioxide. The book is a compilation of the material developed for a graduate course on this subject that the author has taught for a number of years. It is appropriate to assess this book from this perspective.

Chapter 1 is intended to provide the reader with a summary of the basic concepts concerning greenhouse gases and global warming and the role of the future greenhouse gas production and provides the student with some background material on this subject. This subject is not well organized and unlikely to convince the reader as to either the reality or seriousness of this problem. It does not include graphs for the following important data: (i.) a graph of the atmospheric concentration of carbon dioxide measurements since 1957 when the first systematic precision measurements started, (ii.) a graph of the estimated global temperatures since 1000 AD to the present that includes the data point errors, (iii.) graphs of the average annual temperature for the globe and the northern and southern hemispheres since 1900, and (iv) a graph of the annual global consumption of fossil fuels since 1900. These four graphs provide an excellent visual summary of the data necessary to understand why global warming is such a serious problem. Chapter 2 provides an overview of energy efficiency concepts and the potential role that good engineering design can play in limiting greenhouse emissions. Chapter 3 discusses zero emission technologies are summarized fairly and the concept of lifecycle accounting is introduced. This very important concept is rarely discussed and deserves a centre piece role in any energy policy since the emissions associated with the construction of energy generating and extraction facilities can be a significant component in the total greenhouse gas emission assessment.

The author is very knowledgeable about sequestration of carbon dioxide in the oceans and in land sinks. His discussion in Chapters 4, 5 and 6 covers all the important possible engineering methodologies as well as the associated problems. Unfortunately, the reader is left with the conclusion that the environmental problems and risks make these possible mitigation technologies unlikely candidates in the absence of carbon taxes. The recent cancellation of a proposed large scale private industry carbon dioxide sequestration project supported by the US government because of the associated costs underlines the unlikely success of this approach unless carbon taxes increase significantly.

Chapter 7 includes a discussion of adaptation strategies in the context of possible rapid climate change. This discussion includes ethical issues, intergenerational issues and topics such as food security. Although this discussion is too short to be penetrating, it is effective in forcing the reader to recognize the complexity and importance of these issues.

The book closes with a discussion of the role that carbon credits can play in offsetting the dumping of greenhouse gases into the atmosphere provided these credits are issued by governments or the United Nations. This leads to a discussion about the Kyoto agreement and its possible successors and the clean development mechanism. Chapter 8 closes the book with a rather pessimistic discussion about the costs associated with reducing greenhouse gas emissions. This economic discussion is classical as one expects from an engineer and avoids the issues related to the environmental, economic and human costs of not acting decisively to avert serious global warming.

Overall, this book has some strengths because it includes a useful collection of engineering information relevant to global warming issues and an excellent discussion about the engineering and technology necessary for greenhouse gas mitigation using land and ocean sequestration. It also has significant weaknesses because it fails to provide the reader with the basic information required to understand and appreciate the scientific principles involved in the very complex issue of global warming necessary to make a discussion of mitigation strategies successful. The role of energy conservation and the critical need to decrease greenhouse gas emissions are not discussed, On balance, I cannot recommend it for use as a textbook in a science or engineering course.

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