

Lovell, Bryan. 2010. *Challenged by Carbon: The Oil Industry and Climate Change*. Cambridge: Cambridge University Press.

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Bryan Lovell grounds his analysis of climate change, the role of the oil industry in addressing the climate challenge, and the prospects of carbon capture and storage in “messages from the rocks” (p. 87). As befits a book written by a geologist, Lovell’s at-times autobiographical account reflects his commitment to observational data, the stock-in-trade of geology’s contribution to climate science. His insider’s perspective, first as an academic geologist at the University of Edinburgh and then as an employee of British Petroleum (BP), is both the strength and weakness of *Challenged by Carbon*. The book offers new insight on the production of climate science and gives unfiltered access to oil industry dialogues. Lovell’s account remains at a narrative level, however, offering empirical detail but lacking integrative analytic insight.

Geologists (and geologic data) are the heroes of this book. Lovell likens present-day geologists to Charles Darwin, rather than Darwin’s fellow naturalist Alfred Wallace. Both are credited with discovering the theory of evolution, but history remembers Darwin since he had the geological record on his side. Similarly, Lovell argues that geologists can offer observational data that vindicate climatologists’ claims, while the latter are limited to computer modeling. In particular, Lovell points to the Palocene-Eocene Thermal Maximum (PETM), a global warming event that occurred 55 million years ago and during which a large volume of carbon dioxide (CO₂) was released into the atmosphere, as offering insight on the climate system’s likely response to present-day increases in carbon emissions. During PETM, deep-ocean and high latitude temperatures are estimated to have increased by 5–7 degrees Celsius, and the planet was marked by rapid environmental change.

Lovell presents this geological evidence as resonant to the oil industry in general, and particularly to BP, the oil company that in 1997 publicly broke with its more skeptical peers in the United States and advocated for a precautionary approach to climate change. The battle between BP and ExxonMobil, reproduced via the transcript of a 2003 debate between Frank Sprow and Greg Coleman, senior representatives on environmental matters from ExxonMobil and BP, respectively, is a launching pad for exploring the responsibility of oil companies in the face of climate change. Lovell traces the contours of disagreement between BP and ExxonMobil, but usefully points out that such non-state oil companies control a small fraction of global reserves compared to state oil companies. Moreover, oil company operations account for only 10 percent of the carbon emissions associated with the oil industry. The real question of responsibility lies in the other 90 percent of carbon emissions embodied in the

oil industry's final products. Lovell's solution to this problem is carbon capture and storage (CCS).

CCS is presented as the most promising of Stephen Pacala and Robert Socolow's seven technology wedges available to stabilize carbon emissions over the next fifty years.¹ The second half of *Challenged by Carbon* reads like an effort to convince his geology peers in the oil industry, as well as a larger audience, of the viability of CCS as both a transition technology and part of the long-term solution to climate change. Lovell argues that the oil industry is well positioned to lead CCS efforts. Oil companies have experience injecting CO₂ into fields to enhance recovery of residual oil. CCS technology, therefore, is familiar, and some CCS infrastructure is already in place. Moreover, the expertise of petroleum geologists, who study the interactions between fluids and surrounding rock, is directly relevant to exploring CCS potential, not just in existing oil and gas fields but also in saline aquifers, which would considerably expand the scope of CCS. Finally, CCS offers a future for the oil industry, looking past peak oil. Oil companies could be involved in the compression and dehydration of CO₂, its transport by pipeline, subsurface injection, and ongoing monitoring of safe storage.

Unfortunately, the potential of CCS has not been realized in practice. Various commercial and non-commercial CCS projects have been proposed, initiated, canceled, abandoned, and/or extended in Algeria, China, Norway, the UK, and the US, without obvious rhyme or reason. Lovell's promise of insider information falls short in his analysis of the prospects of CCS. He contends that the economics are viable only with a carbon price of US\$50 per tonne, but he does not explain why some CCS projects advance while others stall. Nor does he offer insight into the strategic thinking of oil companies or the internal dynamics governing investments in CCS. Lovell's analysis of the regulatory context of CCS also lacks specificity and historical perspective. He argues that governments should lead in creating the framework in which CCS becomes of commercial interest to the oil industry, but he offers no advice about the specific forms of government support that would advance CCS. Moreover, he argues that oil companies are in a unique position of asking for regulation in the case of CCS, misunderstanding the central role of government support in the history of oil development. Oil industry profits have always depended on favorable regulation, ranging from offshore leasing arrangements to depletion allowances.²

In sum, *Challenged by Carbon* offers a fascinating anecdotal narrative of the role of geology and geologists in the climate challenge. Geologists working for the fossil fuel industry have liberated the carbon that is contributing to climate change. The geological record offers insight on the climate system's likely response to present-day increases in CO₂ concentrations in the atmosphere.

1. Pacala and Socolow 2004.

2. Freudenburg and Gramling 2011.

Finally, geological expertise is at the heart of implementing CCS as part of the solution to the climate change problem. Lovell is a compelling advocate for the relevance of geological knowledge but offers little additional insight on the politics of oil and climate change.

References

- Freudenburg, William, and Robert Gramling. 2011. *Blowout in the Gulf*. Cambridge, MA: MIT Press.
- Pacala, Stephen, and Robert Socolow. 2004. Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies. *Science* 305: 968–972.