

Introduction

IAN HAVERCROFT, RICHARD MACRORY AND RICHARD STEWART

THE CAPTURE AND long-term storage of carbon dioxide from power stations and other major emitters is increasingly seen as one of the core technologies that will be needed to handle the challenge of climate change. Developing an effective regulatory regime for any new technology is not easy. An unduly precautionary approach may unwittingly stifle innovation, and there are pressing time-scales. But the potential impact on the environment and other interests still needs to be addressed and it is clear that a sound legal framework will be one of the preconditions for successfully harnessing the benefits of carbon capture and securing the investment needed for its wider implementation.

Governments and policy-makers in many jurisdictions are now addressing legal questions raised by carbon capture and storage. This is not the type of issue that can be handled by a single, harmonising international treaty, and differing national and regional legal traditions will inevitably give rise to distinct approaches in the design of regulatory structures. Yet, given the global impact of climate change, it is encouraging to see the growing recognition of the value of international dialogue and the exchange of ideas concerning the regulation of carbon capture and storage; and innovative bodies such as the International CCS Regulatory Network of the International Energy Agency—open to government regulators, industry and non-governmental organisations—are providing an important forum for tackling the subject in a sophisticated manner.

This book is a contribution to that debate, and brings together some of the leading world experts in carbon capture and storage to reflect on developments to date in law and policy, and consider what will be needed in the future.

Effective regulation in this area has to be developed against an understanding of the science and technology involved, and chapters one and two provide this context. Stuart Haszeldine of the University of Edinburgh focuses on the geology of long-term storage, the capacity that might be available, and—a key issue from a lawyer's perspective—the prospects of leakage. Norman Shilling of General Electric provides a technical analysis, and points out that the core elements of CCS—capture, transport, and storage—are being done today, though not all together and at full-scale. But in his view, the greatest challenge facing CCS is not technology, but the uncertainty of where policy and regulation is going, and that 'adaptive, flexible, and performance-based' regulatory approaches will be required.

Chapters three and four examine the regulatory frameworks that have been developed to date in a number of key jurisdictions. Henry Krupa of Lang Michener

considers the position in Canada, which possesses the second largest established crude oil reserves in the world. Aside from cross-boundary pipelines, CCS regulation remains largely within the jurisdiction of the Provinces rather than the Federal government, accounting for differing legal approaches that have developed. The nature of sub-surface property and mineral rights—where Canadian law produces an almost diametrically opposed solution to the United States—is a critical element. Krupa concludes that the existing regulatory frameworks in Canada are not so inadequate as to hinder CCS technology, but that the question of long-term liability has yet to be adequately addressed. Les LoBaugh of Brownstein Hyatt Farber Schreck considers the development of CCS regulation in the United States, with a particular focus on California. California has often been a first mover in environmental legislation within the United States and might yet do so in this field. Yet as LoBaugh demonstrates, at present there remain important questions that have yet to be answered definitively, for example the ownership of sub-surface pore space and the legal liability from migration of stored CO₂ into adjacent property. Robert Nordhaus of Van Ness Feldman is also concerned with US law, but focuses more on the design of regimes appropriate for CCS under a range of regulatory options including conventional regulatory control, a cap-and-trade programme, a carbon tax, or a combination of all three. Finally in this part, Martina Doppelhammer of the European Commission considers the development and content of the 2009 European Community Directive of the geological storage of carbon dioxide. The Directive is one of the most developed examples to date of bespoke CCS legislation, particularly in the way it handles site selection and approval, long-term liabilities, and the relation of CCS with an emissions trading system. Financial assistance will be a key element in securing the building of demonstration plants, and her chapter goes on to analyse the European Union's NER 300 process, a powerful and globally unprecedented mechanism for co-financing CCS demonstration projects.

CCS technology involves the transportation of CO₂ under pressure through pipes from capture to storage, often for long distances, and possibly crossing borders and international boundaries. Chapters seven to nine therefore consider distinctive legal questions that may arise in this context. Martha Roggenkamp and Avelien Haan-Kamminga of the University of Groningen note that the EC Directive says little about legal issues concerning transportation, but argue that CO₂ pipelines should be governed by rules applicable to oil and gas transportation by treating them as a form of reverse upstream pipeline. The Directive does recognise that pipeline owners may hold a monopoly position, and that a regime for third-party access must be established. The authors consider the systems for third-party access that already exist in the energy field, and consider the lessons to be learnt for CO₂ pipelines. Hans Christian Bugge of the University of Oslo focuses on public international law, and how the climate change regime will allocate liabilities for leakages of CO₂ where transboundary pipelines or transport by ship is concerned. He shows how the principles of international law do not necessarily provide clear answers as to responsibility, and argues that while this could be left for bilateral negotiation between parties, it would be preferable to develop a uniform system for accounting post Kyoto. Lawrence J Wolfe of Holland and Hart examines the legal position in the United States, and notes that to date the Federal Government has declined to assume responsibility for regulating interstate

CO₂ pipelines, meaning that operators must deal primarily with State and local governments. Nevertheless, in the context of enhanced oil recovery, there is already a decade's worth of experience of cross-border transportation of CO₂ from the United States to Canada, and this may provide valuable practical lessons.

Chapters ten to thirteen focus on the long-term storage of CO₂, and the legal issues raised. Chiara Armeni of University College London considers the disposal of CO₂ under the sea-bed, and the adaptation of international marine legislation to accommodate the technology. The core international treaty, the London Convention and its Protocol, were amended in a remarkably short time, though not without political controversy. Securing the necessary number of parties to agree amendments to the OSPAR Convention has proved more problematic. Meredith Gibbs of Blake Dawson makes a detailed analysis of legal developments in Australia, where specific CCS legislation has been developed at both Commonwealth and State level. The country has some of the most extensive laws on CCS in the world, yet the differing positions currently being taken on long-term liabilities may prove a real hindrance to investment in the technology. Chris Clarke of University College London examines the differing models of long-term liability that are being developed, with a particular emphasis on the European Union. Finally, J Jared Snyder of the New York State Department of Environmental Conservation examines the approaches to CCS regulation being taken by a number of States in the United States, and reflects on the experience in New York. He argues that for CCS to thrive in the United States a federal approach, particularly on the issue of long-term stewardship, must be developed.

Dedicated legislation on CCS has largely been developed in Australia, the United States and Canada, and the European Union. But it is clear that at some stage major emerging countries with an intensifying carbon economy are likely to need to introduce CCS technology. The next two chapters therefore look at the current position in India and China. Lavanya Rajamani of the Centre for Policy Research, New Delhi seeks to explain the roots of India's current reluctance to embrace CCS by placing it in the context of that country's policies on climate change. India is engaged in various CCS research and development initiatives, but without significant financial and technological incentives from the international community it seems unlikely that CCS will play a major role in India in the near future. Qiuyan Zhao of Beijing Normal University considers the current state of play in China, now the world's largest emitter of carbon dioxide. Although a number of demonstration and research projects are underway, at present China has no legislation specifically addressing CCS activities, and Qiuyan Zhao addresses a number of issues, including property ownership, liability and public engagement, and how these are likely to be resolved with the national legal context. Many of the authors acknowledge the importance of financial arrangements if CCS technology is going to be effectively developed at a commercial level. This is particularly so for emerging and developing economies, and in chapter sixteen Paul Zakkour of Carbon Counts examines the key support mechanisms available under the Kyoto Protocol—international emissions trading, joint implementation, and the Clean Development Mechanism. He highlights the difficulties that have occurred over the past five years, and considers that alternative cooperation frameworks may prove a more fruitful avenue to follow.

Almost 30 years ago, the Lord Flowers, a distinguished scientist and chairman of the UK Royal Commission on Environmental Pollution, noted that, ‘there comes a time in the development of any new technological enterprise when its acceptability by the public at large may be its dominating feature’. This was written in the context of civil nuclear power,¹ but carbon capture and storage may well raise equal public sensitivities, and a number of demonstration storage projects in Europe have already been abandoned or delayed because of local public concern. The final part therefore examines this question. Peta Ashworth and Craig Cormick of the Australian Commonwealth Scientific and Research Organisation examine key issues concerning public participation and risk perception, and identify analogues between nanotechnology and Carbon Capture and Storage. They go on to consider how regulatory frameworks for carbon capture and storage in the State of Victoria have handled the involvement of the public, and argue that project flexibility and transparency of process will be crucial if carbon capture and storage is to be successfully deployed at the scale needed to tackle climate change. Sarah Forbes and colleagues from the World Resources Institute examine key legal frameworks traditionally used for public engagement, and consider that these may complicate the situation even where applied in good faith. They propose a set of guidelines to develop best practice in the context of carbon capture and storage, and which can augment more familiar approaches. Finally, in this part, Meyric Lewis and Ned Westaway of Francis Taylor Building, London examine the current procedures in the United Kingdom where new planning legislation designed to speed up decision-making on major infrastructure projects may compromise long-established regulatory approaches towards public participation. There may be an inevitable tension between the urgent time-scales required to implement carbon capture and storage, and the need to guarantee a fair and participative role for the public in the planning process.

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¹ R Macrory (ed) *Commercial Nuclear Power – Legal and Constitutional Issues* Imperial College, Centre for Environmental Technology, 1982.