

## TABLE OF CONTENTS

FOREWORD.....	5
EXECUTIVE SUMMARY AND POLICY RECOMMENDATIONS.....	9
INTRODUCTION.....	11
THE NEED FOR COAL.....	15
THE PATHWAY TO CARBON DIOXIDE CAPTURE AND STORAGE (CCS).....	23
• Coal upgrading.....	26
• Efficiency improvements at existing power plants.....	26
• Advanced technologies.....	26
• Near-zero emission technologies.....	28
• CO <sub>2</sub> transport and storage.....	30
COMMERCIAL AND POLICY DRIVERS FOR CLEAN COAL TECHNOLOGIES.....	31
• Overview and CIAB members' discussion.....	31
• Establishing a clear, balanced legal framework for CO <sub>2</sub> transport and storage.....	35
• Promoting public understanding and acceptance of CO <sub>2</sub> capture and storage (CCS).....	36
• Funding CCS research, development and deployment.....	36
• Establishing tax incentives and loan guarantees for CCS R,D&D and commercial projects.....	38
• Supporting commercial opportunities for use of CO <sub>2</sub> for enhanced oil recovery (EOR) and enhanced coalbed methane production as a means of developing CCS technology and infrastructure.....	39
• Promoting commercial opportunities in transport fuel and chemical production from coal as a means of developing CCS technology and infrastructure.....	41
• Supporting market-based responses, such as GHG cap-and-trade systems, to speed the ultimate commercialisation of CCS.....	42
• Encouraging mandatory price supports and feed-in tariffs based on the avoided emissions from systems with CCS.....	43
• Promoting participation of emerging economies in CCS development and deployment.....	44
REFERENCES.....	47
ACKNOWLEDGEMENTS.....	50

## List of figures

Figure 1.	Business-as-usual emissions and stabilisation trajectories for 450-550 ppm atmospheric concentration of CO <sub>2</sub> e showing “mitigation gaps” for 2050 .....	12
Figure 2.	Energy demand changes under two scenarios for 2030.....	15
Figure 3.	Global CO <sub>2</sub> emissions from fossil fuel combustion, 1971-2005 .....	17
Figure 4.	Global hard coal consumption by major region, 1980-2006.....	18
Figure 5.	Historical relationship of per capita GDP and energy demand growth.....	19
Figure 6.	Trends in European import prices for steam coal, pipeline natural gas and high sulphur fuel oil (HSFO), 1992-2007.....	20
Figure 7.	Reductions in emissions of CO <sub>2</sub> through clean coal technological innovation.....	24
Figure 8.	Cumulative CO <sub>2</sub> emission reduction potential in the EU from efficiency improvements at existing power plants of all ages.....	27
Figure 9.	Development phases for power plant efficiencies.....	27
Figure 10.	Overview of main technology options for CO <sub>2</sub> capture from power plants.....	29
Figure 11.	Roles of innovation-chain actors .....	32
Figure 12.	R&D expenditure in IEA countries and oil price 1974-2003 .....	37
Figure 13.	Operating CO <sub>2</sub> enhanced oil recovery (EOR) projects in the USA.....	40

## List of tables

Table 1.	Comparison of world energy consumption growth rates by fuel to 2015 (average annual % growth).....	16
Table 2.	IEA estimates of CCS costs for current and prospective generating technologies .....	25
Table 3.	Aggregate percentage change in major public sector energy R&D programme areas of eleven IEA member countries.....	38