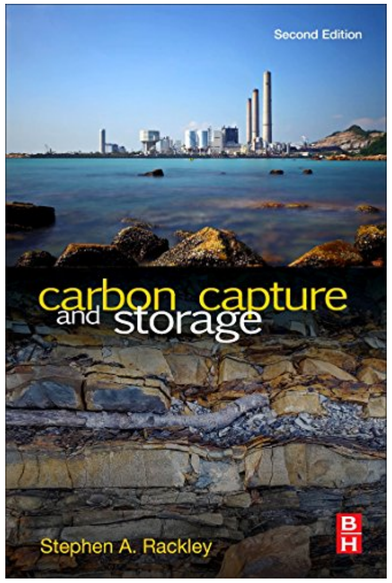

[Book] Carbon Capture And Storage

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Carbon Capture and Storage-Stephen A. Rackley 2017-09-05 Carbon Capture and Storage, Second Edition, provides a thorough, non-specialist introduction to technologies aimed at reducing greenhouse gas emissions from burning fossil fuels during power generation and other energy-intensive industrial processes, such as steelmaking. Extensively revised and updated, this second edition provides detailed coverage of key carbon dioxide capture methods along with an examination of the most promising techniques for carbon storage. The book opens with an introductory section that provides background regarding the need to reduce greenhouse gas emissions, an overview of carbon capture and storage (CCS) technologies, and a primer in the fundamentals of power generation. The next chapters focus on key carbon capture technologies, including absorption, adsorption, and membrane-based systems, addressing their applications in both the power and non-power sectors. New for the second edition, a dedicated section on geological storage of carbon dioxide follows, with chapters addressing the relevant features, events, and processes (FEP) associated with this scenario. Non-geological storage methods such as ocean storage and storage in terrestrial ecosystems are the subject of the final group of chapters. A chapter on carbon dioxide transportation is also included. This extensively revised and expanded second edition will be a valuable resource for power plant engineers, chemical engineers, geological engineers, environmental engineers, and industrial engineers seeking a concise, yet authoritative one-volume overview of this field. Researchers, consultants, and policy makers entering this discipline also will benefit from this reference. Provides all-inclusive and authoritative coverage of the major technologies under consideration for carbon capture and storage Presents information in an approachable format, for those with a scientific or engineering background, as well as non-specialists Includes a new Part III dedicated to geological storage of carbon dioxide, covering this topic in much more depth (9 chapters compared to 1 in the first edition) Features revisions and updates to all chapters Includes new sections or expanded content on: chemical looping/calcium looping; life-cycle GHG assessment of CCS technologies; non-power industries (e.g. including pulp/paper alongside ones already covered); carbon negative technologies (e.g. BECCS); gas-fired power plants; biomass and waste co-firing; and hydrate-based capture

Carbon Capture and Storage-Michael Gebert Faure 2017-04-14 A theoretical and practical analysis of the complex liability issues raised by carbon capture and storage systems for containing greenhouse gases.

Carbon Capture and Storage-Rao Y. Surampalli 2014-12

Carbon Dioxide Capture and Storage-Intergovernmental Panel on Climate Change. Working Group III. 2005-12-19 IPCC Report on sources, capture, transport, and storage of CO2, for researchers, policy-makers and engineers.

Carbon Capture and Storage-José Carlos Magalhães Pires 2019-08-23 Climate change is one of the main threats to modern society. This phenomenon is associated with an increase in greenhouse gas (GHGs, mainly carbon dioxide—CO2) emissions due to anthropogenic activities. The main causes are the burning of fossil fuels and land use change (deforestation). Climate change impacts are associated with risks to basic needs (health, food security, and clean water), as well as risks to development (jobs, economic growth, and the cost of living). The processes involving CO2 capture and storage are gaining attention in the scientific community as an alternative for decreasing CO2 emissions, reducing its concentration in ambient air. The carbon capture and storage (CCS) methodologies comprise three steps: CO2 capture, CO2 transportation, and CO2 storage. Despite the high research activity within this topic, several technological, economic, and environmental issues as well as safety problems remain to be solved, such as the following needs: increase of CO2 capture efficiency, reduction of process costs, and verification of the environmental sustainability of CO2 storage.

Carbon Capture-Howard J. Herzog 2018-09-11 A concise overview of carbon dioxide capture and storage (CCS), a promising but overlooked climate change mitigation pathway. The burning of fossil fuels releases carbon dioxide (CO2), and these CO2 emissions are a major driver of climate change. Carbon capture offers a path to climate change mitigation that has received relatively little attention. In this volume in the MIT Press Essential Knowledge series, Howard Herzog offers a concise guide to carbon capture, covering basic information as well as the larger context of climate technology and policy. Carbon capture, or carbon dioxide capture and storage (CCS), refers to a suite of technologies that reduce CO2 emissions by “capturing” CO2 before it is released into the atmosphere and then transporting it to where it will be stored or used. It is the only climate change mitigation technique that deals directly with fossil fuels rather than providing alternatives to them. Herzog, a pioneer in carbon capture research, begins by discussing the fundamentals of climate change and how carbon capture can be one of the solutions. He explains capture and storage technologies, including chemical scrubbing and the injection of CO2 deep underground. He reports on current efforts to deploy CCS at factories and power plants and attempts to capture CO2 from the air itself. Finally, he explores the policies and politics in play around CCS and argues for elevating carbon capture in the policy agenda.

Carbon Capture and Storage-King Abdullah Petroleum Studies 2011-11-02 This book focuses on issues related to a suite of technologies known asCarbon Capture and Storage (CCS), which can be used to capture and store underground large amounts of industrial CO2 emissions. It addresses how CCS should work, as well as where, why, and how these technologies should be deployed, emphasizing the gaps to be filled in terms o

Carbon Capture and Storage-Amitava Bandyopadhyay 2014-04-10 Carbon capture and storage (CCS) refers to a set of technologies and methods for the mitigation, remediation, and storage of industrial CO2 emissions, the most imminent and virile of the greenhouse gases (GHG). The book addresses the methods and technologies currently being applied, developed, and most in need of further research. The book: • Discusses methods of carbon capture in industrial settings • Presents biological and geological approaches to carbon sequestration • Introduces ionic liquids as a method of carbon capture • Introduces new approaches to capturing CO2 from ambient air

Carbon Capture, Storage and Use-Wilhelm Kuckshinrichs 2014-11-17 Carbon Capture and Storage technologies (CCS) are moving from experiment toward commercial applications at a rapid pace, driven by urgent demand for carbon mitigation strategies. This book examines the potential role of CCS from four perspectives: technology development, economic competitiveness, environmental and safety impacts, and social acceptance. IEK-STE of Forschungszentrum Juelich presents this interdisciplinary study on CCS, based on methods of Integrated Technology Assessment. Following an introductory chapter by editor Wilhelm Kuckshinrichs, Part I of the book surveys the status of carbon capture technologies, and assesses the potential for research and development of applications that are useful at scales required for meaningful mitigation. Transportation, Utilization and Environmental Aspects of CO2 receive chapter-length treatments, and the section concludes with an examination of safe geological storage of CO2 based on the example of the Ketzin pilot site, not far from Berlin. Part II covers Economic and Societal Perspectives. The first chapter discusses the use of CCS in the energy sector, analyzing costs associated with electricity generation and CO2 mitigation on the basis of technology-specific cost and process parameters, along with a merit-order illustration of the possible implications of CCS facilities for energy costs. Later chapters outline the costs of CCS application in energy- and CO2-intensive industries; analyze system characteristics of CCS infrastructures, showing that the infrastructure cost function depends on the ratio of fixed to variable costs, as well as on the spatial distribution of CO2 sources and storage facilities; interpret cross-sector carbon mitigation strategies and their impacts on the energy and CO2 balance; and discuss awareness and knowledge of CCS, attitudes towards it, and how the risks and benefits of CCS are perceived. Part III discusses the Framework for Energy and Climate Policy, with chapters on acceptance and adoption of CCS policy in Germany, and the EU, and an assessment of international cooperation in support of CCS. The final chapter summarizes the central arguments, discusses the potential role of carbon capture and utilization as part of a German transformation strategy, and extrapolates the findings to European and international contexts.

Recent Advances in Carbon Capture and Storage-Yongseung Yun 2017-03-08 Carbon capture and storage (CCS) has been considered as a practical way in sequestering the huge anthropogenic CO2 amount with a reasonable cost until a more pragmatic solution appears. The CCS can work as a bridge before fulfilling the no-CO2 era of the future by applying to large-scale CO2 emitting facilities. But CCS appears to lose some passion by the lack of progress in technical developments and in commercial success stories other than EOR. This is the time to go back to basics, starting from finding a solution in small steps. The CCS technology desperately needs far newer ideas and breakthroughs that can overcome earlier attempts through improving, modifying, and switching the known principles. This book tries to give some insight into developing an urgently needed technical breakthrough through the recent advances in CCS research, in addition to the available small steps like soil carbon sequestration. This book provides the fundamental and practical information for researchers and graduate students who want to review the current technical status and to bring in new ideas to the conventional CCS technologies.

The Social Dynamics of Carbon Capture and Storage-Nils Markusson 2012-05-04 Carbon capture and storage (CCS) has emerged rapidly as a crucial technological option for decarbonising electricity supply and mitigating climate change. Great hopes are being pinned on this new technology but it is also facing growing scepticism and criticism. This book is the first to bring together the full range of social and policy issues surrounding CCS shedding new light on this potentially vital technology and its future. The book covers many crucial topics including the roles and positions that different publics, NGOs, industry, political parties and media are taking up; the way CCS is organised, supported and regulated; how CCS is being debated and judged; how innovation, demonstration and learning are occurring and being conceptualised and promoted; and the role of CCS in the transition to a low carbon energy future. The authors draw on a variety of approaches, concepts, methods and themes and provide a new understanding of innovation in the energy and climate change fields. It tackles the many issues in a way that speaks to those concerned not only to understand these developments, but to those who are involved in the scientific and technological work itself, as well as those charged with evaluating and making decisions relevant to the future of the technology.

Developments and Innovation in Carbon Dioxide (CO2) Capture and Storage Technology-M. Mercedes Maroto-Valer 2010-07-13 Carbon dioxide (CO2) capture and storage (CCS) is the one advanced technology that conventional power generation cannot do without. CCS technology reduces the carbon footprint of power plants by capturing, and storing the CO2 emissions from burning fossil-fuels and biomass. This volume provides a comprehensive reference on the state of the art research, development and demonstration of carbon storage and utilisation, covering all the storage options and their environmental impacts. It critically reviews geological, terrestrial and ocean sequestration, including enhanced oil and gas recovery, as well as other advanced concepts such as industrial utilisation, mineral carbonation, biofixation and photocatalytic reduction. Foreword written by Lord Oxburgh, Climate Science Peer Comprehensively examines the different methods of storage of carbon dioxide (CO2) and the various concepts for utilisation Reviews geological sequestration of CO2, including coverage of reservoir sealing and monitoring and modelling techniques used to verify geological sequestration of CO2

Bioenergy with Carbon Capture and Storage-Jose Carlos Magalhaes Pires 2019-08-07 Bioenergy with Carbon Capture and Storage: Using Natural Resources for Sustainable Development presents the technologies associated with bioenergy and CCS and its applicability as an emissions reduction tool. The book explores existing climate policies and current carbon capture and storage technologies. Sections offer an overview of several routes to use biomass and produce bioenergy through processes with low or even negative CO2 emissions. Associated technology and the results of recent research studies to improve the sustainability of the processes are described, pointing out future trends and needs. This book can be used by bioenergy engineering researchers in industry and academia and by professionals and researchers in carbon capture and storage. Presents the most recent technologies in use and future trends in research and policy Examines the bioenergy production and biomass processing value chains, including biorefining, negative emission technologies and the use of microalgae Includes techno-economic analysis and sustainability assessment of the technologies discussed, as well as an overview of the latest research results

Carbon Capture, Storage and, Utilization-Malti Goel 2014-11-14 Carbon capture and storage (CCS) is among the advanced energy technologies suggested to make the conventional fossil fuel sources environmentally sustainable. It is of particular importance to coal-based economies. Carbon Capture, Storage, and Utilization deals at length with the various aspects of carbon dioxide capture, its utilization and takes a closer look at the earth processes in carbon dioxide storage. It discusses potential of Carbon Capture, Storage, and Utilization as innovative energy technology towards a sustainable energy future. Various techniques of carbon dioxide recovery from power plants by physical, chemical, and biological means as well as challenges and prospects in biomimetic carbon sequestration are described. Carbon fixation potential in coal mines and in saline aquifers is also discussed.

Carbon Capture and its Storage-Clair Gough 2016-12-05 Climate change is arguably the most important environmental issue that the world currently faces. Carbon Capture and Storage (CCS) offers the possibility of significant reductions in the volume of CO2 released into the atmosphere in the near to medium term. As a fairly new technology that has not been widely adopted, there remain some uncertainties related to both viability and desirability. This book discusses the key issues with regard to technical and legal feasibility, economic viability and public and stakeholder perceptions. It also provides recommendations for policy and future research.

Carbon Capture and Storage-Ian Havercroft 2018-02-08 Carbon Capture and Storage (CCS) is increasingly viewed as one of the most significant ways of dealing with greenhouse gas emissions. Critical to realising its potential will be the design of effective legal regimes at national and international level that can handle the challenges raised but without stifling a new technology of potential great public benefit. These include: long-term liability for storage; regulation of transport; the treatment of stored carbon under emissions trading regimes; issues of property ownership; and, increasingly, the sensitivities of handling the public engagement and perception. Following its publication in 2011, Carbon Capture and Storage quickly became required reading for all those interested in, or engaged by, the need to implement regulatory approaches to CCS. The intervening years have seen significant developments globally. Earlier legislative models are now in force, providing important lessons for future legal design. Despite these developments, the growth of the technology has been slower in some jurisdictions than others. This timely new edition will update and critically assess these updates and provide context for the development of CCS in 2018 and beyond.

Fundamentals of Carbon Capture and Storage Technology-Tom Nicholls 2007 Carbon capture and storage (CCS) is a technological process consisting of, firstly, the separation of carbon dioxide (CO2) from industrial and energy-related sources such as power stations and chemical plants, secondly, its transport to a storage location and, lastly, its long-term underground isolation from the atmosphere. This book contains a series of articles by experts from the worlds of science, policy and industry (including BP). They cover technology, policy and regulatory issues and the market opportunities for CCS. It sets out to present a balanced but compelling case for why CCS is the bridging technology to address climate change and enhance fossil fuel sustainability.

Negative Emissions Technologies and Reliable Sequestration-National Academies of Sciences, Engineering, and Medicine 2019-04-08 To achieve goals for climate and economic growth, "negative emissions technologies" (NETs) that remove and sequester carbon dioxide from the air will need to play a significant role in mitigating climate change. Unlike carbon capture and storage technologies that remove carbon dioxide emissions directly from large point sources such as coal power plants, NETs remove carbon dioxide directly from the atmosphere or enhance natural carbon sinks. Storing the carbon dioxide from NETs has the same impact on the atmosphere and climate as simultaneously preventing an equal amount of carbon dioxide from being emitted. Recent analyses found that deploying NETs may be less expensive and less disruptive than reducing some emissions, such as a substantial portion of agricultural and land-use emissions and some transportation emissions. In 2015, the National Academies published Climate Intervention: Carbon Dioxide Removal and Reliable Sequestration, which described and initially assessed NETs and sequestration technologies. This report acknowledged the relative paucity of research on NETs and recommended development of a research agenda that covers all aspects of NETs from fundamental science to full-scale deployment. To address this need, Negative Emissions Technologies and Reliable Sequestration: A Research Agenda assesses the benefits, risks, and "sustainable scale potential" for NETs and sequestration. This report also defines the essential components of a research and development program, including its estimated costs and potential impact.

The Hydrogen Economy-National Academy of Engineering 2004-09-05 The announcement of a hydrogen fuel initiative in the Presidentâ€™s 2003 State of the Union speech substantially increased interest in the potential for hydrogen to play a major role in the nationâ€™s long-term energy future. Prior to that event, DOE asked the National Research Council to examine key technical issues about the hydrogen economy to assist in the development of its hydrogen R&D program. Included in the assessment were the current state of technology; future cost estimates; CO2 emissions; distribution, storage, and end use considerations; and the DOE RD&D program. The report provides an assessment of hydrogen as a fuel in the nationâ€™s future energy economy and describes a number of important challenges that must be overcome if it is to make a major energy contribution. Topics covered include the hydrogen end-use technologies, transportation, hydrogen production technologies, and transition issues for hydrogen in vehicles.

Nanomaterials for CO2 Capture, Storage, Conversion and Utilization-Phuong Nguyen Tri 2021-04-15 The gradual increase of population and the consequential rise in the energy demands in recent years have led to the widespread use of fossil fuels. CO2 transformation by various processes is considered as a promising alternative technology. This book sets out the fundaments of how nanomaterials are being used for this purpose. Nanomaterials for CO2 Capture, Storage, Conversion and Utilization summarizes the research, development and innovations in the capture, storage, transformation and utilization of CO2 into useful products and raw chemicals for industry. This is achieved by using advanced processes such as CO2 reforming, bi-reforming and tri-reforming of hydrocarbons or biomass derivatives; homogeneous and heterogeneous hydrogenation; photochemical reduction; photoelectrochemical reduction; electrochemical reduction; biochemical reduction; supercritical CO2 technology; advanced catalyst synthesis for CO2 conversion; organic carbonates for polymers synthesis from CO2, and CO2 capture and sequestration. The systematic and updated reviews on the mentioned sectors, especially on the use of nanotechnology for the transformation of CO2 is scarce in the literature. Thus, the book addresses the recent knowledge gaps and potential solutions of the storage, utilization and transformation of CO2 as well as its promising applications. This is an important reference source for materials scientists, engineers and energy scientists who want to understand how nanotechnology is helping us to solve some of the world’s major energy problems. Shows how nanomaterials are being used to create more efficient CO2 capture, storage and conversation systems Outlines the major nanomaterials-based techniques to create such systems Assesses the major challenges in using nanomaterials for energy capture, storage and conversion

Biomass Energy with Carbon Capture and Storage (BECCS)-Clair Gough 2018-09-24 An essential resource for understanding the potential role for biomass energy with carbon capture and storage in addressing climate change Biomass Energy with Carbon Capture and Storage (BECCS) offers a comprehensive review of the characteristics of BECCS technologies in relation to its various applications. The authors — a team of expert professionals — bring together in one volume the technical, scientific, social, economic and governance issues relating to the potential deployment of BECCS as a key approach to climate change mitigation. The text contains information on the current and future opportunities and constraints for biomass energy, explores the technologies involved in BECCS systems and the performance characteristics of a variety of technical systems. In addition, the text includes an examination of the role of BECCS in climate change mitigation, carbon accounting across the supply chain and policy frameworks. The authors also offer a review of the social and ethical aspects as well as the costs and economics of BECCS. This important text: Reveals the role BECCS could play in the transition to a low-carbon economy Discusses the wide variety of technical and non-technical constraints of BECCS Presents the basics of biomass energy systems Reviews the technical and engineering issues pertinent to BECCS Explores the societal implications of BECCS systems Written for academics and research professionals, Biomass Energy with Carbon Capture and Storage (BECCS) brings together in one volume the issues surrounding BECCS in an accessible and authoritative manner.

Advances in Carbon Capture-Mohammad Reza Rahimpour 2020-08-21 Advances in Carbon Capture reviews major implementations of CO2 capture, including absorption, adsorption, permeation and biological techniques. For each approach, key benefits and drawbacks of separation methods and technologies, perspectives on CO2 reuse and conversion, and pathways for future CO2 capture research are explored in depth. The work presents a comprehensive comparison of capture technologies. In addition, the alternatives for CO2 separation from various feeds are investigated based on process economics, flexibility, industrial aspects, purification level and environmental viewpoints. Explores key CO2 separation and compare technologies in terms of provable advantages and limitations Analyzes all critical CO2 capture methods in tandem with related technologies Introduces a panorama of various applications of CO2 capture

Carbon Capture, Utilization and Sequestration-Ramesh K. Agarwal 2018-09-12 This book is divided in two sections. Several chapters in the first section provide a state-of-the-art review of various carbon sinks for CO2 sequestration such as soil and oceans. Other chapters discuss the carbon sequestration achieved by storage in kerogen nanopores, CO2 miscible flooding and generation of energy efficient solvents for postcombustion CO2 capture. The chapters in the second section focus on monitoring and tracking of CO2 migration in various types of storage sites, as well as important physical parameters relevant to sequestration. Both researchers and students should find the material useful in their work.

Carbon Capture-Ronald E. Hester 2010 Reports on methods of capturing and storing CO2 from major sources to reduce the levels emitted to the atmosphere by human activities.

Carbon Capture-Jennifer Wilcox 2012-03-28 This book approaches the energy science sub-field carbon capture with an interdisciplinary discussion based upon fundamental chemical concepts ranging from thermodynamics, combustion, kinetics, mass transfer, material properties, and the relationship between the chemistry and process of carbon capture technologies. Energy science itself is a broad field that spans many disciplines -- policy, mathematics, physical chemistry, chemical engineering, geology, materials science and mineralogy -- and the author has selected the material, as well as end-of-chapter problems and policy discussions, that provide the necessary tools to interested students.

Geological Storage of Carbon Dioxide (CO2)-J Gluyas 2013-11-23 Geological storage and sequestration of carbon dioxide, in saline aquifers, depleted oil and gas fields or unminable coal seams, represents one of the most important processes for reducing humankind’s emissions of greenhouse gases. Geological storage of carbon dioxide (CO2) reviews the techniques and wider implications of carbon dioxide capture and storage (CCS). Part one provides an overview of the fundamentals of the geological storage of CO2. Chapters discuss anthropogenic climate change and the role of CCS, the modelling of storage capacity, injectivity, migration and trapping of CO2, the monitoring of geological storage of CO2, and the role of pressure in CCS. Chapters in part two move on to explore the environmental, social and regulatory aspects of CCS including CO2 leakage from geological storage facilities, risk assessment of CO2 storage complexes and public engagement in projects, and the legal framework for CCS. Finally, part three focuses on a variety of different projects and includes case studies of offshore CO2 storage at Sleipner natural gas field beneath the North Sea, the CO2CRC Otway Project in Australia, on-shore CO2 storage at the Ketzin pilot site in Germany, and the K12-B CO2 injection project in the Netherlands. Geological storage of carbon dioxide (CO2) is a comprehensive resource for geoscientists and geotechnical engineers and academics and researches interested in the field. Reviews the techniques and wider implications of carbon dioxide capture and storage (CCS) An overview of the fundamentals of the geological storage of CO2 discussing the modelling of storage capacity, injectivity, migration and trapping of CO2 among other subjects Explores the environmental, social and regulatory aspects of CCS including CO2 leakage from geological storage facilities, risk assessment of CO2 storage complexes and the legal framework for CCS

Returning Carbon to Nature-Michael H. Stephenson 2013-08-14 Carbon capture and storage is one of the main carbon emissions policy issues globally, yet you may know little about it if you’re outside the academic community. As the global push to address the impact that carbon emissions has on global warming continues, awareness and knowledge of viable solutions must be communicated in layperson terms. Returning Coal and Carbon To Nature breaks across traditional barriers among history, geology, biology and climate change to address the topic from a multidisciplinary, Earth System Science approach. If you’re a policymakeror someone who influences policy, this book will explain carbon capture and storage—a relatively new concept—in easy-to-understand terms. Clearly presented charts, tables and diagrams explain critical concepts, and a range of full-color photographs will help you visualize the carbon capture and storage process and its principles. Discusses carbon capture and storage in terms easily accessible to a range of stakeholders, including policymakers worldwide and geoscientists who influence policy. The first cross-disciplinary look at the history, geology and biology of coal, and presents carbon capture and storage in the context of Earth System Science. Authored by one of the world’s foremost carbon capture and storage experts who has more than 30 years of field research experience.

Introduction to Carbon Capture and Sequestration-Berend Smit 2014-01-10 The aim of the book is to provide an understanding of the current science underpinning Carbon Capture and Sequestration (CCS) and to provide students and interested researchers with sufficient background on the basics of Chemical Engineering, Material Science, and Geology that they can understand the current state of the art of the research in the field of CCS. In addition, the book provides a comprehensive discussion of the impact of CCS on the energy landscape, society, and climate as these topics govern the success of the science being done in this field. The book is aimed at undergraduate students, graduate students, scientists, and professionals who would like to gain a broad multidisciplinary view of the research that is being carried out to solve one of greatest challenges of our generation. Contents:Energy and ElectricityThe Atmosphere and Climate ModelingThe Carbon CycleIntroduction to Carbon CaptureAbsorptionAdsorptionMembranesIntroduction to Geological SequestrationFluids and RocksLarge-Scale Geological Carbon SequestrationLand Use and Geo-EngineeringList of SymbolsCredits Readership: Students taking courses on environmental sciences and research level individuals who are interested in environmental issues related to CCS. Key Features:The first comprehensive textbook on Carbon Capture and Sequestration (CCS)A comprehensive discussion on the science of CCS and its impact on society and climateA multidisciplinary approach to CCS by the leading US research centers on CCSKeywords:Carbon Capture;Carbon Storage;Carbon Sequestration;Gas Separations

Carbon Dioxide Chemistry, Capture and Oil Recovery-Iyad Karamé 2018-08-16 Fossil fuels still need to meet the growing demand of global economic development, yet they are often considered as one of the main sources of the CO2 release in the atmosphere. CO2, which is the primary greenhouse gas (GHG), is periodically exchanged among the land surface, ocean, and atmosphere where various creatures absorb and produce it daily. However, the balanced processes of producing and consuming the CO2 by nature are unfortunately faced by the anthropogenic release of CO2. Decreasing the emissions of these greenhouse gases is becoming more urgent. Therefore, carbon sequestration and storage (CSS) of CO2, its utilization in oil recovery, as well as its conversion into fuels and chemicals emerge as active options and potential strategies to mitigate CO2 emissions and climate change, energy crises, and challenges in the storage of energy.

Absorption-Based Post-Combustion Capture of Carbon Dioxide-Paul Feron 2016-05-27 Absorption-Based Post-Combustion Capture of Carbon Dioxide provides a comprehensive and authoritative review of the use of absorbents for post-combustion capture of carbon dioxide. As fossil fuel-based power generation technologies are likely to remain key in the future, at least in the short- and medium-term, carbon capture and storage will be a critical greenhouse gas reduction technique. Post-combustion capture involves the removal of carbon dioxide from flue gases after fuel combustion, meaning that carbon dioxide can then be compressed and cooled to form a safely transportable liquid that can be stored underground. Provides researchers in academia and industry with an authoritative overview of the amine-based methods for carbon dioxide capture from flue gases and related processes Editors and contributors are well known experts in the field Presents the first book on this specific topic

Carbon Capture and Sequestration-Millett Granger Morgan 2012 The United States produces over seventy percent of all its electricity from fossil fuels and nearly fifty percent from coal alone. Worldwide, forty-one percent of all electricity is generated from coal, making it the single most important fuel source for electricity generation, followed by natural gas. This means that an essential part of any portfolio for emissions reduction will be technology to capture carbon dioxide and permanently sequester it in suitable geologic formations. While many nations have incentivized development of CCS technology, large regulatory and legal barriers exist that have yet to be addressed. This book identifies current law and regulation that applies to geologic sequestration in the U.S., the regulatory needs to ensure that geologic sequestration is carried out safely and effectively, and barriers that current law and regulation present to timely deployment of CCS. The authors find the three most significant barriers to be: an ill-defined process to access pore space in deep saline formations; a piecemeal, procedural, and static permitting system; and the lack of a clear, responsible plan to address long-term liability associated with sequestered CO2. The book provides legislative options to remove these barriers and address the regulatory needs, and makes recommendations on the best options to encourage safe, effective deployment of CCS. The authors operationalize their recommendations in legislative language, which is of particular use to policymakers faced with the challenge of addressing climate change and energy.

Prospects for Carbon Capture and Storage in Southeast Asia-Asian Development Bank 2013-09-01 This report was produced under the Technical Assistance Grant: Determining the Potential for Carbon Capture and Storage (CCS) in Southeast Asia (TA 7575-REG), and is focused on an assessment of the CCS potential in Thailand, Viet Nam, and specific regions of Indonesia (South Sumatra) and the Philippines (Calabarzon). It contains inventories of carbon dioxide emission sources, estimates of overall storage potential, likely source-sink match options for potential CCS projects, and an analysis of existing policy, legal, and regulatory frameworks with a view toward supporting future CCS operations. The report also presents a comparative financial analysis of candidate CCS projects, highlights possible incentive schemes for financing CCS, and provides an actionable road map for pilot, demonstration, and commercial CCS projects.

Climate Intervention-National Research Council 2015-06-17 The signals are everywhere that our planet is experiencing significant climate change. It is clear that we need to reduce the emissions of carbon dioxide and other greenhouse gases from our atmosphere if we want to avoid greatly increased risk of damage from climate change. Aggressively pursuing a program of emissions abatement or mitigation will show results over a timescale of many decades. How do we actively remove carbon dioxide from the atmosphere to make a bigger difference more quickly? As one of a two-book report, this volume of Climate Intervention discusses CDR, the carbon dioxide removal of greenhouse gas emissions from the atmosphere and sequestration of it in perpetuity. Climate Intervention: Carbon Dioxide Removal and Reliable

Sequestration introduces possible CDR approaches and then discusses them in depth. Land management practices, such as low-till agriculture, reforestation and afforestation, ocean iron fertilization, and land-and-ocean-based accelerated weathering, could amplify the rates of processes that are already occurring as part of the natural carbon cycle. Other CDR approaches, such as bioenergy with carbon capture and sequestration, direct air capture and sequestration, and traditional carbon capture and sequestration, seek to capture CO2 from the atmosphere and dispose of it by pumping it underground at high pressure. This book looks at the pros and cons of these options and estimates possible rates of removal and total amounts that might be removed via these methods. With whatever portfolio of technologies the transition is achieved, eliminating the carbon dioxide emissions from the global energy and transportation systems will pose an enormous technical, economic, and social challenge that will likely take decades of concerted effort to achieve. Climate Intervention: Carbon Dioxide Removal and Reliable Sequestration will help to better understand the potential cost and performance of CDR strategies to inform debate and decision making as we work to stabilize and reduce atmospheric concentrations of carbon dioxide.

Carbon Dioxide Capture for Storage in Deep Geologic Formations-David C. Thomas 2005 Accompanying CD-ROM contains the results from the CO2 capture projects.

Roadmap for Carbon Capture and Storage Demonstration and Deployment in the People's Republic of China-Asian Development Bank 2015-11-01 The People's Republic of China (PRC) is taking concerted efforts and making large investments to peak out its carbon dioxide emissions around 2030. While current efforts are prioritizing accelerated energy efficiency and rapid expansion of renewables and nuclear in the energy mix, the fossil fuel related carbon dioxide emissions are still expected to rise even under a "new normal" growth strategies in the PRC. This brings in renewed emphasis on carbon capture and storage (CCS), which is currently the only near-commercial technologies to make deep cuts (up to 90%) in carbon dioxide emissions from fossil fuel related power plants and industries. This report draws on relevant technical assistance from Asian Development Bank (ADB), consultants' reports, and the work of ADB staff to assess the potential, the barriers and the challenges in demonstrating and deploying CCS in the PRC. It identifies unique low cost opportunities, recommends a gradual two phase approach to CCS deployment in the PRC and, provides complementary suite of policy actions to enable it.

Caching the Carbon-James R. Meadowcroft 2009-01-01 Over the past decade carbon capture and storage (CCS) has increasingly come to the fore as a possible option to manage carbon dioxide emissions that are currently contributing to human induced climate change. This book is concerned with the politics of CCS. The authors examine the way CCS has been brought into the political realm, the different interpretations of the significance of this emerging technology, and the policy challenges government and international institutions face with respect to its development, deployment and regulation. The book includes case studies of engagement with CCS in a number of developed countries as well as more thematically focused analysis.

Algae-Nooruddin Thajuddin 2016-06-29 Algae - Organisms for Imminent Biotechnology will be useful source of information on basic and applied aspects of algae for post graduate students, researchers, scientists, agriculturists, and decision makers. The book comprises a total of 12 chapters covering various aspects of algae particularly on microalgal biotechnology, bloom dynamics, photobioreactor design and operation of microalgal mass cultivation, algae used as indicator of water quality, microalgal biosensors for ecological monitoring in aquatic environment, carbon capture and storage by microalgae to enhancing CO2 removal, synthesis and biotechnological potentials of algal nanoparticles, biofilms, silica-based nanovectors, challenges and opportunities in marine algae, and genetic identification and mass propagation of economically important seaweeds and seaweeds as source of new bioactive prototypes.

Carbon Capture and Storage in Developing Countries-Natalya Kulichenko 2012-06-26 Carbon Capture and Storage (CCS) technology could provide a technological bridge for achieving near to midterm GHG emission reduction goals. Integrated CCS technology is still under development and has noteworthy challenges, which would be possible to overcome through the implementation of large-scale demonstration projects. In order to assist developing countries to better understand issues related to potential technology deployment, there is a need to start analyzing various numerous challenges facing CCS within the economic and legal context of developing countries and countries in transition. This report is the first effort of the World Bank Group to contribute to a deeper understanding of (a) the integration of power generation with CCS technologies, as well as their costs; (b) regulatory barriers to the deployment of CCS; and (c) global financing requirements for CCS and applicable project finance structures involving instruments of multilateral development institutions. This report does not provide prescriptive solutions to overcome these barriers, since action must be taken on a country-by-country basis, taking account of different circumstances and national policies. Individual governments should decide their priorities on climate change mitigation and adopt appropriate measures accordingly. The analyses presented in this report may take on added relevance, depending on the future direction of international climate negotiations and domestic legal and policy measures in both developed and developing countries, and how they serve to encourage carbon sequestration. We expect that this report will provide insights for policy makers, stakeholders, private financiers, and donors in meeting the challenges of the deployment of climate change mitigation technologies and CCS in particular.

Underground Storage of CO2 and Energy-Michael Z. Hou 2010-07-07 Of the known greenhouse gases, political attention to date has primarily focused on carbon dioxide (CO2), whereby it is assumed that underground storages of crude oil and natural gas through Carbon Capture and Storage (CCS) technology could contribute significantly to global climate protection. Underground Storage of CO2 and Energy covers many aspects of CO2 sequestration and its usage, as well as of underground storage of fossil and renewable energy sources, and is divided into 8 parts: • Environmental and Energy Policy & Law for Underground Storage • Geological Storage and Monitoring • Enhanced Gas and Oil Recovery Using CO2 (CO2 -EGR/EOR) • Rock Mechanical Behavior in Consideration of Dilatancy and Damage • Underground Storage of Natural Gas and Oil • Underground Storage of Wind Energy • State-of-the-Art & New Developments in Gas Supply in Germany and China • EOR & New Drilling Technology Underground Storage of CO2 and Energy will be invaluable to academics, professionals and engineers, and to industries and governmental bodies active in the field of underground storage of fossil and renewable energy sources.

Surface Chemistry of Carbon Capture-K. S. Birdi 2019-12-09 Surface Chemistry of Carbon Capture: Climate Change Aspects provides comprehensive and up-to-date literature on carbon capture and storage (CCS) technology and delineates the surface chemistry of this process. Mankind is dependent on energy from gas, oil, coal, atomic energy, and various other sources. In all fossil fuel combustion processes, carbon dioxide (CO2) is produced (ca. 25 Gt/year). In the past few decades, we have observed a constant increase in CO2 content in the air (currently ca. 400 ppm [0.04%]). This book discusses the technology related to carbon (i.e., CO2) capture and sequestration (CCS) from fossil fuel energy plants, which is considered an important means of CO2 control. It also covers the adsorption/absorption processes of CO2 on solids and similar procedures to help address growing climate change concerns.