Coal Power Plant Materials And Life Assessment Developments And Applications Woodhead Publishing Series In Energy

Requirements for Materials R&D for Coal-fired Power Plant -into the 21st Century
Thermal Power Plants - Volume I
Power Plant Life Management and Performance Improvement
Towards Efficient Regulation of Air Pollution from Coal-Fired Power Plants
Ultra-Supercritical Coal Power Plants
Coal Power Plants
Thermal Power Plants - Volume II
Power Plant Capital Costs, Current Trends and Sensitivity to Economic Parameters
Advances in Materials Technology for Fossil Power Plants
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Coal-Fired Power Generation Handbook
Requirements for Materials R & D for Coal-fuelled Power Plant
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BOILER MATERIALS FOR ULTRASUPERCRITICAL COAL POWER PLANTS.
Advances in Materials Technology for Fossil Power Plants
Thermal Power Plants - Volume III
Coal-fired Boiler Costs for Industrial Applications
Advances in Ultra-low Emission Control Technologies for Coal-Fired Power Plants

A Planner's Guide for Selecting Clean-coal Technologies for Power Plants
Impacts of Coal-fired Power Plants on Local Ground-water Systems
Power Generation Technologies
Advances in Power Boilers
Gas-Turbine Power Generation

CHAPMAN HARRELL

Requirements for Materials R&D for Coal-fired Power Plant -into the 21st Century Cuvillier Verlag
Advances in Ultra-low Emission Control Technologies for Coal-Fired Power Plants discusses the emissions standards of dust, SO2, NOx and mercury pollution, also presenting the key technologies available to control emissions in coal-fired power plants. The practical effects of ultra-low emissions projects included help the reader understand related implications in plants. Emphasis is placed on 300MW subcritical, 600MW subcritical, 660MW supercritical and 1000MW ultra-supercritical coal-fired units. The influence of different pollutant control units, such as wet electrostatic precipitator, desulfurization equipment and the electrostatic precipitator are also analyzed, and the pollutant levels before and after retrofitted ultra-low emissions are compared throughout. Provides a unique analysis of advanced technologies, such as dust-removal, desulfurization and denitrification used for ultra-low emissions in coal-fired power plants Introduces emission standards for dust, SO2, NOx and Mercury pollution from coal-fired power plants in China, the US and Europe Provides solutions to reducing emissions based on technological advances in China Analyzes the environmental and economic effects of these technologies
Thermal Power Plants - Volume I Coal Power Plant Materials and Life Assessment
Originally published in 1979, this book discusses the model developed to deal with air pollution from coal fired power plants, but it broadly also illustrates how available scientific information can be organized to improve our understanding of pollution control. This information enables economists to discuss the relevant consequences of specific air pollution abatement strategies. In order to demonstrate the usefulness of a computer based environmental model, the model is applied to a specific case study. The object of the case study is the control of air pollution from a coal-fired, electrical generating station in New Haven, USA. The research contained in this volume advances applied risk analysis by combining the insights of economics and environmental sciences.
Power Plant Life Management and Performance Improvement EOLSS Publications
Conference proceedings covering the latest technology developments for fossil fuel power plants, including nickel-based alloys for advanced ultrasupercritical power plants, materials for turbines, oxidation and corrosion, welding and weld performance, new alloys concepts, and creep and general topics.
Towards Efficient Regulation of Air Pollution from Coal-Fired Power Plants Academic Press
This book has been derived from the

work of several professors in the nuclear and power industry all of whom have been directly involved with the industry as managers or consultants. The text has been written as educational material and many of the individual chapters have been written as course material for advanced university courses. Also several chapters include material related to plant operation which is prescribed for operator training. Hence it bridges the gap between academic study and practical training. While it is not intended to be comprehensive in all respects it does provide an overview of the topic with sufficient technical depth for a general understanding of power plant technology and a basis for further study in a particular area. When used as a reference in this way each chapter can stand alone and be read independently of the others. Overall it meets the general philosophy of EOLSS in providing a source of knowledge for sustainable development and technological progress for educators and decision makers

Ultra-Supercritical Coal Power Plants Elsevier

This book has been derived from the work of several professors in the nuclear and power industry all of whom have been directly involved with the industry as managers or consultants. The text has been written as educational material and many of the individual chapters have been written as course material for advanced university courses. Also several chapters include material related to plant operation which is prescribed for operator training. Hence it bridges the gap between academic study and practical training. While it is not intended to be comprehensive in all respects it does provide an overview of the topic with sufficient technical depth for a general understanding of power plant technology and a basis for further study in a particular area. When used as a reference in this way each chapter can stand alone and be read independently of the others. Overall it meets the general philosophy of EOLSS in providing a source of knowledge for sustainable development and technological progress for educators and decision makers.

Coal Power Plants Elsevier

This book discusses clean coal technology (CCT), the latest generation of coal technology that controls pollutants and performs with improved generating efficiency. CCT involves processes that effectively control emissions and result in highly efficient combustion without significantly contributing to global warming. Basic principles, operational a

Thermal Power Plants - Volume II John Wiley & Sons

The principal objective of this project is to develop materials technology for use in ultrasupercritical (USC) plant boilers capable of operating with 760 C (1400 F), and up to 5500 psi with emphasis upon 35 MPa (5000 psi) steam. In the 21st century, the world faces the critical challenge of providing abundant, cheap electricity to meet the needs of a growing global population while at the same time preserving environmental values. Most studies of this issue conclude that a robust portfolio of generation technologies and fuels should be developed to assure that the United States will have adequate electricity supplies in a variety of possible future scenarios. The use of coal for electricity generation poses a unique set of challenges. On the one hand, coal is plentiful and available at low cost in much of the world, notably in the U.S., China, and India. Countries with large coal reserves will want to develop them

to foster economic growth and energy security. On the other hand, traditional methods of coal combustion emit pollutants and CO2 at high levels relative to other generation options. Maintaining coal as a generation option in the 21st century will require methods for addressing these environmental issues. This project has established a government/industry consortium to undertake a five-year effort to evaluate and develop advanced materials that allow the use of advanced steam cycles in coal-based power plants. These advanced cycles, with steam temperatures up to 760 C, will increase the efficiency of coal-fired boilers from an average of 35% efficiency (current domestic fleet) to 47% (HHV). This efficiency increase will enable coal-fired power plants to generate electricity at competitive rates (irrespective of fuel costs) while reducing CO2 and other fuel-related emissions by as much as 29%. Success in achieving these objectives will support a number of broader goals. First, from a national prospective, the program will identify advanced materials that will make it possible to maintain a cost-competitive, environmentally-acceptable coal-based electric generation option. High sulfur coals will specifically benefit in this respect by having these advanced materials evaluated in high-sulfur coal firing conditions and from the significant reductions in waste generation inherent in the increased operational efficiency. Second, from a national perspective, the results of this program will enable domestic boiler manufacturers to successfully compete in world markets for building high-efficiency coal-fired power plants.

Power Plant Capital Costs, Current Trends and Sensitivity to Economic Parameters ASM International

Coal power plants generate about half of the United States' electricity and are expected to remain a key energy source. Coal power plants also account for about one-third of the nation's emissions of carbon dioxide (CO2), the primary greenhouse gas that experts believe contributes to climate change. Current regulatory efforts and proposed legislation that seek to reduce CO2 emissions could affect coal power plants. Two key technologies show potential for reducing CO2 emissions: (1) carbon capture and storage (CCS), which involves capturing and storing CO2 in geologic formations, and (2) plant efficiency improvements that allow plants to use less coal. The Department of Energy (DOE) plays a key role in accelerating the commercial availability of these technologies and devoted more than $600 million to them in fiscal year 2009. Congress asked GAO to examine (1) the maturity of these technologies; (2) their potential for commercial use, and any challenges to their use; and (3) possible implications of deploying these technologies. To conduct this work, GAO reviewed reports and interviewed stakeholders with expertise in coal technologies. DOE does not systematically assess the maturity of key coal technologies, but GAO found consensus among stakeholders that CCS is less mature than efficiency technologies. Specifically, DOE does not use a standard set of benchmarks or terms to describe the maturity of technologies, limiting its ability to provide key information to Congress, utilities, and other stakeholders. This lack of information limits congressional oversight of DOE's expenditures on these efforts, and it hampers policymakers' efforts to gauge the

maturity of these technologies as they consider climate change policies. In the absence of this information from DOE, GAO interviewed stakeholders with expertise in CCS or efficiency technologies to identify their views on the maturity of these technologies. Stakeholders told GAO that while components of CCS have been used commercially in other industries, their application remains at a small scale in coal power plants, with only one fully integrated CCS project operating at a coal plant. Efficiency technologies, on the other hand, are in wider commercial use. Use of both technologies is, however, contingent on overcoming a variety of economic, technical, and legal challenges. In particular, with respect to CCS, stakeholders highlighted the large costs to install and operate current CCS technologies, the fact that large scale demonstration of CCS is needed in coal plants, and the lack of a national carbon policy to reduce CO2 emissions or a legal framework to govern liability for the permanent storage of large amounts of CO2. With respect to efficiency improvements, stakeholders highlighted the high cost to build or upgrade such coal plants, the fact that some upgrades require highly technical materials, and plant operators' concerns that changes to the existing fleet of coal power plants could trigger additional regulatory requirements. CCS technologies offer more potential to reduce CO2 emissions than efficiency improvements alone, and both could raise electricity costs and have other effects. Most stakeholders told GAO that CCS would increase electricity costs, and some reports estimate that current CCS technologies would increase electricity costs by about 30 to 80 percent at plants using these technologies. DOE has also reported that CCS could increase water consumption at power plants. Efficiency improvements offer more potential for near term reductions in CO2 emissions, but they cannot reduce CO2 emissions from a coal plant to the same extent as CCS. GAO recommends that DOE develop a standard set of benchmarks to gauge and report to Congress on the maturity of key technologies. In commenting on a draft of this report, DOE concurred with our recommendation.

Advances in Materials Technology for Fossil Power Plants Elsevier

Coal- and gas-based power plants currently supply the largest proportion of the world’s power generation capacity, and are required to operate to increasingly stringent environmental standards. Higher temperature combustion is therefore being adopted to improve plant efficiency and to maintain net power output given the energy penalty that integration of advanced emissions control systems cause. However, such operating regimes also serve to intensify degradation mechanisms within power plant systems, potentially affecting their reliability and lifespan. Power plant life management and performance improvement critically reviews the fundamental degradation mechanisms that affect conventional power plant systems and components, as well as examining the operation and maintenance approaches and advanced plant rejuvenation and retrofit options that the industry are applying to ensure overall plant performance improvement and life management. Part one initially reviews plant operation issues, including fuel flexibility, condition monitoring and performance assessment. Parts two, three and four focus on coal boiler plant, gas turbine plant, and steam boiler and

turbine plant respectively, reviewing environmental degradation mechanisms affecting plant components and their mitigation via advances in materials selection and life management approaches, such as repair, refurbishment and upgrade. Finally, part five reviews issues relevant to the performance management and improvement of advanced heat exchangers and power plant welds. With its distinguished editor and international team of contributors, Power plant life management and performance improvement is an essential reference for power plant operators, industrial engineers and metallurgists, and researchers interested in this important field. Provides an overview of the improvements to plant efficiency in coal- and gas-based power plants Critically reviews the fundamental degradation mechanisms that affect conventional power plant systems and components, noting mitigation routes alongside monitoring and assessment methods Addresses plant operation issues including fuel flexibility, condition monitoring and performance assessment
Advances in Materials Technology for Fossil Power Plants Elsevier
Biomass and waste materials are regarded as renewable energy sources which can reduce CO2 production and prevent environment pollution when they are co-utilized with coal in power plant facilities. A great fraction of biomass or waste is characterized with high chlorine content. Fuel chlorine can induce fast material oxidation on superheater or waterwall surface in power plant boiler. However, the mechanisms of chlorine corrosion are different in oxidizing atmosphere and in reducing environment, and the corrosion rate is influenced by deposit ash characteristics and flue gas composition. Based on experimental researches, this work gives a comprehensive explanation of the morphologies and mechanisms of chlorine corrosion in reducing and in oxidizing atmosphere under the interaction of flue gas and deposit ash. The behaviour of a wide spectrum of boiler materials on the chlorine corrosion is described. Furthermore, the influence of fuel characteristics on the chlorine deposition during combustion process is discussed and predicated. Practical guidance for the material selection and for the fuel combination is suggested.
High-Temperature Chlorine Corrosion during Co-Utilisation of Coal with Biomass or Waste Elsevier
Coal-Fired Electricity and Emissions Control: Efficiency and Effectiveness discusses the relationship between efficiency and emissions management, providing methods for reducing emissions in newer and older plants as coal-fired powered plants are facing increasing new emission control standards. The book presents the environmental forces driving technology development for coal-fired electricity generation, then covers other topics, such as cyclone firing, supercritical boilers, fabric filter technology, acid gas control technology and clean coal technologies. The book relates efficiency and environmental considerations, particularly from a technology development perspective. Features time tested methods for achieving optimal emission control through efficiency for environmental protection, including reducing the carbon footprint Covers the regulations governing coal-fired electricity Highlights the development of the coal-fired technologies through regulatory change
Coal-Fired Electricity and Emissions

Control Routledge
Due to their continuing role in electricity generation, it is important that coal power plants operate as efficiently and cleanly as possible. Coal Power Plant Materials and Life Assessment reviews the materials used in coal plants, and how they can be assessed and managed to optimize plant operation. Part I considers the structural alloys used in coal plants. Part II then reviews performance modelling and life assessment techniques, explains the inspection and life-management approaches that can be adopted to optimize long term plant operation, and considers the technical and economic issues involved in meeting variable energy demands. Summarizes key research on coal-fired power plant materials, their behavior under operational loads, and approaches to life assessment and defect management Details the range of structural alloys used in coal power plants, and the life assessment techniques applicable to defect-free components under operational loads Reviews the life assessment techniques applicable to components containing defects and the approaches that can be adopted to optimize plant operation and new plant and component design
Advances in Materials Technology for Fossil Power Plants CRC Press
Gas-Turbine Power Generation is a concise, up-to-date, and readable guide providing an introduction to gas turbine power generation technology. It includes detailed descriptions of gas fired generation systems, demystifies the functions of gas fired technology, and explores the economic and environmental risk factors Engineers, managers, policymakers and those involved in planning and delivering energy resources will find this reference a valuable guide that will help them establish a reliable power supply as they also account for both social and economic objectives. Provides a concise, up-to-date, and readable guide on gas turbine power generation technology Focuses on the evolution of gas-fired power generation using gas turbines Evaluates the economic and environmental viability of the system with concise diagrams and accessible explanations
Advanced Power Plant Materials, Design and Technology Ashgate Publishing
An October 2007 conference allowed scientists and engineers from around the world to exchange information on advanced, high-efficiency coal power plants. Papers from the conference are presented here, in sections on boilers, turbines, oxidation, creep/life management, welding, and oxy fuel. Some specific topics include materials solutions for advanced steam power plants, consideration of weld behavior in the design of high temperature components, nickel alloys for high efficiency fossil power plants, and material development and mechanical integrity analysis for advanced steam turbines. Other subjects are ferritic and austenitic grades for a new generation of steam power plants, the impact of steam-side oxidation on boiler heat-exchanger tube design, and oxy-combustion technology for utility coal-fired boilers.
Construction Materials for Coal Conversion Butterworth-Heinemann
Concern over the effects of airborne pollution, green house gases, and the impact of global warming has become a worldwide issue that transcends international boundaries, politics, and social responsibility. The 2nd Edition of

Coal Energy Systems: Clean Coal Technology describes a new generation of energy processes that sharply reduce air emissions and other pollutants from coal-burning power plants. Coal is the dirtiest of all fossil fuels. When burned, it produces emissions that contribute to global warming, create acid rain, and pollute water. With all of the interest and research surrounding nuclear energy, hydropower, and biofuels, many think that coal is finally on its way out. However, coal generates half of the electricity in the United States and throughout the world today. It will likely continue to do so as long as it's cheap and plentiful [Source: Energy Information Administration]. Coal provides stability in price and availability, will continue to be a major source of electricity generation, will be the major source of hydrogen for the coming hydrogen economy, and has the potential to become an important source of liquid fuels. Conservation and renewable/sustainable energy are important in the overall energy picture, but will play a lesser role in helping us satisfy our energy demands today. Dramatically updated to meet the needs of an ever changing energy market, Coal Energy Systems, 2nd Edition is a single source covering policy and the engineering involved in implementing that policy. The book addresses many coal-related subjects of interest ranging from the chemistry of coal and the future engineering anatomy of a coal fired plant to the cutting edge clean coal technologies being researched and utilized today. A 50% update over the first edition, this new book contains new chapters on processes such as CO2 capture and sequestration, Integrated Gasification Combined Cycle (IGCC) systems, Pulverized-Coal Power Plants and Carbon Emission Trading. Existing materials on worldwide coal distribution and quantities, technical and policy issues regarding the use of coal, technologies used and under development for utilizing coal to produce heat, electricity, and chemicals with low environmental impact, vision for utilizing coal well into the 21st century, and the security coal presents. Clean Liquids and Gaseous Fuels from Coal for Electric Power Integrated Gasification Combined Cycle (IGCC) systems Pulverized-Coal Power Plants Advanced Coal-Based Power Plants Fluidized-Bed Combustion Technology CO2 capture and sequestration

Boiler Materials for Ultra Supercritical Coal Power Plants ASM International

The technological developments in electrical power generation over the last decade have enabled creation of large pulverized coal fired and combined cycle power plants. These are required to run continuously without faults to assure highest reliability and availability of electrical power around the clock. Condition Monitoring in Large Thermal Power Plants deals with monitoring the operational integrity of boiler and turbine generator plants that includes pumps, fans etc - A most important step in achieving highest reliability and availability.

Clean Coal Engineering Technology Elsevier

This book makes intelligible the wide range of electricity generating technologies available today, as well as some closely allied technologies such as energy storage. The book opens by setting the many power generation technologies in the context of global energy consumption, the development of the electricity generation industry and the economics involved in this sector. A

series of chapters are each devoted to assessing the environmental and economic impact of a single technology, including conventional technologies, nuclear and renewable (such as solar, wind and hydropower). The technologies are presented in an easily digestible form. Different power generation technologies have different greenhouse gas emissions and the link between greenhouse gases and global warming is a highly topical environmental and political issue. With developed nations worldwide looking to reduce their emissions of carbon dioxide, it is becoming increasingly important to explore the effectiveness of a mix of energy generation technologies. Power Generation Technologies gives a clear, unbiased review and comparison of the different types of power generation technologies available. In the light of the Kyoto protocol and OSPAR updates, Power Generation Technologies will provide an invaluable reference text for power generation planners, facility managers, consultants, policy makers and economists, as well as students and lecturers of related Engineering courses. · Provides a unique comparison of a wide range of power generation technologies - conventional, nuclear and renewable · Describes the workings and environmental impact of each technology · Evaluates the economic viability of each different power generation system

Materials Technology Foresight for the UK Power Generation Industry World Bank Publications

Carbon Capture and Storage is a key technology for a sustainable and low carbon economy. This book unites top academic and industry researchers in search for commercial concepts for CCS at coal power ploants. This reference focuses on power plant technology and ways to improve efficiency. It details the three principal ways of capturing the CO2 produced in power plants: oxyfuel combustion, postcombustion and precombustion, with the main part concentrating on the different approaches to removing carbon dioxide. Wtih an eye on safety, the authors explain how the three parts of the CCS chain work - capture, transport and storage - and how they can be performed safely. The result is specific insights for process engineers, chemists, physicists and materials engineers in their relevant fields, as well as a sufficiently broad scope to be able to understand the opportunities and implications of the other disciples.

Materials for Supercritical Pulverised Coal-fired Power Plant BoD – Books on Demand

Coal-Fired Generation is a concise, up-to-date and readable guide providing an introduction to this traditional power generation technology. It includes detailed descriptions of coal fired generation systems, demystifies the coal fired technology functions in practice as well as exploring the economic and environmental risk factors. Engineers, managers, policymakers and those involved in planning and delivering energy resources will find this reference a valuable guide, to help establish a reliable power supply address social and economic objectives. Focuses on the evolution of the traditional coal-fired generation Evaluates the economic and environmental viability of the system with concise diagrams and accessible explanations

Coal-Fired Generation Createspace Independent Pub

This comprehensive volume provides a complete, authoritative, up-to-date

reference for all aspects of power plant engineering. Coverage ranges from engineering economics to coal and limestone handling, from design processes to plant thermal heat balances. Both theory and practical applications are covered, giving engineers the information needed to plan, design, construct, upgrade, and operate power plants. Power Plant Engineering is the culmination of experience of hundreds of engineers from Black & Veatch, a leading firm in the field for more than 80 years. The authors review all major power generating technologies, giving particular emphasis to current approaches. Special features of the book include: * More than 1000 figures and lines drawings that illustrate all aspects of the subject. * Coverage of related components and systems in power plants such as turbine-generators, feedwater heaters, condenser, and cooling towers. * Definitions and analyses of the features of various plant systems. * Discussions of promising future technologies. Power Plant Engineering will be the standard reference in the professional engineer's library as the source of information on steam power plant generation. In addition, the clear presentation of the material will make this book suitable for use by students preparing to enter the field.