Exergy Analysis Of Combined Cycle Cogeneration Systems A

In this thesis, several configurations of combined cycle cogeneration systems proposed by the author and an existing system, the Bilkent Combined Cycle Cogeneration Plant, are investigated by energy, exergy and thermoeconomic analyses. In each of these configurations, varying steam demand is considered rather than fixed steam demand. Basic thermodynamic properties of the systems are determined by energy analysis utilizing main operation conditions. Exergy destructions within the system and exergy losses to environment are investigated to determine thermodynamic inefficiencies in the system and to assist in guiding future improvements in the plant. Among the different approaches for thermoeconomic analysis in literature, SPECO method is applied. Since the systems have more than one product (process steam and electrical power), systems are divided into several subsystems and cost balances are applied together with the auxiliary equations. Hence, cost of each product is calculated. Comparison of the configurations in terms of performance assessment parameters and costs per unit of exergy are also given in this thesis.

This volume provides detailed analysis of the basic thermodynamics and economic implications of combined power plants. It includes details of developments in Europe, the USA and Japan, and should be useful to practising engineers, policy-makers, and students in mechanical engineering.

This book does not give a prediction of what the efficiency will be of the energy use of

industrial processes in the future. However, it does give an exploration of limits to the efficiency of current processes and an indication of what might be achieved if new technologies can be developed. At the Department of Science, Technology and Society of Utrecht University research had been done to the opportunities for improvement of the energy efficiency in the short term since the 1980's. This had resulted in a comprehensive database on energy efficient measures. This database and a possible application are described in Chapter 3 of this book. The use of the database induced new research themes around efficiency improvement, e.g. concerning barriers for implementation of measures. It was around 1993 that I did a preliminary study to the potential for efficiency improvement in the long term. Historical analysis had shown us that the short term potential stayed constant over the years. It seemed to be replenished by the introduction of new technologies. This lead to the question whether there are limits to the efficiency, taking into account both thermodynamic considerations and ideas on the development and dissemination of new technologies.

Deals with the availability method and its application to power plant system design and energy conversion. The first part of the book describes the development and the formulation of the availability method. The second part presents its applications to energy conversion processes. Examples for each energy conversion system are introduced and there are practice problems throughout the text.

The Exergy Analysis On A Natural Gas Based Combined Cycle Power PlantPerformance Analysis on Combined Cycle Power PlantLAP Lambert Academic Publishing

Exergy, Energy System Analysis, and Optimization theme is a component of the Encyclopedia of Energy Sciences, Engineering and Technology Resources which is part of the global

Encyclopedia of Life Support Systems (EOLSS), an integrated compendium of twenty one Encyclopedias. These three volumes are organized into five different topics which represent the main scientific areas of the theme: 1. Exergy and Thermodynamic Analysis; 2. Thermoeconomic Analysis; 3. Modeling, Simulation and Optimization in Energy Systems; 4. Artificial Intelligence and Expert Systems in Energy Systems Analysis; 5. Sustainability Considerations in the Modeling of Energy Systems. Fundamentals and applications of characteristic methods are presented in these volumes. These three volumes are aimed at the following five major target audiences: University and College Students, Educators, Professional Practitioners, Research Personnel and Policy Analysts, Managers, and Decision Makers and NGOs.

This thesis deals with modelling and performance enhancements of a gas-turbine combined cycle power plant. A clean and safe energy is the greatest challenges to meet the requirements of green environment. These requirements given way the long time governing authority of steam turbine (ST) in the world power generation, and gas turbine (GT) and its combined cycle (CCGT) will replace it. Therefore, it is necessary to predict the characteristics of the CCGT system and optimize its operating strategy by developing a simulation system. Several configurations of the GT and CCGT plants systems are proposed by thermal analysis. The integrated model and simulation code for exploiting the performance of gas turbine and CCGT power plant are developed utilizing MATLAB code. New strategies for GT and CCGT power plant's operational modelling and optimizations are suggested for power plant operation, to improve overall performance. The effect of various enhancing strategies on the performance of the CCGT power plant (two-shaft, intercooler, regenerative, reheat, and multi-pressure heat

recovery steam generator (HRSG)) based on the real GT and CCGT power plants. An extensive thermodynamic analysis of the modifications of the most common configuration's enhancements has been carried out. The performance code for heavy-duty GT and CCGT power plants are validated with the real power plant of Baiji GT and MARAFIQ CCGT plants the results have been satisfactory. The simulating results show that the reheated GT has a higher power (388MW) while the higher thermal efficiency occurs in the regenerative GT (52%) with optimal pressure ratio and turbine inlet temperature. The performance enhancing strategies results show that the higher power output occurs in the intercooler-reheat GT strategy (404MW). Furthermore, the higher thermal efficiency (56.9%) and lower fuel consumption (0.13kg/kWh) occur in the intercooler-regenerative-reheat GT strategy. The analyses of the HRSG configurations show that the maximum power output (1238MW) occurred in the supplementary triple pressure with reheat CCGT while the overall efficiency was about 56.6%. The intercooler-reheat CCGT strategy has higher power output (1637MW) and the higher overall thermal efficiency (59.4%) and lower fuel consumption (0.047kg/kWh) occur with the regenerative-reheat CCGT strategy. The simulation result shows that the proposed GT system improved 19% of thermal efficiency and 22% of power output. In addition, the proposed CCGT system improved 4.6% of thermal efficiency for and 22.5% of power output. The optimization result shows that the optimum power (1280MW) and the overall thermal efficiency (65%) of the supplementary triple pressure with reheat CCGT. Therefore, the optimization procedure is reasonably accurate and efficient. Thus, the operation conditions and ambient temperature are strongly influenced on the overall performance of the GT and CCGT. The optimum efficiency and power are found at higher turbine inlet temperatures. It can

be comprehended that the developed models are powerful tools for estimating the overall performance of the CCGT plants. The energy and exergy analysis models for the GT and CCGT plants are highly recommended for predicting them performance based on inlet air cooling system.

This multi-disciplinary volume presents information on the state-of-the-art in sustainable energy technologies key to tackling the world's energy challenges and achieving environmentally benign solutions. Its unique amalgamation of the latest technical information, research findings and examples of successfully applied new developments in the area of sustainable energy will be of keen interest to engineers, students, practitioners, scientists and researchers working with sustainable energy technologies. Problem statements, projections, new concepts, models, experiments, measurements and simulations from not only engineering and science, but disciplines as diverse as ecology, education, economics and information technology are included, in order to create a truly holistic vision of the sustainable energy field. The contributions feature coverage of topics including solar and wind energy, biomass and biofuels, waste-to-energy, renewable fuels, geothermal and hydrogen power, efficiency gains in fossil fuels and energy storage technologies including batteries and fuel cells.

Thermal Power Plants theme is a component of Encyclopedia of Energy Sciences, Engineering and Technology Resources in the global Encyclopedia of Life Support Systems (EOLSS), which is an integrated compendium of twenty Encyclopedias. The

Theme on Thermal Power Plants presents three main topics which are then expanded into multiple subtopics, each as a chapter. The first topic covers the basic theory including fossil fuel combustion, nuclear fission, thermal fluids and thermodynamic cycles. It then deals with those aspects important to the maintenance of high efficiency and good reliability such as exergy analysis, material characteristics and life extension. The second topic deals with the production of steam. Although this is only the heat receiving part of the steam cycle it is consistent with the general layout of the power plant where the fossil fuel fired boiler or nuclear fission reactor is a separate and distinct part with its own ancilliary equipment. Fossil boilers and nuclear reactors both produce steam but are so different that each is covered separately in its respective series of chapters. The third topic deals with the generation of power utilizing the steam produced in the boiler or reactor. Several chapters cover steam turbine design and operation. Since power must be produced to exactly match the demand, consideration is given to operational constraints and protective devices. Heat rejection in cooling towers is important where no large body of water exists and is addressed in one chapter. Gas turbines are used for peak power generation and, with steam turbines, for combined cycle plants so are dealt with in two chapters. Conversion of mechanical power from the turbine to electrical power for distribution to the consumer is an important aspect and is covered by the last chapter. These three volumes are aimed at the following five major target audiences: University and College Students Educators,

Professional Practitioners, Research Personnel and Policy Analysts, Managers, and Decision Makers, NGOs and GOs.

This multi-disciplinary volume presents information on the state-of-the-art in the sustainable development technologies and tactics. Its unique amalgamation of the latest technical information, research findings and examples of successfully applied new developments in the area of sustainable development will be of keen interest to engineers, students, practitioners, scientists and researchers concerned with sustainability. Problem statements, projections, new concepts, models, experiments, measurements and simulations from not only engineering and science, but disciplines as diverse as ecology, education, economics and information technology are included, in order to create a truly holistic vision of the sustainable development field. The contributions feature coverage of topics including green buildings, exergy analysis, clean carbon technologies, waste management, energy conservation, environmental remediation, energy security and sustainable development policy.

This book is intended to provide valuable information for the analysis and design of various gas turbine engines for different applications. The target audience for this book is design, maintenance, materials, aerospace and mechanical engineers. The design and maintenance engineers in the gas turbine and aircraft industry will benefit immensely from the integration and system discussions in the book. The chapters are of high relevance and interest to manufacturers, researchers and academicians as well.

This important book is an overall analysis of different innovative methods and ways of recycling in connection with various types of materials. It aims to provide a basic understanding about polymer recycling and its reuse as well as presents an in-depth look at various recycling methods. It provides a thorough knowledge about the work being done in recycling in different parts of the world and throws light on areas that need to be further explored. Emphasizing eco-friendly methods and recovery of useful materials The book covers a wide variety of innovative recycling methods and research, including • Green methods of recycling • Effective conversion of biomass and municipal wastes to energy-generating systems • A catalyst for the reuse of glycerol byproduct • Methods of adsorption to treat wastewater and make it suitable for irrigation and other purposes • Disposal of sludge • The use of calcined clay to replace both fine and coarse aggregates • Recycling of rubbers • The production of a sorbent material for paper mill sludge • Replacing polypropylene absorbent in oil spill sanitations • The use of natural fibers for various industrial applications • Cashew nut shell liquid as a source of surface active reagents • Integrated power and cooling systems based on biomass • Recycling water from household laundering • much more

This thorough and highly relevant volume examines exergy, energy and the environment in the context of energy systems and applications and as a potential tool for design, analysis, optimization. It further considers their role in minimizing and/or eliminating environmental impacts and providing for sustainable development. In this

regard, several key topics ranging from the basics of the thermodynamic concepts to advanced exergy analysis techniques in a wide range of applications are covered.
This book is the proceedings of the International Conference on Power Engineering-2007. The fields of this book include power engineering and relevant environmental issues. The recent technological advances in power engineering and related areas are introduced. This book is valuable for researchers, engineers and students majoring in power engineering.
Energy Systems Engineering is one of the most exciting and fastest growing fields in engineering. Modeling and simulation plays a key role in Energy Systems Engineering because it is the primary basis on which energy system design, control, optimization, and analysis are based. This book contains a specially curated collection of recent research articles on the modeling and simulation of energy systems written by top experts around the world from universities and research labs, such as Massachusetts Institute of Technology, Yale University, Norwegian University of Science and Technology, National Energy Technology Laboratory of the US Department of Energy, University of Technology Sydney, McMaster University, Queens University, Purdue University, the University of Connecticut, Technical University of Denmark, the University of Toronto, Technische Universität Berlin, Texas A&M, the University of

Pennsylvania, and many more. The key research themes covered include energy systems design, control systems, flexible operations, operational strategies, and systems analysis. The addressed areas of application include electric power generation, refrigeration cycles, natural gas liquefaction, shale gas treatment, concentrated solar power, waste-to-energy systems, micro-gas turbines, carbon dioxide capture systems, energy storage, petroleum refinery unit operations, Brayton cycles, to name but a few.

The volume includes a set of selected papers extended and revised from the International Conference on Informatics, Cybernetics, and Computer Engineering. A computer network, often simply referred to as a network, is a collection of computers and devices interconnected by communications channels that facilitate communications and allows sharing of resources and information among interconnected devices. Put more simply, a computer network is a collection of two or more computers linked together for the purposes of sharing information, resources, among other things. Computer networking or Data Communications (Datacom) is the engineering discipline concerned with computer networks. Computer networking is sometimes considered a sub-discipline of electrical engineering, telecommunications, computer science, information technology and/or computer engineering since it relies heavily upon

the theoretical and practical application of these scientific and engineering disciplines. Networks may be classified according to a wide variety of characteristics such as medium used to transport the data, communications protocol used, scale, topology, organizational scope, etc. Electronics engineering, also referred to as electronic engineering, is an engineering discipline where non-linear and active electrical components such as electron tubes, and semiconductor devices, especially transistors, diodes and integrated circuits, are utilized to design electronic circuits, devices and systems, typically also including passive electrical components and based on printed circuit boards. The term denotes a broad engineering field that covers important subfields such as analog electronics, digital electronics, consumer electronics, embedded systems and power electronics. Electronics engineering deals with implementation of applications, principles and algorithms developed within many related fields, for example solid-state physics, radio engineering, telecommunications, control systems, signal processing, systems engineering, computer engineering, instrumentation engineering, electric power control, robotics, and many others. ICCE 2011 Volume 3 is to provide a forum for researchers, educators, engineers, and government officials involved in the general areas of Computer Engineering and Electronic Engineering to

disseminate their latest research results and exchange views on the future research directions of these fields. 99 high-quality papers are included in the volume. Each paper has been peer-reviewed by at least 2 program committee members and selected by the volume editor. Special thanks to editors, staff of association and every participants of the conference. It’s you make the conference a success. We look forward to meeting you next year.

Power plant performance can be assessed by the method of thermodynamic analysis. The goal of this thesis is to perform a thermodynamic analysis on the University of Massachusetts' Combined Heat and Power (CHP) District Heating System. Energy and exergy analyses are performed based on the first and second laws of thermodynamics for power generation systems that include a 10-MW Solar combustion gas turbine, a 4-MW low pressure steam turbine, a 2-MW high pressure steam turbine, a 100,000 pph heat recovery steam generator (HRSG), three 125,000 pph package boilers, and auxiliary equipment. The University of Massachusetts' CHP plant delivers all of the campus' steam and nearly all its electricity to the more than 200 buildings and nearly 10 million gross square feet of building space. Two 20-inch main steam transmission lines connect the plant to the campus. On an annual basis the plant generates approximately 1,100,000,000 pounds of steam and 100,000,000 kWh of electric

power. The plant has a SCADA (Supervisory Control and Data Acquisition) system. Rockwell Automation's RSLinx OPC (Object Linking and Embedding for Process Control) server acquires data from up to 675 field instruments in the plant which is used for carrying out the analyses. The latest pollution control technologies, including advanced combustion turbine low NOx burners, advanced Selective Catalytic Reduction and Oxidation Catalyst pollution control technologies are employed in the plant. System efficiencies are calculated for a wide range of component operating loads. Factors affecting efficiency of the CHP district heating system are analyzed. In the analysis, actual system data is used to assess the district heating system performance, energy and exergy efficiencies and exergy losses. Energy and exergy calculations are conducted for the whole year on an hourly basis. Factors affecting efficiency of the CHP district heating system are analyzed and recommendations made to improve the operating efficiency. The results show how thermodynamic analysis can be used to identify the magnitudes and location of energy losses in order to improve the existing system, processes or components.

Covers the latest advances in the design and operation of large and small steam power plants.

This leading text in the field maintains its engaging, readable style while

presenting a broader range of applications that motivate engineers to learn the core thermodynamics concepts. Two new coauthors help update the material and integrate engaging, new problems. Throughout the chapters, they focus on the relevance of thermodynamics to modern engineering problems. Many relevant engineering based situations are also presented to help engineers model and solve these problems.

It is widely believed that a large proportion of greenhouse gas emissions originated anthropogenically from the use of fossil fuels with additional contributions coming from manufactured materials, deforestation, soil erosion, and agriculture (including livestock). The global society actively supports measures to create a flexible and low-carbon energy economy to attenuate climate change and its devastating environmental consequences. In this Special Issue, the recent advancements in the next-generation thermochemical conversion processes for solid fuels and renewable energies (e.g., the operational flexibility of co-combustion of biomass and lignite, integrated solar combined cycle power plants, and advanced gasification systems such as the sorption-enhanced gasification and the chemical looping gasification) were shown.

In this study, efficiency analysis of combined cycle power plant which is working

in Çigli/Izmir-Turkey for industrial zone for first and second laws of thermodynamics is realized. While analyzing of efficiency of combined power plant different environmental conditions and loads are observed and considered. The variations of the performance parameters and their magnitudes are studied. The useful power, reversible power and irreversibility are obtained for each component which constitutes the plant, and overall efficiencies of the plant are calculated. The results show the exergy analyses for a steam cycle system predict the plant efficiency more precisely. In addition to this, with this study, the efficiency of combined cycle power plant for second law of thermodynamic is showed and gives the attention on it

A comprehensive assessment of the methodologies of thermodynamic optimization, exergy analysis and thermoeconomics, and their application to the design of efficient and environmentally sound energy systems. The chapters are organized in a sequence that begins with pure thermodynamics and progresses towards the blending of thermodynamics with other disciplines, such as heat transfer and cost accounting. Three methods of analysis stand out: entropy generation minimization, exergy (or availability) analysis, and thermoeconomics. The book reviews current directions in a field that is both extremely important and intellectually alive. Additionally, new directions for research on thermodynamics

and optimization are revealed.

The Handbook of Clean Energy Systems brings together an international team of experts to present a comprehensive overview of the latest research, developments and practical applications throughout all areas of clean energy systems. Consolidating information which is currently scattered across a wide variety of literature sources, the handbook covers a broad range of topics in this interdisciplinary research field including both fossil and renewable energy systems. The development of intelligent energy systems for efficient energy processes and mitigation technologies for the reduction of environmental pollutants is explored in depth, and environmental, social and economic impacts are also addressed. Topics covered include: Volume 1 - Renewable Energy: Biomass resources and biofuel production; Bioenergy Utilization; Solar Energy; Wind Energy; Geothermal Energy; Tidal Energy. Volume 2 - Clean Energy Conversion Technologies: Steam/Vapor Power Generation; Gas Turbines Power Generation; Reciprocating Engines; Fuel Cells; Cogeneration and Polygeneration. Volume 3 - Mitigation Technologies: Carbon Capture; Negative Emissions System; Carbon Transportation; Carbon Storage; Emission Mitigation Technologies; Efficiency Improvements and Waste Management; Waste to Energy. Volume 4 - Intelligent Energy Systems: Future Electricity Markets;

Diagnostic and Control of Energy Systems; New Electric Transmission Systems; Smart Grid and Modern Electrical Systems; Energy Efficiency of Municipal Energy Systems; Energy Efficiency of Industrial Energy Systems; Consumer Behaviors; Load Control and Management; Electric Car and Hybrid Car; Energy Efficiency Improvement. Volume 5 - Energy Storage: Thermal Energy Storage; Chemical Storage; Mechanical Storage; Electrochemical Storage; Integrated Storage Systems. Volume 6 - Sustainability of Energy Systems: Sustainability Indicators, Evaluation Criteria, and Reporting; Regulation and Policy; Finance and Investment; Emission Trading; Modeling and Analysis of Energy Systems; Energy vs. Development; Low Carbon Economy; Energy Efficiencies and Emission Reduction. Key features: Comprising over 3,500 pages in 6 volumes, HCES presents a comprehensive overview of the latest research, developments and practical applications throughout all areas of clean energy systems, consolidating a wealth of information which is currently scattered across a wide variety of literature sources. In addition to renewable energy systems, HCES also covers processes for the efficient and clean conversion of traditional fuels such as coal, oil and gas, energy storage systems, mitigation technologies for the reduction of environmental pollutants, and the development of intelligent energy systems. Environmental, social and economic impacts of energy systems are

also addressed in depth. Published in full colour throughout. Fully indexed with cross referencing within and between all six volumes. Edited by leading researchers from academia and industry who are internationally renowned and active in their respective fields. Published in print and online. The online version is a single publication (i.e. no updates), available for one-time purchase or through annual subscription.

This book results from a Special Issue related to the latest progress in the thermodynamics of machines systems and processes since the premonitory work of Carnot. Carnot invented his famous cycle and generalized the efficiency concept for thermo-mechanical engines. Since that time, research progressed from the equilibrium approach to the irreversible situation that represents the general case. This book illustrates the present state-of-the-art advances after one or two centuries of consideration regarding applications and fundamental aspects. The research is moving fast in the direction of economic and environmental aspects. This will probably continue during the coming years. This book mainly highlights the recent focus on the maximum power of engines, as well as the corresponding first law efficiency upper bounds.

This book comprises select proceedings of the International Conference on Future Learning Aspects of Mechanical Engineering (FLAME 2018). The book

gives an overview of recent developments in the field of thermal and fluid engineering, and covers theoretical and experimental fluid dynamics, numerical methods in heat transfer and fluid mechanics, different modes of heat transfer, multiphase transport and phase change, fluid machinery, turbo machinery, and fluid power. The book is primarily intended for researchers and professionals working in the field of fluid dynamics and thermal engineering.

Discover a straightforward and holistic look at energy conversion and conservation processes using the exergy concept with this thorough text. Explains the fundamental energy conversion processes in numerous diverse systems, ranging from jet engines and nuclear reactors to human bodies. Provides examples for applications to practical energy conversion processes and systems that use our naturally occurring energy resources, such as fossil fuels, solar energy, wind, geothermal, and nuclear fuels. With more than one-hundred diverse cases and solved examples, readers will be able to perform optimizations for a cleaner environment, a sustainable energy future, and affordable energy generation. An essential tool for practicing scientists and engineers who work or do research in the area of energy and exergy, as well as graduate students and faculty in chemical engineering, mechanical engineering and physics.

This book deals with exergy and its applications to various energy systems and

applications as a potential tool for design, analysis and optimization, and its role in minimizing and/or eliminating environmental impacts and providing sustainable development. In this regard, several key topics ranging from the basics of the thermodynamic concepts to advanced exergy analysis techniques in a wide range of applications are covered as outlined in the contents. Offers comprehensive coverage of exergy and its applications, along with the most up-to-date information in the area with recent developments Connects exergy with three essential areas in terms of energy, environment and sustainable development Provides a number of illustrative examples, practical applications, and case studies Written in an easy-to-follow style, starting from the basics to advanced systems

Application of advanced computer-oriented techniques are necessary in the synthesis, design analysis and operation of a complex integrated plant to produce power and freshwater, by desalting seawater or brackish water, at higher efficiency and lower cost. These are the two vital commodities to maintains sustainability of life, particularly in the arid regions where natural freshwater supply is either totally lacking or has become scarce. Even in the regions with polluted water resources, such a system is required to support life. At the same time, the available energy should be put to maximum use and life-

cycle analysis is essential to ensure sustainability of the systems. The contributors of this book, experts in their own respective fields, outline the various techniques enriched by their experience. The contents of the book would, therefore, be of great interest not only to designers and operators of dual-purpose power-desalination plants but also to educators and researchers as well serve as a valuable source of information to those engaged in other areas of processing industry. The book is motivated by the growing importance of integrated power and desalination plants in general and in their respective regions in particular, and the long felt need for an authoritative book on the subject. After a long gap of more than two decades following the publication of "Principles of Desalination" Spiegler and Laird in 1980, this book would be a welcome addition to the literature in the field to serve as a valuable guide and reference to all those who are concerned with the integration of power and desalination plants. It will also serve as a valuable source of information to those in the processing industry in general.

Although the exergy method has been featured as the subject of many publishing papers in scientific and engineering journals and at conferences, very few comprehensive books on this subject have been published so far. Practical Approach to Exergy and Thermoeconomic Analyses of Industrial Processes

details the exergetic and thermoeconomic analyses of industrial processes using Aspen Plus and a novel Microsoft Excel Application developed by the authors which can be applied to industrial processes across the board. Employing a practical approach to an innovative and complex energy process, every chapter contains extensive explanations of a complex and real case and numerous examples whose solution demonstrates the application of theory to a wide range of real and practical problems. Illustrations, tables and graphs support and illustrate the new methodology to build a deep understanding of the real employment of the fuel used and the cost formation and increase inside the process. Practical Approach to Exergy and Thermoeconomic Analyses of Industrial Processes provides users, students and practitioners of process analysis, power plant design and fuel use optimization, with a broad introduction and approach to computer aided process optimization. It also serves as a comprehensive guide to the operational application of the MHBT to real cases analysis.

This volume provides a good understanding of the binary fluid system, highlighting new dimensions of the existing Kalina cycle system, a thermodynamic process for converting thermal energy into usable mechanical power. The book illustrates that providing new flexibility leads to new research

outcomes and possible new projects in this field. The information provided in the book simplifies the application of the Kalina cycle system with an easy-to-understand and thorough explanation of properties development, processes solutions, sub-system work, and total system work. There are currently no books available in the area of binary fluid system in the field of KCS with added fallibility in the operation and process design. Currently decentralized power systems are gaining more attention due to shortages in power, and cooling demands are competing with other electrical loads. This book fills a valuable information gap, providing insight into a new dimension for designers, practicing engineers, and academicians in this area.

This is Describes about the Operational Aspects of Combined Cycle Power Plant, Main concentration is on Performance Analysis and Thermodynamic aspects of all the sub systems. The effective heat utilization and accounting of Exergy in the work consumable devices and work extractable. The improvement aspects of various power plants based on combined cycle has been discussed. This book contains the information regarding the working, improving the efficiency of a combined cycle power plant through exergy analysis. In the combined cycle power plants, natural gas is used as major fuel. These plants can achieve higher efficiency in converting fuel to electricity which makes it possible for relatively

high priced fuel like natural gas to be competitive for intermediate or base loads Comprehensively covers conventional and novel drying systems and applications, while keeping a focus on the fundamentals of drying phenomena. Presents detailed thermodynamic and heat/mass transfer analyses in a reader-friendly and easy-to-follow approach Includes case studies, illustrative examples and problems Presents experimental and computational approaches Includes comprehensive information identifying the roles of flow and heat transfer mechanisms on the drying phenomena Considers industrial applications, corresponding criterion, complications, prospects, etc. Discusses novel drying technologies, the corresponding research platforms and potential solutions