

1. Record Nr.	UNINA9910135044703321
Autore	Chiasson Andrew <1966->
Titolo	Geothermal heat pump and heat engine systems : theory and practice / Andrew Chiasson
Pubbl/distr/stampa	Chichester, England : , : ASME Press : , : Wiley, , 2016 ©2016
ISBN	1-5231-5490-X 1-118-96196-X 1-118-96197-8 1-118-96195-1
Descrizione fisica	1 online resource (494 p.)
Collana	Wiley-ASME Press Series
Disciplina	697
Soggetti	Ground source heat pump systems Heat pumps - Thermodynamics Heat-engines - Thermodynamics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Title Page ; Copyright; Contents; Series Preface; Preface; About the Companion Website; Chapter 1 Geothermal Energy Project Considerations ; 1.1 Overview; 1.2 Renewable/Clean Energy System Analysis; 1.3 Elements of Renewable/Clean Energy Systems; 1.4 Geothermal Energy Utilization and Resource Temperature; 1.5 Geothermal Energy Project History and Development; 1.5.1 Geothermal Power Plants; 1.5.2 Direct Uses of Geothermal Energy; 1.5.3 Geothermal Heat Pumps; 1.6 Chapter Summary; Discussion Questions and Exercise Problems ; Part 1 Geothermal Energy - Utilization and Resource Characterization Chapter 2 Geothermal Process Loads 2.1 Overview; 2.2 Weather Data; 2.3 Space Heating and Cooling Loads; 2.3.1 Peak Design Loads; 2.3.2 Monthly and Annual Loads; 2.4 Hot Water Process Loads; 2.5 Swimming Pool and Small Pond Heating Loads; 2.6 Snow-Melting Loads; 2.7 Chapter Summary; Discussion Questions and Exercise Problems ; Chapter 3 Characterizing the Resource ; 3.1 Overview; 3.2 Origin and Structure of the Earth; 3.3 Geology and Drilling Basics for Energy

Engineers; 3.3.1 `Geology 101 for Energy Engineers; 3.3.2 Overview of Drilling Methods  
3.4 Earth Temperature Regime and Global Heat Flows: Why is the Center of the Earth Hot?3.5 Shallow Earth Temperatures; 3.6 The Geothermal Reservoir Concept; 3.7 Geothermal Site Suitability Analysis; 3.7.1 Groundwater Resources; 3.7.2 Geoexchange Applications; 3.8 Chapter Summary; Discussion Questions and Exercise Problems ; Part 2 Harnessing the Resource ; Chapter 4 Groundwater Heat Exchange Systems ; 4.1 Overview; 4.2 Why Groundwater?; 4.3 Theoretical Considerations; 4.3.1 Equations of Groundwater Flow; 4.3.2 Well Hydraulics; 4.3.3 Heat Transport in Groundwater; 4.4 Practical Considerations  
4.4.1 Equipment Needed4.4.2 Groundwater Quality; 4.5 Groundwater Heat Pump Systems; 4.5.1 Small Residential Systems; 4.5.2 Large Commercial Distributed Heat Pump Systems; 4.5.3 System Energy Analysis and the Required Groundwater Flow Rate; 4.5.4 Well Pump Control; 4.5.5 Single Supply-Return Well Systems; 4.6 Chapter Summary; Discussion Questions and Exercise Problems ; Chapter 5 Borehole Heat Exchangers ; 5.1 Overview of Borehole Heat Exchangers (BHEs); 5.2 What is a Borehole Heat Exchanger?; 5.3 Brief Historical Overview of BHEs; 5.4 Installation of BHEs  
5.5 Thermal and Mathematical Considerations for BHEs5.5.1 General BHE Thermal Considerations; 5.5.2 Mathematical Models of Heat Transfer around BHEs; 5.5.3 Determining the BHE Fluid Temperature; 5.5.4 Fluctuating Thermal Loads; 5.5.5 Effects of Groundwater Flow on BHEs; 5.5.6 Mathematical Models of the Borehole Thermal Resistance; 5.6 Thermal Response Testing; 5.6.1 Field Methods; 5.6.2 Analysis Methods of Field Test Data; 5.7 Pressure Considerations for Deep Vertical Boreholes; 5.8 Special Cases; 5.8.1 Standing Column Wells Revisited; 5.8.2 Heat Pipes; 5.9 Chapter Summary  
Discussion Questions and Exercise Problems

---

Sommario/riassunto

"Geothermal Heat Pump Systems: Theory and Practice comprehensively covers the theory, fundamental principles and practical applications of geothermal heat pump systems. It takes an interdisciplinary approach considering the disciplines of geoscience, thermodynamics, heat transfer, and fluid mechanics, while keeping in mind the engineering and practical constraints of the real world. The main focus of this book is geothermal heat pump applications for buildings, however the reader is introduced to the bigger picture of geothermal energy utilization, of which geothermal heat pumps is just one type. Methods and equipment used to convert stored thermal energy into useful energy are also discussed and different ground heat exchangers are considered. Geothermal Heat Pump Systems: Theory and Practice contains end of chapter exercise problems and discussion questions and is accompanied by a website hosting practical design software tools that allow the solution of complex, real problems. It also includes presentation files with lecture slides."--

---