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3.5: Cyclical temperature signals in the ground 3.6: Geothermal gradient; 3.7: Human sources of heat in the ground; 3.8: Geochemical energy; 3.9: The heat energy budget of our subsurface reservoir; 3.10: Cyclical storage of heat; 3.11: Manipulating the ground heat reservoir; 4: What Is a Heat Pump?; 4.1: Engines; 4.2: Pumps; 4.3: Heat pumps; 4.4: The rude mechanics of the heat pump; 4.5: Absorption heat pumps; 4.6: Heat pumps for space heating; 4.7: The efficiency of heat pumps; 4.8: Air-sourced heat pumps; 4.9: Ground source heat pumps; 4.10: Seasonal performance factor (SPF) 4.11: GSHPs for cooling 4.12: Other environmental sources of heat; 4.13: The benefits of GSHP's; 4.14: Capital cost; 4.15: Other practical considerations; 4.16: The challenge of delivering efficient GSHP systems; 4.17: Challenges: the future; 4.18: Summary; 5: Heat Pumps and Thermogeology: A Brief History and International Perspective; 5.1: Refrigeration before the heat pump; 5.2: The overseas ice trade; 5.3: Artificial refrigeration: who invented the heat pump?; 5.4: The history of the GSHP; 5.5: The global energy budget: how significant are GSHP's? 5.6: Ground source heat: a competitor in energy markets?6: Ground Source Cooling; 6.1: Our cooling needs in space; 6.2: Scale effects and our cooling needs in time; 6.3: Traditional cooling; 6.4: Dry coolers; 6.5: Evaporation; 6.6: Chillers/heat pumps; 6.7: Absorption heat pumps; 6.8: Delivery of cooling in large buildings; 6.9: Dehumidification; 6.10: Passive cooling using the ground; 6.11: Active ground source cooling; 6.12: An example of open-loop groundwater cooling; 7: Options and Applications for Ground Source Heat Pumps; 7.1: How much heat do I need?; 7.2: Sizing a GSHP 7.3: Open-loop ground source heat systems

Sommario/riassunto

This authoritative guide provides a basis for understanding the emerging technology of ground source heating and cooling. It equips engineers, geologists, architects, planners and regulators with the fundamental skills needed to manipulate the ground's huge capacity to store, supply and receive heat, and to implement technologies (such as heat pumps) to exploit that capacity for space heating and cooling. The author has geared the book towards understanding ground source heating and cooling from the ground side (the geological aspects), rather than solely the building aspects. He explains t
