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Nota di contenuto	Front Cover; Energy and the New Reality 2 Carbon-Free Energy Supply; Copyright Page; Contents; List of figures, tables and boxes; Preface; Online supplemental material; Acknowledgements; Chapter highlights; List of abbreviations; Chapter 1. Introduction and Key Points from Volume 1; 1.1 The scientific basis for concern about global warming; 1.2 Kaya identity and efficiency versus C-free energy tradeoffs; 1.3 Potential reductions in end-use energy demand; Chapter 2. Solar Energy; 2.1 Seasonal, latitudinal and diurnal distribution of solar energy; 2.2 Photovoltaic electricity 2.3 Solar thermal generation of electricity2.4 Solar thermal energy for heating and hot water; 2.5 Solar thermal energy for air conditioning; 2.6 Solar cogeneration: Integrated PV modules and thermal collectors; 2.7 Industrial uses of solar thermal energy; 2.8 Direct use of solar energy for desalination, in agriculture and for cooking; 2.9 Dealing with the intermittent nature of solar energy; 2.10 Synthesis and global

potential; Chapter 3. Wind Energy; 3.1 Introduction; 3.2 Components and characteristics of wind turbines; 3.3 Wind turbine aerodynamics; 3.4 Wind turbine generators
3.5 Variation of wind speed and turbulence with height near the earth's surface3.6 Power output from a wind turbine; 3.7 Available wind resources; 3.8 Wind farms; 3.9 Scaling relationships and implications for required land area; 3.10 Offshore wind power; 3.11 Mitigating the adverse effect of fluctuations in available wind energy; 3.12 Long-distance transmission; 3.13 Economics; 3.14 Baseload wind-derived electricity: Strategies and costs; 3.15 Energy payback time and GHG emissions; 3.16 Noise and impact on birds; 3.17 Benefits to farmers; 3.18 Overcoming local opposition
3.19 Global and regional wind energy potential and cost3.20 Scenario of future wind energy use; 3.21 Summary; Chapter 4. Biomass Energy; 4.1 Introduction; 4.2 Sources of biomass for energy; 4.3 Processes for extracting energy from biomass; 4.4 Electricity from biomass; 4.5 Environmental and social considerations in the use of biomass for energy; 4.6 Net energy yield and GHG balance of biomass energy; 4.7 Biomass as a chemical feedstock; 4.8 Comparison of CO2 emission savings for alternative uses of land; 4.9 Global biomass energy potential; 4.10 Cost of biomass and biomass products
4.11 Vulnerability of biomass energy production to climatic change4.12 Summary and synthesis; Chapter 5. Geothermal Energy; 5.1 Introduction; 5.2 Geothermal resources; 5.3 Technologies for utilizing geothermal energy; 5.4 Environmental considerations; 5.5 Current and potential utilization and costs; 5.6 Concluding comments; Chapter 6. Hydroelectric Power; 6.1 Physical principles; 6.2 Hydroelectric configurations and types of runners; 6.3 Existing hydroelectric capacity and electricity generation; 6.4 Technical and economic potential for further hydropower; 6.5 Upgrading existing facilities
6.6 Social and environmental considerations

Sommario/riassunto

Transforming our energy supplies to be more sustainable is seen by many to be the biggest challenge of our times. In this comprehensive textbook, L. D. Danny Harvey sets out in unprecedented detail the path we must take to minimize the effects that the way we harness energy will have on future climate change. The book opens by highlighting the importance of moving to low carbon technologies for generation, then moves on to explain the functioning, potential and social/environmental issues around: solar energy wind energybiomass energygeothermal