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Nota di contenuto	Part I: Energy and the environment : the landscape : A primer on climate change / Melinda Marquis, Pieter Tans -- Global energy landscape and energy security / V.S. Arunachalam, Anshu Bharadwaj -- Sustainability and energy conversions / Franklin M. Orr, Jr., Sally M. Benson -- Energy cost of materials : materials for thin-film photovoltaics as an example / Ajay K. Gupta, Charles A.S. Hall --

Economics of materials / Lester B. Lave, Frank R. Field III -- Global energy flows / Richard Sassoon -- Global materials flows / Fridolin Krausmann -- Carbon dioxide capture and sequestration / Sally M. Benson -- Part II: Non-renewable energy sources -- Petroleum and natural gas / Russell R. Chianelli, Xiomara C. Kretschmer, Stephen A. Holditch -- Advancing coal conversion technologies : materials challenges / Bryan D. Morreale, Cynthia A. Powell, David R. Luebke -- Oil shale and tar sands / James W. Bunger -- Unconventional energy sources : gas hydrates / Carolyn A. Koh, E. Dendy Sloan, Amadeu K. Sum -- Nuclear energy : current and future schemes / Christopher R. Stanek, Robin W. Grimes, Cetin Unal -- Nuclear nonproliferation / Siegfried S. Hecker, Matthias Englert, Michael C. Miller -- Nuclear waste management and disposal / Rodney C. Ewing, William J. Weber -- Material requirements for controlled nuclear fusion / Nathaniel J. Fisch, J. Luc Peterson, Adam Cohen -- Part III: Renewable energy sources -- Solar energy overview / Miguel A. Contreras, Satyen Deb -- Direct solar energy conversion with photovoltaic devices / David S. Ginley, Reuben Collins, David Cahen -- Future concepts for photovoltaic energy conversion / Jean-Francois Guillemoles -- Concentrating and multijunction photovoltaics / Daniel J. Friedman -- Concentrating solar thermal power / Abraham Kribus -- Solar thermoelectrics : direct solar thermal energy conversion / Terry M. Tritt, Xinfeng Tang, Qingjie Zhang [and others] -- Off-grid solar in the developing world / Tiffany Tong, Wali Akande, Winston O. Soboyejo -- Principles of photosynthesis / Johannes Messinger, Dmitriy Shevela -- Biofuels and biomaterials from microbes / Trent R. Northen -- Biofuels from cellulosic biomass via aqueous processing / Jian Shi, Qing Qing, Taiying Zhang [and others] -- Artificial photosynthesis for solar energy conversion / Boris Rybtchinski, Michael R. Wasielewski -- Engineering natural photosynthesis / Huub J.M. de Groot -- Geothermal and ocean energy / Jiabin Han, J. William Carey, Bruce A. Robinson -- Wind energy / Michael Robinson, Neil Kelley, Patrick Moriarty -- Part IV: Transportation -- Transportation : motor vehicles / Jerry Gibbs, Ahmad A. Pesaran, Philip S. Sklad -- Transportation : aviation / Robin G. Bennett, Linda A. Caldwell Stancin, William L. Carberry [and others] -- Transportation: shipping / David S. Ginley -- Transportation : fully autonomous vehicles / Christopher E. Borroni-Bird, Mark W. Verbrugge -- Part V: Energy efficiency -- Lighting / Dandan Zhu, Colin J. Humphreys -- Energy efficient buildings / Ron Judkoff -- Insulation science / Leon R. Glicksman, Ellann Cohen -- Industrial energy efficiency : a case study -- Green processing : catalysis / Ronny Neumann -- Material availability and recycling / Randolph Kirchain, Elsa Alonso -- Life-cycle assessment / Corrie E. Clark -- Part VI: Energy storage, high penetration renewables, and grid stabilization -- Toward the smart grid : the US as a case study / S. Massoud Amin, Anthony M. Giacomoni -- Consequences of high penetration renewables / Paul Denholm -- Electrochemical energy storage : batteries and capacitors / M. Stanley Whittingham -- Mechanical energy storage : pumped hydro, CAES, flywheels / Troy McBride, Benjamin Bollinger, Dax Kepshire -- Fuel cells / Shyam Kocha, Bryan Pivovar, Thomas Gennett -- Solar fuels / Christian Jooss, Helmut Tributsch -- Solar thermal routes to fuel / Michael Epstein -- Photoelectrochemistry and hybrid solar conversion / Stuart Licht.

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## Sommario/riassunto

How will we meet rising energy demands? What are our options? Are there viable long-term solutions for the future? Learn the fundamental physical, chemical and materials science at the heart of:

- Renewable/non-renewable energy sources
- Future transportation systems
- Energy efficiency
- Energy storage

Whether you are a

student taking an energy course or a newcomer to the field, this textbook will help you understand critical relationships between the environment, energy and sustainability. Leading experts provide comprehensive coverage of each topic, bringing together diverse subject matter by integrating theory with engaging insights. Each chapter includes helpful features to aid understanding, including a historical overview to provide context, suggested further reading and questions for discussion. Every subject is beautifully illustrated and brought to life with full color images and color-coded sections for easy browsing, making this a complete educational package. Fundamentals of Materials for Energy and Environmental Sustainability will enable today's scientists and educate future generations.

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