

1. Record Nr.	UNINA9910583369603321
Titolo	Managing global warming : an interface of technology and human issues / / edited by Trevor M. Letcher
Pubbl/distr/stampa	London, United Kingdom : , : Academic Press, An imprint of Elsevier, , [2019] ©2019
ISBN	0-12-814105-0
Descrizione fisica	1 online resource (822 pages)
Disciplina	363.73874
Soggetti	Global warming Climatic changes Carbon dioxide mitigation
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Front Cover -- Managing Global Warming: An Interface of Technology and Human Issues -- Copyright -- Contents -- List of contributors -- Section A: Introduction -- Chapter 1: Why do we have global warming? -- 1.1. The greenhouse effect -- 1.2. The root cause of global warming -- 1.3. Other causes of global warming and climate change including global cooling -- 1.4. Indicators of climate change -- 1.5. Why we must act now -- 1.6. What must be done to reduce global warming? -- 1.7. Are we making progress in reducing global warming? -- 1.8. Conclusions -- References -- Chapter 2: The Paris Agreement-Implications for greenhouse gas removal and zero emissions energy production -- 2.1. Introduction -- 2.2. Methodology -- 2.3. Plausibility -- 2.4. The numbers -- 2.4.1. Business as usual -- 2.4.2. Zero emissions energy only -- 2.4.3. Zero emissions energy/Reducing energy consumption -- 2.4.4. Zero emissions energy/Reducing energy consumption/Carbon intensity reduction -- 2.4.5. Greenhouse gas removal -- 2.5. Applying plausibility -- 2.5.1. Fossil fuel emissions -- 2.5.2. Reduction in energy consumption (REC) -- 2.5.3. Reduction in FF carbon intensity (CIR) -- 2.5.4. Greenhouse gas removal (GGR) -- 2.6. Policy implications -- 2.6.1. Zero GGR -- 2.6.2. GGR of 1.5Gt(C)/yr -- 2.6.3. GGR of 5Gt(C)/yr -- 2.6.4. GGR of 10Gt(C)/yr -- 2.7. Delivering

ZEE -- 2.8. Conclusion -- References -- Chapter 3: Current status of electricity generation in the world and future of nuclear power industry -- 3.1. Statistics on electricity generation in the world -- 3.2. Share and operation of various energy sources in an electrical grid -- 3.3. Modern thermal power plants -- 3.4. Modern nuclear power reactors and nuclear power plants -- 3.5. Conclusions -- Acknowledgments -- References -- Section B: Reducing CO₂: Fossil Fuels, Nuclear Energy. Chapter 4: Current and future nuclear power reactors and plants -- 4.1. Introduction -- 4.2. Current nuclear power reactors and NPPs -- 4.2.1. Pressurized water reactors -- 4.2.2. Boiling water reactors -- 4.2.3. Pressurized heavy-water reactors -- 4.2.4. Advanced Gas-cooled Reactors -- 4.2.5. Light-water-cooled graphite-moderated reactors: RBMK and EGP -- 4.2.6. Sodium-cooled fast reactor: BN-600 and BN-800 -- 4.3. Generation IV International Forum -- 4.3.1. Introduction -- 4.3.2. Origins of the GIF -- 4.3.3. Generation IV goals -- 4.3.4. Selection of Generation IV systems -- 4.3.5. Six Generation IV nuclear energy systems -- 4.3.5.1. Very-high-temperature reactor -- 4.3.5.2. Gas-cooled fast reactor -- 4.3.5.3. Sodium-cooled fast reactor -- 4.3.5.4. Lead-cooled fast reactor -- 4.3.5.5. Molten-salt reactor -- 4.3.5.6. Supercritical water-cooled reactors -- 4.3.6. Additional reactor classifications -- 4.3.7. Summary -- 4.4. Comparison of thermophysical properties of reactor coolants -- 4.4.1. Introduction -- 4.4.1.1. Generation II, III, and III+ reactor coolants -- 4.4.1.2. Generation IV reactor coolants -- 4.4.2. Reactor coolants by type -- 4.4.2.1. Fluid coolants -- 4.4.2.2. Gas coolants -- 4.4.2.3. Liquid-metal coolants -- 4.4.2.4. Molten-salt coolants -- 4.4.3. Thermophysical properties of proposed Generations II, III, III+, and IV reactor coolants -- 4.4.4. Heat-transfer coefficients in nuclear power reactors -- 4.4.5. Conclusions -- 4.5. Concise overview of conventional and alternative nuclear fuels -- 4.5.1. Introduction -- 4.5.2. Metallic fuels -- 4.5.3. Ceramic fuels -- 4.5.3.1. Oxide fuels -- 4.5.3.2. Carbide fuels -- 4.5.3.3. Nitride fuels -- 4.5.4. Hydride fuels -- 4.5.5. Composite fuels -- 4.5.6. Nuclear fuel cycles and global sustainability -- Acknowledgments -- References -- Chapter 5: Nuclear fusion: What of the future?. 5.1. The promise of fusion -- 5.1.1. Fusion resources -- 5.1.2. Fusion safety -- 5.2. Fusion concepts -- 5.2.1. Magnetic confinement -- 5.2.2. Inertial confinement -- 5.3. Main technology challenges -- 5.3.1. Reactor materials -- 5.3.2. Power exhaust -- 5.3.3. Breeder blanket -- 5.3.4. Superconducting magnets -- 5.3.5. Remote handling -- 5.3.6. Heating and current drive -- 5.3.7. Other plant issues -- 5.4. Fusion's role in future energy markets -- 5.5. Status of current research -- 5.6. Summary -- References -- Further reading -- Chapter 6: Global renewable energy resources and use in 2050 -- 6.1. Introduction -- 6.2. Biomass energy -- 6.2.1. Introduction -- 6.2.2. Bioenergy in 2050 -- 6.3. Hydroelectricity -- 6.3.1. Introduction -- 6.3.2. Hydroelectricity in 2050 -- 6.4. Wind energy -- 6.4.1. Introduction -- 6.4.2. Wind energy in 2050 -- 6.5. Solar energy -- 6.5.1. Introduction -- 6.5.2. Solar energy in 2050 -- 6.6. Geothermal energy -- 6.6.1. Introduction -- 6.6.2. Geothermal energy in 2050 -- 6.7. Other possible renewable energy sources -- 6.8. Discussion -- References -- Further reading -- Section C: Reducing Greenhouse Gases: Renewables and Zero Carbon/Carbon Neutral Forms of Energy and Electric Cars -- Chapter 7: Methane hydrate as a ``new energy'' -- 7.1. Introduction -- 7.1.1. What is methane hydrate? -- 7.1.2. Where is the reserve and how much? -- 7.2. Production methods -- 7.2.1. Thermal recovery method -- 7.2.2. Depressurization method -- 7.3. Testing equipment and sample preparation -- 7.3.1. Triaxial testing apparatus -- 7.3.2.

Specimen preparation -- 7.3.3. Generation of MH and experimental procedure -- 7.3.4. Triaxial compression tests -- 7.3.4.1. Testing condition -- 7.3.4.2. Test results -- 7.4. MH dissociation tests -- 7.4.1. Initial stress before MH dissociation started -- 7.4.2. Depressurization method -- 7.4.3. Thermal recovery.

7.4.4. Experimental findings -- 7.5. DEM simulation of MH dissociation process -- 7.5.1. Reproduction of MH dissociation process using DEM -- 7.5.2. Micromechanism associated with MH dissociation -- 7.6. Conclusions -- References -- Chapter 8: Hydropower -- 8.1. Introduction -- 8.2. Hydropower generation-Theory -- 8.3. Technology -- 8.3.1. Hydropower project classification -- 8.3.2. Run-of-river hydropower plants -- 8.3.3. Storage hydropower plants -- 8.3.4. Pumped-storage hydropower plants -- 8.3.5. In-stream (hydrokinetic) hydropower plants -- 8.4. Classification according to size-Small and large hydro -- 8.5. Cutting-edge technology -- 8.5.1. Extending operational regime for turbines -- 8.5.2. Utilizing low or very low head-Unpowered dams -- 8.5.3. Fish-friendly hydropower plants -- 8.5.4. Tunneling and underground power plants -- 8.5.5. Surge tanks in hydropower plants -- 8.6. Hydropower resources-Potential -- 8.6.1. Definition of potential -- 8.6.2. Global and regional overview -- 8.7. Existing generation-Regional and global status -- 8.7.1. Historical trends in hydropower production -- 8.7.2. Countries with highest hydropower production -- 8.7.3. Share of hydropower in the global energy mix -- 8.7.4. Share of hydropower from small and large hydro -- 8.8. Cost issues -- 8.9. Integration into broader energy system -- 8.9.1. Energy management services -- 8.9.2. Energy storage -- 8.9.3. Pumped-storage hydro -- 8.9.4. Role in water management -- 8.10. Sustainability issues -- 8.10.1. Environmental and social impacts -- 8.10.2. Greenhouse gas emissions and carbon footprint -- 8.10.3. Energy payback -- 8.10.4. Water consumption and water footprint -- 8.10.5. Sediment issues and reservoir sedimentation -- 8.10.6. Climate change issues -- 8.11. Hydropower in the future-Potential deployment -- 8.11.1. Energy production.

8.11.2. Pumped-storage hydropower -- 8.12. Summary -- References -- Chapter 9: Solar energy -- 9.1. What is solar energy? -- 9.2. Solar energy adoption -- 9.3. Barriers to solar energy adoption -- 9.4. Research in solar devices -- 9.5. The potential of solar energy to reduce greenhouse gas emissions -- References -- Chapter 10: Wind power: A sustainable way to limit climate change -- 10.1. Wind among the renewables -- 10.2. Wind power data -- 10.3. Wind energy in a nutshell -- 10.3.1. What is wind? -- 10.3.2. How much power is there in wind? -- 10.4. Wind turbines -- 10.4.1. History of wind turbine -- 10.4.2. The anatomy of a modern wind turbine -- 10.4.3. How much power can a turbine generate? -- 10.4.4. Offshore wind farms -- 10.5. Offshore wind farm site selection -- 10.6. Case study: Performance of nearshore wind farm during 2012 Tohoku earthquake -- 10.6.1. Why did the wind farm stand up? -- 10.7. Future of offshore wind farm and sustainability -- 10.7.1. Sustainability -- 10.7.1.1. Decommissioning of Lely wind farm -- 10.7.2. ASIDE: Banning of petrol and diesel cars from 2040 and offshore wind energy -- 10.8. Summary -- References -- Chapter 11: Storing electrical energy -- 11.1. Introduction -- 11.2. Electricity energy storage -- 11.3. Pumped hydropower -- 11.4. Compressed air energy storage -- 11.5. Battery energy storage systems -- 11.6. Liquid air energy storage -- 11.7. Superconducting magnetic storage -- 11.8. Chemical Storage (H₂ and CH₄) -- 11.9. Vehicle-to-grid systems -- 11.10. Other methods of storing electrical energy -- 11.11. Conclusion -- References -- Further reading -- Chapter 12: Bioenergy -- 12.1. The role of bioenergy -- 12.2. Advantages of

bioenergy -- 12.3. Emission reductions and carbon balance -- 12.4. Sustainability -- 12.5. Bioenergy case study: Generating low carbon energy from agricultural & food wastes.

12.5.1. Anaerobic digestion of agriculture manures and slurries.

Sommario/riassunto

What are the causes of global warming? What options are available to solving the global warming problem? How can each option be realistically implemented? Technological Solutions to Global Warming is the first book of its kind, based on scientific content providing an overall reference looking at the problems of global warming and possible solutions in one volume. Containing all the necessary authoritative chapters written by scientists and engineers working in the field; each chapter includes the very latest research and references in the potential impact of wind, solar, hydro, geo-engineering and other energy technologies on climate change. With such a wide ranging set of topics and solutions readers will find a beneficial synergy, between the different solutions and issues, making this a handbook for engineers, professors, leaders and policy makers.--
