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Descrizione fisica	1 online resource (VI, 386 p. 50 illus., 48 illus. in color.)
Collana	Green Energy and Technology, , 1865-3537
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Soggetti	Renewable energy sources Industrial engineering Automation Biochemical engineering Industrial Management Renewable Energy Industrial Automation Bioprocess Engineering
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Nota di bibliografia	Includes bibliographical references.
Nota di contenuto	Renewable carbon in Industry 4.0: Towards the sustainable bio-economy -- Precision biomass collection, storage and transportation of feedstock at biorefinery gate -- Technical aspects and new developments in first generation, second generation and third generation biorefinery -- Process automation in smart biorefinery for renewables production -- The realm of smart biomass degrading enzymes in low carbon fuels and chemicals production -- Sustainable ethanol production and high add value by-products in biorefinery -- Industry 4.0 in development of new crops, smart enzymes and designer bugs in biofuels production -- Embracing Industry 4.0 ingredients in synthetic biology for the development of carbon neutral economy -- Industry 4.0 and 3D printing: advancing the generation of smart materials in biorefineries -- Nanocellulose and nanolignin in plethora of new sustainable applications -- Possibilities, benefits and challenges of applying lean manufacturing in biorefineries -- Supply chain and value chain analysis in biorefineries -- Economic, social, political and

	organizational challenges in Industry 4.0 -- Carbon capture and utilization (CCU) to chemicals through Industry 4.0 -- Biotechnological production of vegan protein through Industry 4.0 to cater the growing demand in society.
Sommario/riassunto	This book provides a comprehensive overview of the latest advances in the production of low carbon chemicals and biofuels from renewable feedstock, including pilot, demo, and commercial-scale technologies. It highlights the role of Industry 4.0 in improving the efficiency and affordability of biorefineries, ultimately leading to the production of bio-based molecules and energy with low carbon and water footprints. Drawing on the expertise of established researchers, academics, and engineers, the book presents a range of informative chapters on the subject. It explores the key elements of Industry 4.0, such as, interconnectivity and smart process automation, and shows how these can be harnessed to revolutionize industrial processes and offer finished products in a cost-effective manner. With its emphasis on sustainability and cutting-edge technology, this book is an essential resource for anyone interested in the future of low carbon chemistry and bioenergy production.