Introduction and Overview

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Abstract  This chapter gives an overview of the entire book summarizing all 29 chapters, laying out its structure and linkage of different chapters. This book is purposefully styled as an introductory textbook on circular economy (CE) for the benefit of educators and students of universities. It provides comprehensive knowledge exemplified by practices from policy, education, R&D, innovation, design, production, waste management, business, and financing around the world. The book covers sectors such as agriculture/food, packaging materials, build environment, textile, energy, and mobility to inspire the growth of circular business transformation. It aims to stimulate action among different stakeholders to drive CE transformation. It elaborates critical driving forces of CE including digital technologies; restorative innovations; business opportunities & sustainable business model; financing instruments, regulation & assessment and experiential education programs. It connects a CE transformation for reaching the SDGs2030 and highlights youth leadership and entrepreneurship at all levels in driving the sustainability transformation.

1 Background

This book is written during unprecedented times of recent human history. Three pertinent observations could be drawn from the COVID-19 pandemic. First, clean air, water, food and energy, and hygienic living environment anchored by general healthcare, wellness, mental health, and family support are essential for the survival and sustainability of the human race on planet Earth. In other words, we can only lead healthy lives in a healthy and safe environment. Second, digital technologies including the internet and artificial intelligence (AI) enabled big data analytics, mobile communication devices, cloud-based services enabling point of care, learning
from anywhere and anytime at own pace, and telecommuting have become integral to human society. In other words, the modern society entrenched with digital technologies found them to be necessary in unprecedented times as well as normal times. Third, the modern society is inundated with non-essentials such as travel for leisure, clubbing and entertainment, and window shopping. In other words, the modern society consumes far more resources per person when compared to the pre-modern society. Modern society is thriving on the abundant supply of materials, energy, and water, and accessible to billions of people around the world. Waste generation commensurate with consumption. Waste is often not adequately recycled, and hence ends up in soil, water, and air environment of planet Earth. In other words, depletion of natural resources and increased pollution of the Earth ecosystem, which in turn affects the health and well-being of human beings. Current ways of modern society are not conducive to ensure sustainability of resources of Earth for the future generations. Hence, the primary objective of circular economy and sustainability efforts is to deliver a new-modern society in which the ways of the current society least compromise the needs of future generations. Desired characteristics of the new-modern society encompass the visions of circular economy and sustainability development aimed at protecting the Earth while ensuring improved quality of living and growth. Simply put it is an economic system aimed at eliminating waste and the continual use of resources (https://en.wikipedia.org/wiki/Circular_economy).

Circular Economy is emerging and is evolving rapidly, specially today, when humanity is facing various challenges including climate change, pandemics and environmental devastation, and widening social inequalities. Policymakers, manufacturers and service providers, and consumers are developing Earth-friendly policies, innovating business practices, and changing consumption behavior toward sustainability, respectively. The adoption of emerging technologies and innovative business models are enabling the transformation of a circular and more sustainable economy. A circular and sustainable economy is driven by sustainable consumption and production. Sustainability mindset, action, and behavior of stakeholders in the ecosystem of production and consumption leads to sustainable practices. The most critical driver of an economic transformation is education that shapes the mindset, action, and behavior of all stakeholders including policymakers, investors, researchers, educators, producers, service providers, consumers, and media.

University curriculum are beginning to embrace circular economy and sustainability knowledge in educating future generation of graduates who become the stakeholders of the economic ecosystem. This book is purposefully styled as an introductory textbook on circular economy (CE) for the benefit of educators and students of universities. It provides comprehensive knowledge exemplified by practices from policy, education, R&D, innovation, design, production, waste management, business, and financing around the world. The book covers sectors such as agriculture/food, packaging materials, build environment, textile, energy, and mobility to inspire the growth of circular business transformation. It aims to stimulate action among different stakeholders to drive CE transformation.

It elaborates critical driving forces of CE including digital technologies; restorative innovations; business opportunities and sustainable business model; financing
instruments, regulation and assessment, and experiential education programs. It connects a CE transformation for reaching the SDGs2030 and highlights youth leadership and entrepreneurship at all levels in driving the sustainability transformation.

Each chapter of the book (except the first and the last chapter) follows the format of Abstract; Keywords; Learning Objectives; Introduction; detailed coverage of the topic including Concepts/Mechanisms/Methodologies exemplified by Case Studies; Questions and Further Readings as a homework or exercises for students to expand and deepen their learning; and References.

Below capture the key features of the book:

• Addresses Circularity along product value chain and business supply chain with case studies.
• Provides Circularity guidelines including framework, examples, and case studies for policymakers, educators, business leaders, and investors.
• Contains Comprehensive contribution with inclusivity in terms of age (1/3 below 35 years old) and gender (over 40% female) with multidisciplinary background from all five continents.
• Comprises substantial coverage of updated policy, research and innovation, education programs, and business practices on circular economy in the Asian region.
• Includes Life Cycle Assessment and Costing methodology for circular economy practices.
• Presents interconnectivity along the circular value chain and roles of different stakeholders for a circular economy transformation.
• Highlights different driving factors for a circular economy transition including digital technologies, business opportunities and consumer service models, financing, circularity indicators and assessment, policy and regulations, and education.

2 Overview

See Fig. 1.

We design this book to ensure the circularity of the content, starting from the most critical Life Cycle Thinking mindset in Chapter GHÉEWALA, zooming in an overview of the macro world of circular city in Chapter KISSER, to mesoworld of industry circular manufacturing ecosystem (Chapter SHI) where industrial symbiosis is practiced (Chapter LA ROSA), and circular supply chain management (Chapter KHOMPATRAPORN) enabling innovative circular business model based on services (Chapter ITKIN). Further zooming in to microworld of products and consumption circularity from Food (Chapter KISSER, Chapter KHOR, Chapter GODOY-FAUDEZ, CHAPTER EMF, Chapter KHOMPATRAPORN, and Chapter CHEN); Materials including plastics (Chapter BALAJI, Chapter MODAK), buildings (Chapter KISSER, Chapter EMF, Chapter HOOSAIN), and textiles (Chapter KEH); Energy (Chapter SEETHARAM on Community Microgrid, Chapter PATIL
on Building Integrated Photovoltaic, and Chapter KHOMPATRAPORN on Virtual Power Plant); Water (Chapter KISSER, Chapter GODOY-FAUDEZ) to Mobility (Chapter EMF). Product design for circularity for building and packaging is also featured in Chapter KISSER, Chapter SHI, Chapter MODAK, Chapter BALAJI, and Chapter TAN.

Moving downstream, in sustainable waste management, extensive coverage includes food waste (Chapter KHOR), waste electric and electronic products (Chapter YU), agriculture and municipal waste (Chapter PETERS, Chapter FUKUDA, Chapter MODAD). An example of upcycling practice through creating eco-art from electronics waste (E-waste) is elaborated in Chapter MALLABADI where the entire artwork creation and its strategic practice for scaling up through education on E-waste are shared.

Circular economy needs a workforce equipped with life cycle thinking mindset, STEM knowledge, and entrepreneurship skills, Chapter SIDDIQUE provides a dedicated overview on circular economy education worldwide and highlighted the STEAM Platform practices on Circular Economy general education module and its youth leadership program. Chapter EMF emphasizes that importance of embedding circular economy principles into teaching across all ages of learning. This supports
**Table 1  Summary of book structure**

| Circular Economy Structure | Topics | Chapter Title                                                                 | 1st Author                     |
|----------------------------|--------|-------------------------------------------------------------------------------|--------------------------------|
| Key Concepts and Terminology | **Key Concepts and Terminology** | Key Concepts and Terminology                                                  | Mengmeng CUI                   |
| Life Cycle Thinking Mindset | Life Cycle Thinking & Assessment | Life Cycle Thinking in a Circular Economy                                     | Shabbir GHEEWALA               |
| The Fabrics of A Circular City | Holistic Picture of Circular City | The Fabrics of a Circular City                                                | Johannes KISSER                |
| Mining                     | Impact on Water, Energy and Food | Circular Economy in a Water-Energy-Food Security Nexus in a SDGs Framework: Understanding Complexities | Alex GODOY-FAUNDEZ            |
| Production                 | Industry Circular Manufacturing | Industry Circular Manufacturing                                              | Lei SHI                        |
|                           | Industrial Symbiosis             | Industry Symbiosis for Circular Economy: A Possible Scenario in Norway         | Daniela LA ROSA                |
| Consumption                | Agriculture & Food               | Agriculture & Food Circularity                                               | Hung Teik KHOR                 |
|                           | Plastics                         | Plastics in Circular Economy: A sustainable Progression                      | Anand BELLAM BALAJI           |
|                           | Built Environment                | Materials Passports and Circular Economy                                     | Mohamed SAMEER HOOSAIN         |
|                           | Textile                          | New Paradigm for R&D and Business Model of Textile Circularity                | Edwin KEH                     |
|                           | Water                            | Circular Economy in a Water-Energy-Food Security Nexus in a SDGs Framework: Understanding Complexities | Alex GODOY-FAUNDEZ            |
|                           | Mobility                         | The Business Opportunity of a Circular Economy                               | Ellen MacArthur Foundation (EMF) |
|                           | Energy: Community Microgrid      | Circular Economy Enabled by Community Microgrids                              | Deva P SEETHARAM              |

(continued)
| Circular Economy Structure | Topics                        | Chapter Title                                                                 | 1st Author                  |
|---------------------------|-------------------------------|-------------------------------------------------------------------------------|-----------------------------|
|                           | Energy: Building Integrated Photovoltaic | Renewable Energy for Circular Economy: Application of Life Cycle Costing for the Building Integrated Solar PV Systems | Rashmi ANOOP PATIL          |
| Waste Management          | Electronic and Electrical Equipment Waste | Recycling of Waste Electric and Electronic Products in China                  | Kelin YU                   |
|                           | Agricultural Waste            | Agricultural & Municipal Waste Management in Thailand                         | Suneerat FUKUDA             |
|                           | Municipal Waste               | Waste Management Practices: Innovation, Waste to Energy & e-EPR                | Stephen PETERS              |
|                           | Upcycling for Eco-Art         | Transforming e-waste to Eco-Art by Upcycling                                  | Vishwanath MALLABADIA       |
|                           | R&D                           | New Paradigm Shift in R&D                                                      | Edwin KEH                   |
|                           | Technology & Innovation       | Digital Technologies                                                          | Parvathy KRISHNAKUMARI      |
|                           | Restorative Innovation        | Innovation for Circular Economy                                               | Jovan TAN                  |
|                           | Circular Business             | Business Opportunities                                                          | Ellen MacArthur Foundation  |
|                           | Circular Supply Chain         | Circular Supply Chain Management                                               | Charoenchai KHOMPATRAPORN   |
|                           | Business Model                | Circular Economy Business Models and Practices                                 | Anna ITKIN                 |
|                           | Financing                     | Economic Instruments and Financial Mechanisms for the Adoption of a Circular Economy | Santiago ENRIQUEZ          |
|                           | Assessment                    | Life Cycle Thinking in a Circular Economy                                     | Shabbir GHEEWALA           |

(continued)
Table 1 (continued)

| Circular Economy Structure | Topics | Chapter Title | 1st Author |
|----------------------------|--------|---------------|------------|
| Greenhouse Gas Emissions Life Cycle Assessment | Life Cycle Greenhouse Gas Emissions for Circular Economy | Thumrongrut MUNGCHAROEN |
| Life Cycle Costing | The Life Cycle Costing: Methodology and Applications in a Circular Economy | Piya KERDLAP |
| Environment, Social and Governance (ESG) | Towards Sustainable Business Strategies for a Circular Economy: Environmental, Social and Governance (ESG) Performance and Evaluation | Rashmi ANOOP PATIL |
| Education | Sustainability Education | Youth Leadership in a Circular Economy: Education Enabled by the STEAM Platform | Arslan SIDDIQUE |
| | Education on E-waste and Art Creation | Transforming e-waste to Eco-Art by Upcycling | Vishwanath MALLABADI |
| Policy Case Studies | India | Circular Economy Practices in India | Prasad MODAK |
| | Taiwan | Taiwan Circular Economy: Transition Roadmap and Food, Textile & Construction Industries | Shadow CHEN |

a mindset shift that will enable future leaders and young professionals to acquire circular economy knowledge, skills, and capabilities which they can take forward within their careers.

Table 1 summarizes the structure of the book and Fig. 1 captures the infographic interpretation of the book content.

The driving force of circularity involves emerging technologies such as digital technologies; research, development and innovation; business opportunities and sustainable business model; economic instruments and financing mechanisms, and assessment and regulation.
2.1 The Role of Digital Technologies

We are entering the era of the 4th Industrial Revolution - Industry 4.0 where digital technologies such as Internet of Things (IoT), Artificial Intelligence (AI), Cloud Computing and Blockchain are enabling transparency and efficiency in our economy.

Digital technologies enable digitization across product lifecycle, from resource extraction, production processes (design, materials, component, module, system), distribution (logistics and retails), consumption to waste management. Chapter HOOSAIN elaborates Materials Passport (MP) for the Built Environment with a highlight of the enabling digital technologies. MP provides information (composition/specification, spatial and life cycle) across the entire value chain of a product and its supply chain from sources to producers, distributors, and consumers/users. This enables re-use, remanufacture, recycle, and recover of materials, components, and systems.

Chapter KRISHNAKUMARI connects Industry 4.0 and the circular economy. Through a digitalization framework, Industry 4.0 proposes the creation of ‘digital twins,’ embeds interconnected IoT networks, and utilizes Machine Learning, and Big Data Analytics to derive understanding and predictive metrics from manufacturing and industrial data. Industry 4.0 drives the digital transformation toward smart and resilient economy. It focuses how Data Analytics could accelerate a circular economy transition through case studies.

Digital technologies also enable efficient and effective circular supply chain management described in Chapter KHOMPATRAPORN. It also provides circular supply chain transformation strategy through digitalization, collaborative platform, and reverse loop.

2.2 Research and Development and Innovations

Circularity solutions require research and innovation to reach sustainability. Recognizing the urgency of developing a resilient society when humanity is facing unprecedented crisis such as climate change and pandemics, all stakeholders need to act coherently in developing and implementing solutions to secure human survival sustainably. Chapter KISSER, Chapter SHI, Chapter PETERS, Chapter EMF, Chapter MODAK, and CHAPTER CHEN have all discussed the role of the government and multi-stakeholder partnerships in driving circular economy transformation. In particular, Chapter KEH demonstrated public-private partnership (PPP) in developing innovative and scalable circularity solutions enabled by accelerated research and development. The chapter focuses on a case study of a successful implementation of circularity in textile and apparel sector. The case study represents common problems and solutions development methodology applicable to industry sectors. The chapter highlights a new paradigm R&D where all stakeholders (government, research institutes, and industry) have the urgency mindset in solving environmental
problems caused by the waste of production of textile and consumption of apparels. A short-term focused target was set, strong partnership and open innovation R&D platform was set up to include supply chain of the entire textile industry. This is to ensure a scalable working solution implementable on both the production and consumption sites. This PPP is practiced in both co-financing and R&D enabling industry partners to implement a scalable solution in both manufacturing and business.

This case study also demonstrates technology innovation drives circular business innovation, allowing decentralization of product end of life (waste) management improving economic and environmental performance of business.

Deep diving into innovation, Chapter TAN introduces Restorative Innovation—an innovation economic model that explains a pattern of innovation-driven growth for innovative solutions designed to restore our health, humanity, and environment. The chapter showcases a number innovative business practices including a cradle to cradle circular business enabled by restorative innovation where the featured company produces materials from bio-based resources, designs customized packaging, services, collects and composts waste, and returns back to earth for regenerating bio-resources.

2.3 Business Opportunities

Chapter EMF demonstrates that circular economy provides a value creation opportunity and solutions framework to address global challenges. This translates to enormous new business opportunities in terms of saving materials cost, avoiding waste management cost, cost saving for improving business efficiency, and new revenue from new business. It also presents enormous opportunities for innovation enabled by emerging technologies such as digital technologies. Circular Economy is viewed as a delivery mechanism for achieving climate change targets, sustainable development goals, and ultimately reaching sustainable development. The chapter shares the outcome of analysis by EMF including a) the circular economy transformation could yield annual benefits for Europe of up to EUR 1.8 trillion in 2030, b) For China, activating broader circular economy solutions in cities could significantly lower the cost of access to goods and services and could save businesses and households approximately USD 11.2 trillion in 2040, and c) For India, the annual benefits could amount to USD 624 billion in 2050 compared with the current development path.

The chapter focuses on business opportunities in three key sectors: the food system in India; the built environment in China’s cities; and mobility in Europe. It further quantifies the economic, environmental, and social benefits of these opportunities and explores what are the levers to bring them to scale.
2.4 Business Model

Sustainability of a company is driven by its business model. In a circular economy, business can no longer focus on the pure growth of profit, it has to sustain its operation through taking care of the planet, people, and profit holistically. Chapter ITKIN stresses a sustainable business model (SBM) drives circular economy toward sustainable development. The chapter highlights that circular economy is a functional service economy leading to economic competitiveness. Selling a service enables to create sustainable profits without an externalization of the costs of risk and costs of waste. Case studies of circular business model practices are also elaborated in Chapter TAN, Chapter KHOMPATRAPORN, Chapter MODAK, and Chapter CHEN.

2.5 Economic Instruments and Financing Mechanisms

To implement R&D, business innovation and drive the economic transformation, economic instruments, and financing mechanisms are crucial. Chapter ENRIQUEZ elaborates the importance of incentives that aim to incorporate environmental costs into the budgets of households and enterprises and encourage environmentally sound and efficient production and consumption through full-cost pricing. The chapter recommends incentives to free up and reallocate resources that are currently used in the linear model, as well as to mobilize new funding (sustainable bonds, ESG investment, equity capital) to support a circular economy transition. It stresses that the environmental policy instruments and financing enable investments in eco-design and the adoption and scaling up of new technologies and business models.

2.6 Assessments and Regulations

To drive a circular economy transition locally and globally toward sustainability, monitoring, and assessment is necessary. Although there are not yet standardized sets of circular economy indicators, the European Union, other European countries, and the Ellen MacArthur Foundation (EMF) have developed indicators to measure resource efficiency and raw materials management, materials circularity at the product and corporate levels, such as Buildings As Material Banks (BAMB) Circular Building Assessment and the industry-based circularity dataset initiative.

Circularity assessment tools primarily developed by European organizations include Cradle to Cradle Certified (The Cradle to Cradle Products Innovation Institute), The Circularity Check (Ecopreneur.eu), Circularity Gap Report (Platform for Accelerating the Circular Economy (PACE)), and Circular Business Solutions (alchemy-nova GmbH) are summarized in Chapter KISSER. Other circular economy
progress measurement tools including Circulytics by the Ellen MacArthur Foundation, the Circular Transition Indicators by World Business Council for Sustainable Development, Global Reporting Initiative’s upcoming circular economy reporting guidelines in the context of waste are summarized in Chapter EMF.

Circular economy-specific regulation, the extended product responsibility (EPR) policy is discussed in a number of chapters including Chapter SHI, Chapter PETERS, Chapter ENRIQUEZ, and Chapter KISSER.

EPR needs to be enforced to all producers globally. Shifting the waste management cost to producers incentivized circular product design, closing the materials loop, and driving service-based business model. In particular, Chapter PETERS stresses that through public–private partnership models the EPR policy enabled by digital technologies offers more efficient and effective route to implementation and accelerates a circular economy transition.

2.7 Sustainability and SDGs

The outcome of circular economy transition needs to be aligned with sustainable development goals and sustainability (social, environmental and economic) as a whole. Chapter GODOY-FAUNDEZ elaborates, for an extractive economy focusing on agriculture and mining, that practicing a circular economy will help to solve problems of the Food-Water-Energy insecurities and achieving sustainable development goals in countries such as Chile.

Circularity does not necessarily lead to sustainability. Life Cycle Assessment (LCA) and Environmental, Social & Governance (ESG) assessments are necessary tools to guide industry and business to achieve sustainability. Chapter GHEEWALAIL adopts LCA framework to assess the environmental sustainability for sugar cane production and packaging materials. To ensure that circular business is actually environmentally beneficial, it is essential to demonstrate the reduction of life cycle Greenhouse Gas (GHG) emissions. Chapter MUNGCHAROEN demonstrates the calculation of GHG emissions of circular business using methodology of the Intergovernmental Panel on Climate Change (IPCC) guidelines and life cycle assessment standards. In order to guide the economic decision-making for consumers and businesses, Chapter KERDLAP elaborates on Life Cycle Costing (LCC) methodology with case studies on different circular economy business practices. Chapter PATIL further provides a basic overview of the current circularity assessment methodologies and highlighted with case studies that ESG performance can be enhanced through circularity business practices.

Circular economy does not only address environmental sustainability but it also creates social and economic benefits. Chapter KHOMPATRAPORN, Chapter ITKIN, and Chapter EMF discussed both the societal and economic aspect of Circular Economy.
2.8 Policy Case Studies

Without an extensive coverage on circular economy development around world, we feature circular economy in India and Taiwan. In addition to policy coverage of the region, Chapter MODAK provided an overview on India circular economy highlighted the adoption of digital technology in managing waste flow, integrating informal waste recycler into the CE supply chain creating social benefits to the waste pickers, and building multi-stakeholder partnership platform in CE transition. Chapter CHEN shares the Taiwan’s transition roadmap that focuses on guiding industry and business toward the circularity transition. The chapter focuses on a few flagships on emerging business in the food, textile, and construction sectors.

Circular economy is evolving rapidly and expanding globally. Some of the case studies shown in this book have not been scaled yet. We hope this book is able to provide guidance for policymakers, investors, corporations, entrepreneurs, researchers, educators, and general public to take action as a consumer and stakeholder to accelerate the transformation through scaling up those practices or innovating more effective practices.

Some of the topics that are emerging such as circularity by design, circularity assessment and regulations, and digital technologies applications will have more extensive coverage with case studies in the second edition to appear in 2021. We will also continue with regional coverage, especially in North America, North Asia, and other part of the world in the next edition.

3 Authors Analytics

We are fortunate to have a total of 66 authors from around the world across 5 continents with multidisciplinary background contributed covering 30 chapters in this book at this inaugural edition to share their learning, knowledge, practices and solutions for acceleration of a circular economy transition. Figure 2a shows the authors demographics based on survey from over two third of total authors participated in the survey. Figure 2b shows the diversity of authors in terms of background, gender, and age group, in particular, authors who are under 35 are in the majority.

A circular economy transition needs each and every one of us to take action both personally and professionally. Effective communication and making a circular economy framework and practices understood by all stakeholder is critical. This book uses Infographics, figures, and tables to make the book content more visual and easy to read and understand. It aims to be inclusive to all. The inclusivity of the book includes diverse age group, geographical location, disciplines, sectors, and stakeholders.
Fig. 2a Author analytics on demographics (Generated Parvathy Krishnan from DAV Data Solutions)
Fig. 2b  Author analytics on diversity (Generated Parvathy Krishnan from DAV Data Solutions)
Lerwen Liu is a strong advocate of sustainability through innovation and entrepreneurship education and training focusing on the Asian region. She is a senior advisor in King Mongkut’s University of Technology Thonburi (KMUTT) in Bangkok playing a leadership role in (1) streamlining strategy of education, research and innovation, and social impact toward sustainable development goals, industry 4.0, and circular economy, (2) building strategic partnerships with the United Nations, Asia Development Bank, leading universities, government funding agencies and industries worldwide in developing solutions for reaching SDGs and circular economy, and (3) conducting strategic training to KMUTT students and staff preparing the change agents/leaders for the SDGs 2030 and circular economy through her STEAM Platform.

She pioneered education programs of innovation and entrepreneurship toward sustainability, SDGs and circular economy in the National University of Singapore (NUS), Yale-NUS College, and KMUTT. She has organized various platform events in partnership with the UN, ADB, World Bank, and other entrepreneurship-related organizations in driving youth leadership and entrepreneurship towards SDGs and Circular Economy through the adoption of STEM knowledge, and Industry 4.0.

Professor Seeram Ramakrishna FREng, Everest Chair (https://www.eng.nus.edu.sg/me/staff/ramakrishna-seeram/), is among the top three impactful authors at the National University of Singapore, NUS (https://academic.microsoft.com/institution/165932596). NUS is ranked among the top five best global universities for engineering in the world (https://www.usnews.com/education/best-global-universities/engineering). He is the Chair of Circular Economy Taskforce. He is a member of Enterprise Singapore’s and ISO’s Committees on ISO/TC323 Circular Economy and WG3 on Circularity. He also the Chair of Sustainable Manufacturing TC at the Institution of Engineers Singapore and a member of standards committee of Singapore Manufacturing Federation (http://www.smfederation.org.sg). He is an advisor to the Ministry of Sustainability & Environment—National Environmental Agency’s CESS events, (https://www.cleanenvirosummit.sg/programme/speakers/professor-seeram-ramakrishna; https://bit.ly/catalyst2019video; https://youtube.com/watch?v=ptSh_1Bg11g). European Commission Director-General for Environment, Excellency Daniel Calleja Crespo, said, “Professor Seeram Ramakrishna should be praised for his personal engagement leading the reflections on how to develop a more sustainable future for all”, in his foreword for the Springer Nature book on Circular Economy (ISBN: 978-981-15-8509-8). He is a member of UNESCO’s Global Independent Expert Group on Universities and the 2030 Agenda (EGU2030). He is the Editor-in-Chief of the Springer NATURE Journal Materials Circular Economy—Sustainability (https://www.springer.com/journal/42824). He is an Associate Editor of eScience journal (http://www.keaipublishing.com/en/journals/escience/editorial-board/). He is an opinion contributor to the Springer Nature Sustainability Community (https://sustainabilitycommunity.springernature.com/users/98825-seeram-ramakrishna/posts/looking-through-covid-19-lens-for-a-sustainable-new-modern-society). He teaches ME6501 Materials and Sustainability course (https://www.europeanbusinessreview.com/circular-economy-sustainability-and-business-opportunities/). He also mentors Integrated Sustainable Design ISD5102
project students. Microsoft Academic ranked him among the top 25 authors out of three million materials researchers worldwide based on H-index (https://academic.microsoft.com/authors/192562407). He is named among the World’s Most Influential Minds (Thomson Reuters) and World’s Highly Cited Researchers (Clarivate Analytics). Listed among the top three scientists of the world as per the Stanford University researcher study on career-long impact of researchers or c-score (https://drive.google.com/file/d/1bUJrvurVVBBxS19eFZRSHFi7tt30-5U/view). He is an Impact Speaker at the University of Toronto, Canada Low Carbon Renewable Materials Center (https://www.lcrmc.com/). He is a judge for the Mohammed Bin Rashid Initiative for the Global Prosperity (https://www.facebook.com/Make4Prosperity/videos/innovation-inclusive-trade/479503539339143/). He advises technology companies with sustainability vision such as TRIA (www.triabio24.com), CeEntek (https://ceentek.com/), Green Li-Ion (www.Greenli-ion.com) and InfraPrime (https://www.infra-prime.com/vision-leadership). He is a Vice-President of Asian Polymer Association (https://www.asianpolymer.org/committee.html). He is a Founding Member of Plastics Recycling Association of Singapore (PRAS). His senior academic leadership roles include University Vice-President (Research Strategy), Dean of Faculty of Engineering; Director of NUS Enterprise and Founding Chairman of Solar Energy Institute of Singapore (http://www.seris.nus.edu.sg/). He is an elected Fellow of UK Royal Academy of Engineering (FREng), Singapore Academy of Engineering and Indian National Academy of Engineering. He received PhD from the University of Cambridge, UK, and The TGMP from the Harvard University, USA.