
Encyclopedia of the UN Sustainable Development Goals

Series Editor

Walter Leal Filho

The problems related to the process of industrialization such as biodiversity depletion, climate change, and a worsening of health and living conditions, especially but not only in developing countries, intensify. Therefore, there is also an increasing need to search for integrated solutions to make development more sustainable. The current model of economic growth used by many countries is heavily based on the exploitation of natural resources, which is not viable. Evidence shows that a more careful, that is, a more sustainable, approach to the use of our limited resources is needed.

The United Nations has acknowledged the problem, and among other measures, it produced a set of documents at the UN Conference on Sustainable Development (Rio+20), held in Rio de Janeiro, Brazil, in 2012. In 2015, the UN General Assembly approved the “2030 Agenda for Sustainable Development.”

On January 1, 2016, the 17 Sustainable Development Goals (SDGs) of the Agenda officially came into force. These goals cover the three dimensions of sustainable development: economic growth, social inclusion, and environmental protection.

There are to date no comprehensive publications addressing the SDGs in an integrated way. Therefore, the Encyclopedia of the UN Sustainable Development Goals is being published. It encompasses 17 volumes, each devoted to one of the 17 SDGs.

More information about this series at <https://www.springer.com/series/15893>

Walter Leal Filho • Anabela Marisa Azul •
Luciana Brandli • Amanda Lange Salvia •
Tony Wall
Editors

Affordable and Clean Energy

With 280 Figures and 78 Tables

 Springer

Editors

Walter Leal Filho
European School of Sustainability
Science and Research
Hamburg University of Applied Sciences
Hamburg, Germany

Anabela Marisa Azul
Center for Neuroscience and Cell Biology
Institute for Interdisciplinary Research
University of Coimbra
Coimbra, Portugal

Luciana Brandli
Faculty of Engineering and Architecture
The University of Passo Fundo
Passo Fundo, Brazil

Amanda Lange Salvia
University of Passo Fundo
Passo Fundo, Brazil

Tony Wall
International Centre for Thriving
University of Chester
Chester, UK

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Series Preface

The United Nations General Assembly agreed and approved in September 2015 the document “2030 Agenda for Sustainable Development”, which contains a set of measures aiming to balance economic progress and protection of the environment, while at the same time remain aware of the need to address the many disparities still seen between industrialized and developing countries.

The Agenda document consists of 17 Sustainable Development Goals (SDGs). These Goals build on the successes of the Millennium Development Goals, while including new areas such as climate change, economic inequality, innovation, sustainable consumption, peace and justice, among other priorities. The goals are interconnected – often the key to success on one will involve tackling issues more commonly associated with another. The 17 SDGs are:

SDG 1, placing an emphasis on ending all forms of extreme poverty.

SDG 2, which aims to end hunger and achieve food security with improved nutrition

SDG 3, focusing on ensuring healthy lives and promoting well-being for all

SDG 4, touches on one of the most important areas, namely inclusive and quality education

SDG 5, focusing on gender equality

SDG 6, which emphasizes the need for clean water and sanitation

SDG 7, advocates the need for affordable and clean energy

SDG 8, sustaining inclusive and sustainable economic growth with productive and decent working conditions for all

SDG 9, which intends to foster industry, innovation, and infrastructure

SDG 10, being about reducing inequalities among countries

SDG 11, an attempt to ensure that human settlements and cities are inclusive, safe, resilient, and sustainable

SDG 12, with a focus on sustainable consumption and production patterns

SDG 13, with an emphasis on the need for climate action

SDG 14, raises the need to preserve life below water, especially rivers and oceans

SDG 15, draws attention about the need for a greater care about life on land

SDG 16, which advocates peace, justice, and strong institutions

SDG 17, a cross-SDGs effort to foster the partnership for the goals and their delivery

The SDGs and their specific objectives are very complex. The mandate of the Encyclopedia of the UN Sustainable Development Goals is, therefore, to

clarify and explain a wide range of terms associated with each SDG. It does so by gathering and presenting inputs provided by experts from across all areas of knowledge and from round the world, who explain each term and their implications, drawing also from the latest literature.

With 17 volumes and involving in excess of 1,500 authors and contributors, the Encyclopedia of the UN Sustainable Development Goals is the largest editorial project on sustainable development ever undertaken. We hope that this publication will be helpful in fostering a broader understanding of the SDGs, and that this process may inspire and support a wide range of initiatives aimed at their implementation, thus realizing the “2030 Agenda for Sustainable Development”.

Hamburg University of Applied Sciences
Germany

Walter Leal Filho

Volume Preface

The pursuit of affordable and clean energy is one of the key SDGs, and one which requires much goodwill from national governments and organizations at the regional and local levels. Even though the production of clean energy is often regarded as “expensive” and may entail investments in equipment, infrastructure, or upgrading technologies, they are worthy for a variety of reasons:

- (a) The provision of clean and more efficient energy means less CO₂ emissions, hence helping to address climate change (SDG13). At the moment, conventional energy (i.e., fossil-fuel based) is the main contributor to climate change, accounting to around 60% of the global greenhouse gases emissions.
- (b) Clean energy is cheap in the long run, since the benefits reaped from the investments initially made have a long duration.
- (c) There is a reduction in the expenditures with the purchase of fossil fuels, a matter of relevance to poor countries and small developing island states, hence alleviating the pressures in their budgets and freeing up money which may be spent to meet basic needs such as those on health and education.
- (d) Affordable clean energy encourages economic growth in all countries where it is implemented.

Current trends related to energy production and use are a reason for concern. Even though the number of people with access to electricity worldwide increased from 78% to 87%, there are still nearly a billion people without electricity. As the world population continues to grow, along with the demand for cheap energy, it makes sense to move away from the traditional reliance on fossil fuels, and toward cleaner energy, which may also be affordable and be deployed, both in industrialized and in developing nations, particularly in the latter, where energy access is still rather limited, hindering progress in key sectors such as industry, health, and education.

Operationally, SDG7 can be implemented by investments in solar, wind, hydro, and thermal power, depending on each specific situation and context. In African countries, for instance, solar energy makes perfect sense since it can be produced in a decentralized manner (e.g., off-grid), hence meeting local needs at a village level. On the other hand, in countries rich in water resources, hydropower may offer a suitable option, since it allows the energy potential of

water to be harnessed and used, both locally and regionally. Wind energy can be produced in many rural areas (especially hilly areas) in both developing and developed countries, whereas thermal energy is commonly used for heating purposes in countries with a temperate climate.

With this volume, we attempt to emphasize and also showcase the advantages of embracing the cause of clean and affordable energy. It contains information on research, analyses, case studies, and practical experiences, which showcase the advantages of pursuing clean and affordable energy at different levels. And since more than 40% of the world's population – that is around 3 billion people – rely on polluting and unhealthy fuels for cooking, it illustrates some of the options which exist, and may be deployed to address similar trends.

We also hope that the contributions in this volume will provide a timely support toward the implementation of SDG 7, and will foster the global efforts toward making energy generation more sustainable, and more widely available.

January 2021

Walter Leal Filho
Anabela Marisa Azul
Luciana Brandli
Amanda Lange Salvia
Tony Wall

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About the Editors



Walter Leal Filho is Professor and Director of the European School of Sustainability Science and Research, whose Headquarters are at the Hamburg University of Applied Sciences in Germany. He also holds the Chair of Environment and Technology at Manchester Metropolitan University, UK. He is Founding Editor of the *International Journal of Sustainability in Higher Education* and heads the Inter-University Sustainable Development Research Programme (IUSDRP), the world's largest network of universities engaged on sustainable development research. He is also Editor-in-Chief of the World Sustainable Development series with Springer. Prof. Walter Leal serves on the editorial board of various journals. He has in excess of 400 publications to his credit, among which are groundbreaking books such as *Universities as Living Labs for Sustainable Development: Supporting the Implementation of the Sustainable Development Goals*, *Social Responsibility and Sustainability*, and *Handbook of Sustainability Science and Research*. He has nearly 30 years of field experience in project management and has a particular interest in the connections between sustainability, climate change adaptation, and human behavior.



Anabela Marisa Azul is a Researcher at the Center for Neuroscience and Cell Biology (CNC) and the Institute for Interdisciplinary Research at the University of Coimbra (III-UC, Portugal). She graduated in Biology at the UC, where she completed her Ph.D. degree in Biology, specialization in Ecology, with collaboration from Ludwig-Maximilians-Universität München (LMU, München, Germany). Anabela became an Associate Researcher (Ciência 2009) at the Centre for Functional Ecology (CFE-UC), where she remained until 2014. There, she developed a holistic approach for advancing translational research that combined the sustainable development with innovation in food production and public scientific awareness (from early childhood). She currently is interested in functional attributes of fungi in the domain of metabolism, aging, and disease and approaches for knowledge coproduction in metabolism and sustainability research. She has coauthored over 40 scientific publications and book chapters, four books for children, two comics, and an animation.



Luciana Brandli is an Associate Professor at the University of Passo Fundo, Brazil, working in the Ph.D. Program in Civil and Environmental Engineering. Her current research interests include sustainability in higher education and green campus, management of urban infrastructure and sustainable cities, and the Agenda 2030 for Sustainable Development. She supervises a number of master's and doctoral students on engineering, environment, and sustainability issues and has in excess of 300 publications, including books, book chapters, and papers in refereed journals.



Amanda Lange Salvia has a degree in Environmental Engineering from the University of Passo Fundo, Brazil, and graduate studies focused on sustainable cities and universities. Her work centers on the Sustainable Development Goals, the role of universities towards sustainability, and the impacts of climate change. Amanda has experience with international studies assessing aspects related to the 2030 Agenda and sustainability in higher education. She is a reviewer for various journals and is also a member of the editorial board of the *International Journal of Sustainability in Higher Education*.



Tony Wall is Founder and Head of the International Centre for Thriving, a global-scale collaboration between business, arts, health, and education to deliver sustainable transformation for the common good. He is passionate about *thriving* and has published 200+ works, including articles in quartile 1 journals such as *The International Journal of Human Resource Management and Vocations and Learning* as well as global policy reports for the *European Mentoring & Coaching Council* in Brussels. Overall, his leadership and international impact in these areas have attracted numerous accolades including the prestigious Advance-HE National Teaching Fellowship and three Santander International Research Excellence Awards.

About the Section Editors



Md. Mahmudul Alam
School of Economics, Finance and Banking
Universiti Utara Malaysia
Sintok, Kedah, Malaysia



Justin Bishop
Arup
London, UK



Luciana Brandli
Faculty of Engineering and Architecture
The University of Passo Fundo
Passo Fundo, Brazil

**Elisa Conticelli**

Department of Architecture
Alma Mater Studiorum - University of Bologna
Bologna, Italy

**Marcos Antonio Leite Frandoloso**

University of Passo Fundo
Passo Fundo, Rio Grande do Sul, Brazil

**Haruna Musa Moda**

Department of Health Professions
Manchester Metropolitan University
Manchester, UK

**Matti Sommarberg**

Faculty of Management and Business
Tampere University
Tampere, Finland

Contributors

Raymond Aabeyir Department of Environment and Resource Studies, Simon Diedong Dombo University of Business and Integrated Development Studies, Wa, Ghana

Annabeth Aagaard Department of Business Development and Technology, Aarhus University, Herning, Denmark

Pami Aalto Faculty of Management and Business/Politics, Tampere University, Tampere, Finland

Fereshteh Abbasizade Sharif Energy Research Institute (SERI), Sharif University of Technology (SUT), Tehran, Iran

Madjid Abbaspour School of Mechanical Engineering, Sharif University of Technology (SUT), Tehran, Iran

A. B. M. Abdullah School of Management, UniSA Business School, University of South Australia, Adelaide, SA, Australia

Adeola Adenikinju Centre for Petroleum, Energy Economics and Law (CPEEL), University of Ibadan, Ibadan, Nigeria

Adewale Aremu Adesanya Environmental and Energy Policy Program, Department of Social Sciences, Michigan Technological University, Houghton, MI, USA

Shalini Aggarwal Department of Management, Chandigarh University, Mohali, Punjab, India

C. Ahlawat Tata Institute of Social Sciences, New Delhi, India

Most. Asikha Aktar Department of Economics, Comilla University, Cumilla, Bangladesh

Ayotomiwa Alabi Centre for Petroleum, Energy Economics and Law (CPEEL), University of Ibadan, Ibadan, Oyo, Nigeria

O. Alabi Ayotomiwa Centre for Petroleum Energy Economics and Law, University of Ibadan, Oyo State, Nigeria

Md. Morshedul Alam International Islamic University Chittagong, Chittagong, Bangladesh

Md. Mahmudul Alam School of Economics, Finance and Banking, Universiti Utara Malaysia, Sintok, Kedah, Malaysia

Mohammad Alipour School of Engineering and Built Environment, Griffith University, Southport, QLD, Australia

Cities Research Institute, Griffith University, Southport, Australia

Mark Opoku Amankwa Department of Public Administration, Punjabi University, Patiala, India

Sylvester Anani Anaba Center for Petroleum, Energy, Economics and Law (CPEEL), University of Ibadan, Ibadan, Nigeria

Atul Anand Department of Economics and Statistics, Government of Tamil Nadu, Chennai, India

Babatunde Anifowose Faculty of Engineering, Environment and Computing; School of Energy, Construction and Environment, Coventry University, Coventry, UK

Nicolás Aranda-Pérez Greenartech S.L., Cordoba, Spain

Osman Arrobbio Department of Culture, Politics, and Society, University of Turin, Turin, Italy

Thomas Adedayo Ayorinde National Biotechnology Development Agency, Abuja, Nigeria

Yevhen Bataltsev Department of Ecology and Environmental Protection Technologies, Sumy State University, Sumy, Ukraine

Linda A. Battalora Department of Petroleum Engineering, Colorado School of Mines, Golden, CO, USA

Alexander Belyakov Consultant, Certified Sustainability Professional (ISSP-CSP), Toronto, ON, Canada

Iwona Bisaga Engineering for International Development Centre, UCL Civil, Environmental and Geomatic Engineering Department, University College London, London, UK

Saheli Bose Department of Political Science, Seth Anandram Jaipuria College, University of Calcutta, Kolkata, India

G. Bothun Department of Physics, University of Oregon, Eugene, OR, USA

Stuart Bruce Wilmer Cutler Pickering Hale and Dorr LLP, London, UK

Maurizio Cellura Department of Engineering, University of Palermo, Palermo, Italy

Tamali Chakraborty Indian Institute of Management Bodh Gaya, Turi Buzurg, India

Judith Alazraque Cherni Imperial College London, London, UK

Yelizaveta Chernysh Department of Ecology and Environmental Protection Technologies, Sumy State University, Sumy, Ukraine

Shahana Afrose Chowdhury Research and Development, Kazi Shahid Foundation, Dhaka, Bangladesh

Ryan Clark College of Engineering and School of Environment and Sustainability – University of Saskatchewan, Saskatchewan, Canada

Gershon Dagba Department of Public Administration, Punjabi University, Patiala, India

Flávia Arcari da Silva Environmental and Sanitary Engineering Department, College of Agriculture and Veterinary, Santa Catarina State University, Lages, SC, Brazil

Aníbal T. de Almeida Institute of Systems and Robotics, Department of Electrical and Computer Engineering, University of Coimbra, Coimbra, Portugal

Lucas Noura de Moraes Rêgo Guimarães Brazilian Institute for Energy Law Studies – IBDEnergia, EDP Brasil, São Paulo, Brazil

Guimarães Lucas Noura de Moraes Rêgo EDP Brasil, Brazilian Institute for Energy Law Studies – IBDEnergia, São Paulo, Brazil

Martin P. de Wit School of Public Leadership, Stellenbosch University, Stellenbosch, South Africa

Joaquim Delgado Institute of Systems and Robotics, Department of Electrical and Computer Engineering, University of Coimbra, Coimbra, Portugal

Sunita Dhal School of Gender and Development Studies, Indira Gandhi National Open University, New Delhi, India

Felix Amankwah Diawuo School of Engineering, University of Energy and Natural Resources (UENR), Sunyani, Ghana

Arnaud Diemer Jean Monnet Excellence Center on Sustainability (ERASME), Clermont-Ferrand, France

CERDI, University of Clermont Auvergne (UCA), Clermont-Ferrand, France

Florian Dierickx Jean Monnet Excellence Center on sustainability (ERASME), University of Clermont Auvergne, CERDI, Clermont-Ferrand, France

University of Iceland, Reykjavik, Iceland

Ananya Dixit Department of Economics, FLAME University, Lavale, Pune, India

Felix Kwabena Donkor College of Agriculture and Environmental Sciences, University of South Africa (UNISA), UNISA Science Campus, Johannesburg, South Africa

College of Agriculture and Environmental Sciences, University of South Africa (UNISA), Florida, South Africa

Johana Dunlop Blue Walrus Sustainability Strategies, Fontainebleau, France

Bojan Đurin Department of Civil Engineering, University North, Varaždin, Croatia

Scott Dwyer Institute for Sustainable Futures, University of Technology Sydney, Sydney, NSW, Australia

Pablo A. Egana-delSol Asia School of Business, UAI Business School, and Sloan School of Management, Massachusetts Institute of Technology, Kuala Lumpur, Malaysia

John Farrell Institute for Local Self Reliance, Minneapolis, MN, USA

Jannatul Ferdous Comilla University, Comilla, Bangladesh

Annarita Ferrante DA-Department of Architecture- School of Engineering and Architecture, ALMA MATER STUDIORUM, Bologna, Italy

Samuel Flanders Asia School of Business, Massachusetts Institute of Technology, Sloan School of Management, Kuala Lumpur, Malaysia

Anastasia Fotopoulou DA-Department of Architecture- School of Engineering and Architecture, ALMA MATER STUDIORUM, Bologna, Italy

Marcos Antonio Leite Frandoloso University of Passo Fundo, Passo Fundo, Rio Grande do Sul, Brazil

Cle-Anne Gabriel The University of Queensland, UQ Business School, Brisbane, QLD, Australia

G. Winston Gilcrease Department of Culture, Politics, and Society, University of Turin, Turin, Italy

Ganna Gladkykh Jean Monnet Excellence Center on Sustainability (ERASME), Clermont-Ferrand, France

CERDI, University of Clermont Auvergne (UCA), Clermont-Ferrand, France

Francesco Guarino Department of Engineering, University of Palermo, Palermo, Italy

Reza Hafezi Futures Studies Research Group, National Research Institute for Science Policy (NRISP), Tehran, Iran

Manouchehr Haghighi University of Adelaide, Adelaide, SA, Australia

Mukaramah Binti Harun School of Economics, Finance and Banking, Universiti Utara Malaysia, Sintok, Kedah, Malaysia

Mohd Sayuti Hassan Centre for Global Sustainability Studies, Universiti Sains Malaysia, Penang, Malaysia

Nor Diana Mohd Idris Institute for Environment and Development, National University of Malaysia, UKM Bangi, Selangor, Malaysia

Muhammad Imran Department of Economics and Business Management, UVAS Business School, University of Veterinary and Animal Sciences, Lahore, Pakistan

Marian Jacobs Department of Geography, King's College London, London, UK

Nirupa Jain Manda Institute of Technology, Bikaner, Rajasthan, India

Riddhi Jain Department of Economics, FLAME University, Lavale, Pune, India

Trilok Kumar Jain Manipal University, Jaipur, Rajasthan, India

Pertti Järventausta Faculty of Information Technology and Communication Sciences/Electrical Engineering, Tampere University, Tampere, Finland

Taslima Julia IIUM Institute of Islamic Banking and Finance (IIiBF), International Islamic University Malaysia, Kuala Lumpur, Selangor, Malaysia
School of Economics, Finance and Banking, Universiti Utara Malaysia, Sintok, Kedah, Malaysia

Frederick Kakembo Ndejje University, Kampala, Uganda

Mehr Kalra Department of Economics, FLAME University, Lavale, Pune, India

Gayani Karunasena School of Architecture and Built Environment, Faculty of Science Engineering and Built Environment, Deakin University, Geelong, VIC, Australia

Salina Kassim IIUM Institute of Islamic Banking and Finance (IIiBF), International Islamic University Malaysia, Kuala Lumpur, Selangor, Malaysia

Winnie Khaemba African Centre for Technology Studies (ACTS), Nairobi, Kenya

Sunil Kumar Khare Department of Petroleum Engineering, University of Petroleum and Energy Studies, Dehradun, India

Ann Kingiri African Centre for Technology Studies (ACTS), Nairobi, Kenya

Kirsi Kotilainen Faculty of Management and Business, Tampere University, Tampere, Finland

Faculty of Business and Economics (HEC), University of Lausanne, Lausanne, Switzerland

Nikola Kranjčić Faculty of Geotechnical Engineering, University of Zagreb, Varaždin, Croatia

Amit Kumar PG Department of Political Science, Munshi Singh College, BR Ambedkar Bihar University, Motihari, India

Nikhil Kumar Department of Management, Chandigarh University, Mohali, Punjab, India

Pardeep Kumar University School of Business, Chandigarh University, Mohali, India

Rosa María Laguna-Ruz Filosolar Association, Seville, Spain

Shpetim Lajqi Faculty of Mechanical Engineering, University of Prishtina “Hasan Prishtina”, Prishtina, Kosovo

Wangchu Lama Department of Peace and Conflict Studies and Management, Sikkim University, Gangtok, India

Linda Lane Department of Social Work, University of Gothenburg, Gothenburg, Sweden

Jasmine Leby Lau Department of Resource Management and Consumer Studies/ Sustainable Consumption Research Center of Excellence, Faculty of Human Ecology, University Putra Malaysia, Serdang, Selangor, Malaysia

Hong Xian Li School of Architecture and Built Environment, Faculty of Science Engineering and Built Environment, Deakin University, Geelong, VIC, Australia

Kjell Liem Salt Spring Community Energy Society, Saltspring Island, BC, Canada

Heikki Liimatainen Transport Research Centre Verne, Tampere University, Tampere, Finland

Sven Linow Hochschule Darmstadt, Fachbereich Maschinenbau und Kunststofftechnik, Darmstadt, Germany

Karoliina Loikkanen Nokia Corporation, Helsinki, Finland

Sonia Longo Department of Engineering, University of Palermo, Palermo, Italy

Saku J. Mäkinen Industrial Management, CITER, Tampere University, Tampere, Finland

Maria McCoy Institute for Local Self Reliance, Minneapolis, MN, USA

Dena McMartin College of Engineering and School of Environment and Sustainability – University of Saskatchewan, Saskatchewan, Canada

Md Muhibbullah Department of Economics, Faculty of Economics and Management Sciences, International Islamic University Malaysia, Kuala Lumpur, Malaysia

Md Nazmus Sadekin Department of Economics, Mawlana Bhashani Science and Technology University, Tangail, Bangladesh

Kevin Mearns College of Agriculture and Environmental Sciences, University of South Africa (UNISA), UNISA Science Campus, Johannesburg, South Africa

College of Agriculture and Environmental Sciences, University of South Africa (UNISA), Florida, South Africa

Department of Environmental Sciences, University of South Africa, Pretoria, South Africa

Gonçalo Mendes Department of Electrical Engineering, LUT University, Lappeenranta, Finland

Satyendra Nath Mishra School of Rural Management, Xavier University, Bhubaneswar, Odisha, India

Marina Mistretta Department of Heritage, Architecture, Urbanism, University Mediterranea of Reggio Calabria, Reggio Calabria, Italy

Siti Fairuz Mohd Radzi Centre for Global Sustainability Studies, Universiti Sains Malaysia, Penang, Malaysia

Tom P. Mommsen University of Victoria, Victoria, BC, Canada
Salish Sea Renewable Energy Cooperative, Galiano, BC, Canada

Alessandro Monti University of Innsbruck, Innsbruck, Austria

Fernando Morgado Department of Biology, Centre for Environmental and Marine Studies (CESAM), University of Aveiro, Aveiro, Portugal

Ayesha Tasnim Mostafa Kazi Shahid Foundation, Dhaka, Bangladesh

Pedro Moura Institute of Systems and Robotics, Department of Electrical and Computer Engineering, University of Coimbra, Coimbra, Portugal

Chandramalar Munusami Department of Marketing and Management, Faculty of Business, Hospitality and Humanities, Nilai University, Nilai, Negeri Sembilan, Malaysia

Md Wahid Murad UniSA College, University of South Australia, Adelaide, SA, Australia

Justice Issah Musah-Surugu Department of Public Administration and Health Services Management, University of Ghana Business School, Accra, Ghana

C. Johannes Muth Faculty of Management and Business/Politics, Tampere University, Tampere, Finland

Liv Teresa Muth Faculty of Bioscience Engineering, Bioport Group (Centre for Synthetic Biology), Ghent University, Ghent, Belgium

Arun Narayanan Department of Electrical Engineering, School of Energy Systems, LUT University (Lappeenranta-Lahti University of Technology LUT), Lappeenranta, Finland

Pedro H. J. Nardelli Department of Electrical Engineering, School of Energy Systems, LUT University (Lappeenranta-Lahti University of Technology LUT), Lappeenranta, Finland

Nelli Nigmatulina Department of Electrical Engineering, LUT University, Lappeenranta, Finland

Abu Hanifa Md. Noman Faculty of Business and Accountancy, Department of Finance and Banking, University of Malaya, Kuala Lumpur, Malaysia
International Islamic University Chittagong, Chittagong, Bangladesh

Melati Nungsari Asia School of Business and Massachusetts Institute of Technology, Sloan School of Management, Kuala Lumpur, Malaysia

D. Nwobi Lucy Centre for Petroleum Energy Economics and Law, University of Ibadan, Oyo State, Nigeria

Busayo Temitope Olanrewaju Centre for Petroleum, Energy Economics and Law, University of Ibadan, Ibadan, Nigeria

Yemi Olayinka Olasebikan Agricultural and Environmental Engineering, Obafemi Awolowo University, Ile Ife, Osun state, Nigeria

Olusanya Elisa Olubusoye Department of Statistics, Laboratory for Interdisciplinary Statistical Interdisciplinary Statistical Analysis (UI-LISA), University of Ibadan, Ibadan, Nigeria

Prince Opoku Department of Political Science, Punjabi University, Patiala, India

Nkechinyelu Oranye Centre for Petroleum, Energy Economics and Law (CPEEL), University of Ibadan, Ibadan, Oyo, Nigeria

Festus Osagu Centre for Petroleum, Energy Economics and Law (CPEEL), University of Ibadan, Ibadan, Nigeria

Pramod Kumar Painuly Department of Energy Management, School of Business, University of Petroleum and Energy Studies, Dehradun, India

Varun Pandey Department of Mechanical Engineering, Vellore Institute of Technology, Vellore, Tamilnadu, India

Devika Panicker Department of Economics, FLAME University, Lavale, Pune, India

Shipra Pathak Department of Management, Chandigarh University, Mohali, Punjab, India

Salvin Paul Department of Peace and Conflict Studies and Management, Sikkim University, Gangtok, India

Lasse Peltonen Faculty of Information Technology and Communication Sciences/Electrical Engineering, Tampere University, Tampere, Finland

Sajeda Pervin Institute of Graduate Studies, University of Malaya, Kuala Lumpur, Malaysia

Ana M. Petrović Geographical Institute “Jovan Cvijić” of the Serbian Academy of Sciences and Arts, Belgrade, Serbia

Francesca Pirlone Department of Civil, Chemical and Environmental Engineering, University of Genoa, Genoa, Italy

Leonid Plyatsuk Department of Ecology and Environmental Protection Technologies, Sumy State University, Sumy, Ukraine

Maria Polugodina Freie Universität Berlin, Berlin, Germany

Nuno Quaresma Institute of Systems and Robotics, Department of Electrical and Computer Engineering, University of Coimbra, Coimbra, Portugal

Navin Rai Department of Peace and Conflict Studies and Management, Sikkim Central University, Gangtok, Sikkim, India

Antti Rautiainen Unit of Electrical Engineering, Tampere University, Tampere, Finland

Bianca Gasparetto Rebelatto University of Passo Fundo, Passo Fundo, Rio Grande do Sul, Brazil

Lucas Fagundes Veiga Ribeiro College of Engineering and School of Environment and Sustainability – University of Saskatchewan, Saskatchewan, Canada

Volker Ritter Frankfurt University of Applied Sciences, Frankfurt, Germany

Igor Roy Department of Ecology and Environmental Protection Technologies, Sumy State University, Sumy, Ukraine

Ilkka Ruostetsaari Faculty of Management and Business/Politics, Tampere University, Tampere, Finland

José Manuel Salvador López Faculty of Bioscience Engineering, Bioport Group (Centre for Synthetic Biology), Ghent University, Ghent, Belgium

Amanda Lange Salvia University of Passo Fundo, Passo Fundo, Brazil

Angela Santangelo CIRI Building and Construction, Alma Mater Studiorum – University of Bologna, Bologna, Italy

Ivana Savić Leiden University, Leiden, Netherlands

Charu Saxena University School of Business, Chandigarh University, Mohali, India

Chelsea Schelly Environmental and Energy Policy Program, Department of Social Sciences, Michigan Technological University, Houghton, MI, USA

Alessandro Sciullo Department of Culture, Politics, and Society, University of Turin, Turin, Italy

Evan N. Shenkin Department of Sociology, Western Oregon University, Monmouth, OR, USA

Md Zakaria Siddiqui Department of Humanities and Social Sciences, Birla Institute of Technology and Science, Pilani, Hyderabad, Telengana, India

Flávio José Simioni Environmental and Sanitary Engineering Department, College of Agriculture and Veterinary, Santa Catarina State University, Lages, SC, Brazil

Kishan Kumar Singh Ministry of Planning and Development, Multilateral Environmental Agreements, Port of Spain, Trinidad and Tobago

Chamhuri Siwar Institute for Environment and Development, National University of Malaysia, UKM Bangi, Selangor, Malaysia

Božo Soldo Department of Civil Engineering, University North, Varaždin, Croatia

Matti Sommarberg Faculty of Management and Business, Tampere University, Tampere, Finland

Dumindu Soorige School of Architecture and Built Environment, Faculty of Science Engineering and Built Environment, Deakin University, Geelong, VIC, Australia

University of Moratuwa, Moratuwa, Sri Lanka

Ilenia Spadaro Department of Civil, Chemical and Environmental Engineering, University of Genoa, Genoa, Italy

Nathalie Spittler Jean Monnet Excellence Center on Sustainability (ERASME), Clermont-Ferrand, France

CERDI, University of Clermont Auvergne (UCA), Clermont-Ferrand, France

Nilima Srivastava School of Gender and Development Studies, Indira Gandhi National Open University, New Delhi, India

Chanan Syan Production Engineering and Management, University of West Indies, St Augustine, Trinidad and Tobago

Kim Talus Tulane Center for Energy Law, Tulane University, New Orleans, LA, USA

UEF Law School, University of Eastern Finland, Joensuu, Finland

Faculty of Law, University of Helsinki, Helsinki, Finland

Bethel Tarekegne Environmental and Energy Policy Program, Department of Social Sciences, Michigan Technological University, Houghton, MI, USA

Barun Kumar Thakur Department of Economics, FLAME University, Lavale, Pune, India

Shardul Tiwari Environmental and Energy Policy Program, Department of Social Sciences, Michigan Technological University, Houghton, MI, USA

Simona Tondelli CIRI Building and Construction, Alma Mater Studiorum – University of Bologna, Bologna, Italy

Department of Architecture, Alma Mater Studiorum – University of Bologna, Bologna, Italy

Ruchi Tyagi HR, OB and Communication, School of Business, University of Petroleum and Energy Studies, Dehradun, India

Sanna Uski VTT Technical Research Centre of Finland, Ltd; Ampner Ltd, Espoo, Finland

Jussi Valta Faculty of Management and Business/Industrial Engineering and Management, Tampere University, Tampere, Finland

Luis R. Vieira Laboratory of Ecotoxicology, Institute of Biomedical Sciences of Abel Salazar (ICBAS) and Interdisciplinary Centre of Marine and Environmental Research (CIIMAR), Porto, Portugal

Suresh Vishwakarma Chartered Engineers Pacific, Vancouver, Canada

Fernanda Torres Volpon Law School, Rio de Janeiro State University, Rio de Janeiro, Rio de Janeiro, Brazil

Philip R. Walsh TRSM and the Centre for Urban Energy, Ryerson University, Toronto, ON, Canada

Ely Caetano Xavier Junior Department of Legal Sciences, Federal Rural University of Rio de Janeiro, Seropédica, Rio de Janeiro, Brazil

Olena Yakhnenko Department of Ecology and Environmental Protection Technologies, Sumy State University, Sumy, Ukraine

Eric Yankson Faculty of Natural Resources and Spatial Sciences, Namibia University of Science and Technology, Windhoek, Namibia

Norzalina Zainudin Department of Resource Management and Consumer Studies/ Sustainable Consumption Research Center of Excellence, Faculty of Human Ecology, University Putra Malaysia, Serdang, Selangor, Malaysia