China and Europe's Partnership for a More Sustainable World

Challenges and Opportunities

Transboundary environmental problems and European Union (EU)-China environmental trade, investment, and technical interactions are multi-dimensional, multinational, and multilevel. Delving into such themes to generate in-depth and policy relevant knowledge requires multi-country teams with broad disciplinary expertise using diverse analytical tools and methodologies. China and Europe's Partnership for a More Sustainable World is such a work. Rich and comprehensive, it sheds light on diverse topics like European investment in China's environmental sector, Chinese environmental FDI in Europe, environmental goods trade, EU and Chinese corporate social responsibility concepts, and biomass utilization and will be of immense interest to academics, businesspeople, and policymakers in China, the EU, and elsewhere.

– Jean-Marc F. Blanchard, Executive Director, Mr. & Mrs. S.H. Wong Center for the Study of Multinational Corporations, Los Gatos, CA, USA

This book offers new insights into an understudied and very important topic – EU-China relations in the environmental and energy field. The carefully researched chapters are rich in data and case studies and illuminating analysis. This book is of interest to academics, practitioners, and policymakers.

– Genia Kostka, Professor of Governance of Infrastructure and Energy, Hertie School of Governance, Berlin, Germany

A multifaceted, interdisciplinary enquiry into what actually drives bilateral investment policies and practices between the EU and China in their effort to pursue higher sustainability standards and the greening of their respective economies. This book has the rare merit of striking the right balance between theoretical and empirical research. While pragmatically recognizing the barriers to be faced, it offers direct insights into economic, legal and technological options, which can feed directly into policy formulation in both the EU and China, and adds a valuable building block to their joint aspiration for a mutually beneficial cooperation.

– Andrea Ricci, Vice President of ISINNOVA – Institute of Studies for the Integration of Systems; Rapporteur of the EC Integrated Roadmap of the SET Plan and Chairman of the EU Transport Advisory Group for Horizon 2020, Roma

In this book you will find the interesting outcomes of a four-year EU-funded research project about the effects of EU-China cooperation in a very fast-moving field: renewable energies and environmental industries. As the research skilfully combines economic, legal and engineering approaches, the book is aimed at many readers – from academics and policy makers to general readers.

– Augusto Ninni, University of Parma, Parma (PR), Italy

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Edited by

Francesca Spigarelli
University of Macerata, Macerata, Italy

Louise Curran
Toulouse Business School, Toulouse, France

Alessia Arteconi
Università eCampus, Novedrate, Italy

United Kingdom – North America – Japan
India – Malaysia – China

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List of Contributors

Alessia Arteconi	Università Telematica e-Campus, Novedrate, Italy
Loretta Battaglia	University of Macerata, Macerata, Italy
Caterina Brandoni	University of Ulster, Newtownabbey, UK
Hongbo Cai	Beijing Normal University, Beijing, China
Elena Cedrola	University of Macerata, Macerata, Italy
Louise Curran	Toulouse Business School, Université de Toulouse, Toulouse, France
Eleonora Cutrini	University of Macerata, Macerata, Italy
Mi Dai	Beijing Normal University, Beijing, China
Jun Gao	Tongji University, Shanghai, China
Yulei Gao	Tongji University, Shanghai, China
Neil Hewitt	University of Ulster, Newtownabbey, UK
Mingjun Huang	University of Ulster, Newtownabbey, UK
Ye Huang	University of Ulster, Newtownabbey, UK
Christoph Lattemann	Jacobs University Bremen, Bremen, Germany
Yong Li	Shanghai Jiao Tong University, Shanghai, China
Fabio Lorusso	Istituto Universitario di Studi Europei (IUSE), Torino, Italy
Federica Monti	University of Macerata, Macerata, Italy
Lee Keng Ng	Curtin University, Sarawak, Malaysia
Giuseppe A. Policaro	University of Piemonte Orientale, Novara, Italy
Fabio Polonara	Università Politecnica delle Marche, Ancona, Italy

Ruxiao Qu	Beijing Normal University, Beijing, China
Paolo Rossi	University of Piemonte Orientale, Novara, Italy
Piercarlo Rossi	University of Piemonte Orientale, Novara, Italy
Federico Salvatelli	University of Macerata, Macerata, Italy
Francesca Spigarelli	University of Macerata, Macerata, Italy
Marco Spitoni	Università Politecnica delle Marche, Ancona, Italy
Ernesto Tavoletti	University of Macerata, Macerata, Italy
Katiuscia Vaccarini	University of Macerata, Macerata, Italy; Jacobs University Bremen, Bremen, Germany
Ruzhu Wang	Shanghai Jiao Tong University, Shanghai, China
Yanyan Wang	Tongji University, Shanghai, China
Lei Wen	Beijing Normal University, Beijing, China
Haitao Yin	Shanghai JiaoTong University, Shanghai, China
Yanping Zeng	Beijing Normal University, Beijing, China
Mingling Zhai	Tongji University, Shanghai, China
Changmian Zhang	East China University of Political Science and Law, Shanghai, China
Lihong Zhang	East China University of Political Science and Law, Shanghai, China
Qun Zhang	Beijing Normal University, Beijing, China
Xu Zhang	Tongji University, Shanghai, China
Xuemei Zhang	Shanghai JiaoTong University, Shanghai, China
Chunming Zhao	Beijing Normal University, Beijing, China
Haoliang Zhao	Tongji University, Shanghai, China
Hui Zhou	Shanghai JiaoTong University, Shanghai, China
Xiang Zhou	Tongji University, Shanghai, China

Foreword

In economic terms, the shift to Asia has been a fact since the beginning of this century. It is difficult to make generalizations for a continent of more than 4 billion people but Asian consumers are growing richer, with average earnings in many countries tripling over the past 10 years. China's economy represented around 5% of world GDP in 2000 and it may account for 25% by 2050.

In terms of economic development, history is accelerating: it took 155 years for Britain to double its GDP per capita, 50 years for the United States, and just 15 years for China. Over the last 10 years, Asia has accounted for half of the world's GDP growth. Forecasts indicate that Asian growth will continue to outpace Europe and the United States.

With economic growth coupled with resource consumption, one can expect more constraints on key resources. As people become wealthier, they use more energy (e.g., for mobility, air conditioning, heating, and computing), more water, eat and waste more food. Efficiency gains are often largely offset by the "rebound effect," whereby technological improvements ultimately lead to greater and not less consumption. This has been true for the electricity and in the transport sectors.

The recent progresses and new-found prosperity in China (and also in India, Brazil, and South Africa) may have knock-on effects on the demand for and availability of global resources. Global weather may become more volatile and severe (cf. hurricanes, disastrous flooding, extreme heat, and shortage of water) while rising sea levels could devastate low-lying cities like Shanghai and Hong Kong.

From a multilateral perspective, systemic governance of climate change has been agreed by 195 countries at the Conference of the Parties of the United Nations Framework Convention on Climate Change (COP-21) in Paris in December 2015. The conclusions of the COP-21 envisage a reduction of global greenhouse

gas emissions to a level that limits the global average temperature increase to below 2°C or 1.5°C above preindustrial levels.

From a bilateral perspective, this book entitled "Going Green: China-Europe Partnership's for a More Sustainable Word" – published in the frame of the POREEN Marie Curie Action (*Partnering opportunities between Europe and China in the renewable energies and environmental industries*) brilliantly coordinated by Francesca Spigarelli – is emblematic of what two strong blocks can do together by combining their investments, cross-fertilizing their knowledge, and cocreating their futures.

The share of foreign direct investment, of megawatt of renewables installed, and the number of energy-efficient buildings are illustrative of the major changes taking place in Europe and China. The chapters of this book provide original analyses, recent key facts, and figures that pave the way toward more sustainability. This notion, sometimes called an oxymoron, covers the traditional economic, environmental, and social dimensions.

But in this trans-disciplinary book, sustainability also rightly addresses some sensitive legal issues like liability and corporate social responsibility. The chapters well integrate social sciences aspects (in the first two parts of the book) as well as science, technology, and engineering aspects (in the last part of the book). Addressing both theoretical and real-life practices, many lessons and opportunities can be drawn from this reading. From the European side, I will focus on five dimensions.

The European Union (EU) 2020 targets for greenhouse gas emissions reductions, for increasing the share of renewable energy, for improving energy efficiency, and for achieving 3% of GDP dedicated to research and innovation may be inspiring. The Energy Union is going in this direction.

Smart growth (fostering knowledge, innovation, education, and digital society), sustainable growth (making production more resource-efficient while boosting competitiveness), and inclusive growth (raising participation in the labor market, acquisition of skills and fight against poverty) are long-term leitmotifs that are good for people, the economy, and the planet.

The research efforts should stimulate technological but also social innovation and public sector innovation. Climate change, urbanization, and relative resource shortages may fuel a shift away from large coal power plants, petrol-engine cars, and energy-consuming buildings to decentralized renewable energy production, small electric and hybrid vehicles, as well as passive houses.

Global connectivity is changing how people live, how they work, and how they think. ICT, the Internet, and new mobile devices are and will continue to play a pervasive and transformational role. In 2000, there were around 700 million mobile devices, most of which did not connect to the Web. In 2015, there were 7.6 billion mobile devices worldwide, many of which are smart and connected to Internet. The European Digital Single Market follows common sense.

Europe needed over a century to develop the infrastructure to supply natural resources to the point of use: sewage farms, ports, electricity grids, pipelines, rail, and road networks. Making significant changes to this infrastructure will take decades. The new European "Circular Economy" paradigm means a shift toward reusing, repairing, refurbishing, and recycling existing materials and products. "Waste" can and should be turned into a resource.

These five dimensions are at the core of many EU–China collaborations like POREEN and URBACHINA (a collaborative research project on *Sustainable Urbanisation in China: Megatrends toward 2050*) that feed scientifically into the "EU–China Urbanisation Partnership." These initiatives should be seen in conjunction with more technologically driven projects, mostly in ICT, energy, and transport fields funded under the "Smart Cities and Communities," including with the large scale demonstrations, the so-called lighthouse projects.

In the near future, through Horizon 2020 – the European framework programme for research and innovation – further EU–China cooperation could take place on sustainable urbanization, on resource-efficient urban agriculture, and on innovating nature-based solutions in cities, especially to enhance the potential for international replication.

Green manufacturing and services, scaling-up of renewable energy, improvement of energy efficiency, sustainable agriculture, and low-carbon transport will certainly continue to shape the EU–China relationship. But resilience and trust should also underlie this relationship: Resilience for dealing with natural, technological, and human changes; trust among actors and institutions, shared conviction in the added value of the protection of collective goods like air, water, and public health.

Domenico Rossetti di Valdalbero
Principal Administrator at the European Commission, Directorate-General for Research and Innovation

Introduction

For many years, the European Union (EU) and China have been developing a dialogue and effective cooperation initiatives on the need to address the environmental issues. They have found common ground on many key aspects and cooperation has been extensive in several fields. Diplomatic efforts have contributed to strengthen partnering opportunities between the countries.

The EU–China cooperation for environment protection has a quite long history. While the relation started as a mainly trade-oriented relationship, it has become a wide partnership, which has benefited from a sound institutional framework. The cooperation has embraced climate change issues, with strong linkages between energy security and environmental security.

There are several drivers for Europe's interest in strengthening environmental partnership with China. Europe has a comparative advantage in the field and has the opportunity to use this to gain bargaining power. China is a profitable market, both for the export of European environmental goods and for European firms seeking to invest locally. Moreover, helping China to diversify its energy mix and to improve its energy efficiency would have positive spillovers for the EU in terms of reduced global demand.

From the Chinese perspective, there are several reasons to engage with the EU, which include the latter's long experience in this sector and China's need to implement "more sustainable growth strategies." There are clear synergies between China's search for a more sustainable growth path and the EU's capacities in environmental protection and renewable energy technologies.

This book gathers some of the main findings of the EU-funded project POREEN on partnering opportunities between Europe and China in the renewable energies and environmental

industries. As a Marie Curie action, POREEN's goal was to produce research results which inform policy, while improving knowledge and research skills. Research outputs were developed leveraging academic mobility in China and Europe, particularly of young researchers. Their common objective was to seek to highlight opportunities to expand and develop this important relationship in a way that moves both regions toward a more sustainable future.

In a four-year time frame, researchers analyzed the opportunities and potential to boost cooperation between China and Europe in this important area. They used a variety of research approaches and academic perspectives, combining economic, legal, and engineering perspectives.

The economic dimensions of the project included the identification of critical issues, gaps, and potential for bilateral foreign direct investments and trade in the broad area of green industries. Legal research had a similar objective, but focused on offshore oil and gas extraction, renewable energies, corporate responsibility, and environmental legislation. The team's engineering research relates to energy efficiency and carbon dioxide reduction, particularly concerning transportation and low-carbon buildings.

The book is structured into three interrelated and connected parts.

Part I has an economic and policy orientation. The seven chapters examine different aspects of trade and foreign direct investment relations between Europe and China, in the renewable energies and/or environmental industries. Bilateral trade and FDI flows are analyzed, also in the light of Chinese and European green policy and cooperation initiatives. Authors identify obstacles, barriers, and difficulties faced by European and Chinese firms in initiating, maintaining, and consolidating both trade and investment initiatives in China and Europe, respectively. Key factors and issues to be addressed to further stimulate EU–China trade and investment flows are also considered.

Part II addresses the legal framework of EU–China cooperation. The first two chapters describe the Chinese environmental protection system, analyzing both national laws and governance measures. Then, the focus is on three specific themes: the electric sector in China, Corporate Social Responsibility in a comparative perspective, and the legal framework for civil liability for environmental damages deriving from energy misuse.

Part III is focused on engineering-related research activity. Two main research areas are developed, both related to energy efficiency and carbon dioxide reduction: mobility and the transportation sector and low-carbon buildings. The four chapters in this part highlight the state of the art of the engineering research group in key areas (mobility and the transportation sector and low-carbon buildings) that might have a huge potential impact on bilateral cooperation between Europe and China. One topic is related to the use of methane and biomethane, both in its compressed and liquid form, as an alternative fuel to reduce the environmental impact and GHG emissions in the transport sector. In general, biomass as feedstock energy source in China and its potential has been evaluated in detail. Whereas on the topic of low-carbon buildings, the use of heat pumps and district cooling/heating networks have been considered in order to increase the energy efficiency for space heating and domestic hot water production. Moreover, smart devices in buildings, studied on experimental test rigs, for thermal comfort and consumption reduction have been presented.

Together these diverse inputs seek to contribute to a more integrated, coherent and effective approach to EU-China cooperation in the sector.

Francesca Spigarelli
Louise Curran
Alessia Arteconi
Editors