Cross-border trade in electricity is rapidly expanding as a result of technical innovations, economic and geopolitical developments and the ongoing decarbonisation of the electricity sector in response to climate change. The expansion of electricity networks and the integration of increasing shares of electricity produced from renewable energy (RE) sources into the grid have made long-distance electricity flows both feasible and desirable. Drawing on the work of experts in trade and energy law and policy, and offering novel, multidisciplinary perspectives on the rapidly evolving landscape shaping international trade in electricity, this book examines the most important challenges – technical, economic, legal and policy-related – posed by long-distance and sustainable electricity trade. The book explores the regulatory implications of the policy instruments aimed at supporting RE electricity and considers how best to promote greater overall coherence in international electricity governance.

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INTERNATIONAL TRADE IN SUSTAINABLE ELECTRICITY

Regulatory Challenges in International Economic Law

Edited by

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PREFACE

The World Trade Forum series was established in 1997 as a meeting hub for academia, policy-makers, international organisations and civil society representatives, with the aim of addressing some of the most pertinent questions facing the international trading system. In its 2014 event, the World Trade Forum focused on the regulatory challenges posed by the expansion of international trade in electricity, triggered by the climate-driven, ongoing process of decarbonisation of the electricity sector, and, how it relates to the international trade and investment regimes.

The cutting-edge innovations that are reconfiguring the landscape of electricity trade and the shift to renewable energy (RE) sources that has occurred in response to the prominence of climate change mitigation in government agendas have prompted cross-border electricity trade. As the uptake of intermittent RE electricity grows, this will require the progressive integration of national, regional and, eventually, continental grids. These trends point to the need for an informed debate in the rapidly evolving area of international trade in electricity, which holds great interest for the public and private sectors alike. The idea of a global grid, of course, reflects a long-term vision which, if it materialises at all, will do so over a long period of time. Yet it is important to work on building blocks in a national and regional context, and to prepare the tools for inter-regional interfaces in the future.

Based upon experiences in the field of trade regulation and investment, the World Trade Forum 2014 sought to contribute to this debate by analysing, from a multidisciplinary perspective, the regulatory challenges that such developments pose to trade and investment in RE electricity. This book is based upon the papers presented at the World Trade Forum held in September 2014 at the World Trade Institute, University of Bern, Switzerland. The Forum brought together leading scholars and practitioners and policy-makers from the trade, investment and energy communities in an effort to learn more about the limits and opportunities
inherent to the current configuration of the trade and investment frameworks for the development of the electricity network over larger regions.

Particular thanks are owed to the authors of the chapters who agreed to present and debate the preliminary versions of their papers at the Forum and promptly went on to produce revised versions for publication. For their participation and most enriching comments during the debates, we should very much like to thank Réne Burkhard, Vanda Markovicova, Ioannis Retsoulis, Bernhard Thies, Jesse Kreier, Robert Howse, Krista Nadakavukaren Schefer and Ludivine Tamiotti.

We extend special thanks to Margrit Vetter and Christian Steiger of the World Trade Institute for support in organising the conference in Bern. We are most grateful to Susan Kaplan, the scientific editor of the World Trade Institute, for reviewing the manuscripts. Finally, our thanks go to Kim Hughes and her excellent team at Cambridge University Press for their support throughout the project and their strong commitment to the World Trade Forum Series.
# Abbreviations

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<td>AB</td>
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<td>ACER</td>
<td>Agency for the Cooperation of Energy Regulators</td>
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<td>ADA</td>
<td>Anti-Dumping Agreement</td>
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<td>AEC Blueprint</td>
<td>ASEAN Economic Community Blueprint</td>
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<td>APAEC</td>
<td>ASEAN Plan of Action for Energy Cooperation</td>
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<td>APG</td>
<td>ASEAN Power Grid</td>
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<td>APS</td>
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<tr>
<td>ASEAN</td>
<td>Association of Southeast Asian Nations</td>
</tr>
<tr>
<td>ATC</td>
<td>available transfer capacity</td>
</tr>
<tr>
<td>BAU</td>
<td>business-as-usual</td>
</tr>
<tr>
<td>BITs</td>
<td>bilateral investment treaties</td>
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<tr>
<td>BNDES</td>
<td>Brazilian Development Bank</td>
</tr>
<tr>
<td>BTA</td>
<td>border tax adjustment</td>
</tr>
<tr>
<td>CACM</td>
<td>Capacity Calculation and Congestion Management</td>
</tr>
<tr>
<td>CAPP</td>
<td>Central African Power Pool</td>
</tr>
<tr>
<td>CARB</td>
<td>California Air Resources Board</td>
</tr>
<tr>
<td>CCCME</td>
<td>China Chamber of Commerce for Import and Export of Machinery and Electronic Products</td>
</tr>
<tr>
<td>CCL</td>
<td>climate change levy</td>
</tr>
<tr>
<td>CDM/JI</td>
<td>Clean Development Mechanism/Joint Initiative</td>
</tr>
<tr>
<td>CEER</td>
<td>Council of European Energy Regulators</td>
</tr>
<tr>
<td>CHP</td>
<td>combined heat and power</td>
</tr>
<tr>
<td>CIER</td>
<td>Regional Energy Integration Commission</td>
</tr>
<tr>
<td>COMEELEC</td>
<td>Comité Maghrébin de l’Electricité</td>
</tr>
<tr>
<td>CO₂</td>
<td>carbon dioxide</td>
</tr>
<tr>
<td>CO₂e</td>
<td>CO2 equivalent</td>
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<tr>
<td>COP</td>
<td>coefficient of performance</td>
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</table>

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# List of Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>CRMs</td>
<td>capacity remuneration mechanisms</td>
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<tr>
<td>C&amp;T</td>
<td>cap-and-trade</td>
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<tr>
<td>CVD</td>
<td>countervailing duty</td>
</tr>
<tr>
<td>dena</td>
<td>Deutsche Energie-Agentur [German Energy Agency]</td>
</tr>
<tr>
<td>DC</td>
<td>direct current</td>
</tr>
<tr>
<td>DER</td>
<td>distributed energy resources</td>
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<tr>
<td>DGAD</td>
<td>Directorate General of Anti-Dumping and Allied Duties (India)</td>
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<tr>
<td>DRC</td>
<td>Democratic Republic of the Congo</td>
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<tr>
<td>DSM</td>
<td>demand-side management technologies</td>
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<tr>
<td>DSOs</td>
<td>distribution system operators</td>
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<tr>
<td>EAPP</td>
<td>Eastern Africa Power Pool</td>
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<tr>
<td>EB</td>
<td>Electricity Balancing</td>
</tr>
<tr>
<td>ECCAS</td>
<td>Economic Community of Central African States</td>
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<tr>
<td>ECOWAS</td>
<td>Economic Commission of West African Countries</td>
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<tr>
<td>ECREEE</td>
<td>ECOWAS Centre for Renewable Energy and Energy Efficiency</td>
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<tr>
<td>ECT</td>
<td>Energy Charter Treaty</td>
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<tr>
<td>EEC Treaty</td>
<td>Treaty establishing the European Economic Community</td>
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<tr>
<td>EEGI</td>
<td>European Electricity Grid Initiative</td>
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<tr>
<td>EERA</td>
<td>European Energy Research Alliance</td>
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<tr>
<td>EERS</td>
<td>energy efficiency resource standards</td>
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<tr>
<td>EIA</td>
<td>Energy Information Administration (United States)</td>
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<tr>
<td>EII</td>
<td>European Industrial Initiatives</td>
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<td>ELTAM</td>
<td>Egypt–Libya–Tunisia–Algeria–Morocco</td>
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<tr>
<td>EMCC</td>
<td>European Market Coupling Company</td>
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<tr>
<td>ENTSO-E</td>
<td>European Network of Transmission System Operators for Electricity</td>
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<tr>
<td>EPA</td>
<td>Environmental Protection Agency (United States)</td>
</tr>
<tr>
<td>EPEX</td>
<td>European Power Exchange</td>
</tr>
<tr>
<td>ERERA</td>
<td>ECOWAS Regional Electricity Regulatory Authority</td>
</tr>
<tr>
<td>ERGEG</td>
<td>European Regulators’ Group for Electricity and Gas</td>
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<tr>
<td>ESCO</td>
<td>energy service company</td>
</tr>
<tr>
<td>ESO</td>
<td>European standardisation organisation</td>
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<tr>
<td>ETS</td>
<td>Emissions Trading System (European Union)</td>
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<td>EU</td>
<td>European Union</td>
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<td>EUAs</td>
<td>EU allowances</td>
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<td>FACTS</td>
<td>Flexible AC Transmission Systems</td>
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<td>FBA</td>
<td>flow-based allocation</td>
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<td>FCA</td>
<td>Forward Capacity Allocation</td>
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<tr>
<td>FERC</td>
<td>Federal Energy Regulatory Commission</td>
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<tr>
<td>FET</td>
<td>fair and equitable treatment</td>
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<tr>
<td>FiT</td>
<td>feed-in tariff</td>
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</table>
LIST OF ABBREVIATIONS

FTA  free trade agreement
GATT  General Agreement on Tariffs and Trade
GATS  General Agreement on Trade in Services
GCC  Gulf Cooperation Council
GCEG  global clean electricity grid
GENI  Global Energy Network Institute
GPP  green public procurement
HDI  Human Development Index
HS  Harmanized Commodity Description and Coding System
HVDC  high-voltage, direct current
IADB  Inter-American Development Bank
IAI  Initiative for ASEAN Integration
ICSID  International Centre for Settlement of Investment Disputes
ICT  information and communications technology
IEA  International Energy Agency
IEC  International Electrotechnical Commission
IPCC  Intergovernmental Panel on Climate Change
IT  information technology
ITC  investment tax credits
LCFS  low carbon fuel standards
LED  light-emitting diode
LEC  levy exemption certificates
LNG  liquefied natural gas
MEDRING  Mediterranean Ring
MER  Regional Electricity Market
MiFID  Markets in Financial Instruments Directive
MFN  most favoured nation
MMTCDE  million metric tonnes of carbon dioxide equivalents
MoU  memorandum of understanding
MPP  Medicines Patent Pool
MTI  merchant transmission investment
Mtoe  megatonne of oil equivalent (Mtoe)
NAPs  National Action Plans
NEM  net energy metering
NEMO  Nominated Electricity Market Operators
NERC  North American Electric Reliability Council
NGO  non-governmental organisation
NIST  National Institute of Standards and Technology
NME  non-market economy
NREL  National Renewable Energy Laboratory
NSCOGI  North Seas Countries Offshore Grid Initiative
# List of Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
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<td>NTC</td>
<td>net transfer capacity</td>
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<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
</tr>
<tr>
<td>OLADE</td>
<td>Latin American Energy Organization</td>
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<tr>
<td>ONS</td>
<td>National System Operator (Brazil)</td>
</tr>
<tr>
<td>PCIs</td>
<td>projects of common interest</td>
</tr>
<tr>
<td>PCR</td>
<td>price coupling regions</td>
</tr>
<tr>
<td>PDAM</td>
<td>post day ahead market</td>
</tr>
<tr>
<td>PIDA</td>
<td>Program for Infrastructure Development in Africa</td>
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<tr>
<td>PLEF</td>
<td>Pentalateral Energy Forum</td>
</tr>
<tr>
<td>PPA</td>
<td>power purchase agreement</td>
</tr>
<tr>
<td>PPMs</td>
<td>processes and production methods</td>
</tr>
<tr>
<td>PTC</td>
<td>production tax credits</td>
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<tr>
<td>PV</td>
<td>photovoltaic</td>
</tr>
<tr>
<td>RE</td>
<td>renewable energy</td>
</tr>
<tr>
<td>REC</td>
<td>Renewable Energy Certificate</td>
</tr>
<tr>
<td>RERA</td>
<td>Regional Electricity Regulators Association of Southern Africa</td>
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<tr>
<td>REIPPPP</td>
<td>Renewable Energy Independent Power Producer Procurement Program</td>
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<tr>
<td>RES</td>
<td>renewable energy sources</td>
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<tr>
<td>RGGI</td>
<td>Regional Greenhouse Gas Initiative</td>
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<td>RMOC</td>
<td>Regional Market Operation Center</td>
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<td>ROC</td>
<td>Renewable Obligation Certificate</td>
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<td>RPP</td>
<td>regional power pools</td>
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<td>RPS</td>
<td>renewable portfolio standards</td>
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<td>SADC</td>
<td>Southern African Development Community</td>
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<tr>
<td>SAPP</td>
<td>Southern African Power Pool</td>
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<tr>
<td>SCM Agreement</td>
<td>Agreement on Subsidies and Countervailing Measures</td>
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<tr>
<td>SETIS</td>
<td>Strategic Energy Technologies Information System</td>
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<td>SG-CG</td>
<td>Smart Grid Coordination Group</td>
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<td>SGTF</td>
<td>Smart Grid Task Force</td>
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<tr>
<td>SIEPAC</td>
<td>Central American Electrical Interconnection System</td>
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<td>SIN</td>
<td>Brazilian Interconnected National System</td>
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<td>SINEA</td>
<td>Andean Electrical Interconnection System</td>
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<td>SOEs</td>
<td>state-owned enterprises</td>
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<td>STEM</td>
<td>short-term energy market</td>
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<td>TBT</td>
<td>Agreement on Technical Barriers to Trade</td>
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<td>TDIs</td>
<td>trade defence instruments</td>
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<td>TEN-E</td>
<td>trans-European energy networks</td>
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<td>TPA</td>
<td>third party access</td>
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<td>TRIMs</td>
<td>Agreement on Trade-Related Investment Measures</td>
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<td>TSO</td>
<td>transmission system operator</td>
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<td>UCTE</td>
<td>Union for the Coordination of the Transmission of Electricity</td>
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</table>
# List of Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>UNASUR</td>
<td>Union of South American Nations</td>
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<tr>
<td>UNCITRAL</td>
<td>United Nations Commission on International Trade Law</td>
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<tr>
<td>UNCTAD</td>
<td>United Nations Conference on Trade and Development</td>
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<tr>
<td>UNEP</td>
<td>United Nations Environment Programme</td>
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<td>UNFCCC</td>
<td>United Nations Framework Convention on Climate Change</td>
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<tr>
<td>UPDEA</td>
<td>Union of African Power Utilities</td>
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<tr>
<td>US</td>
<td>United States</td>
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<tr>
<td>USW</td>
<td>United Steelworkers Union</td>
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<td>WAPP</td>
<td>West African Power Pool</td>
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<td>WTO</td>
<td>World Trade Organization</td>
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<td>ZNE</td>
<td>zero net energy</td>
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