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International Trade in Sustainable Electricity, edited by Thomas Cottier & Ilaria Espa
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The idea of a global grid powered by renewable resources is nothing novel. It emerged in the 1970s and was touted as the solution to environmental concerns and economic inequality alike.¹ Four decades on, concerns about climate change are finally driving the decarbonization of the electricity sector. However, incorporating more renewable resources into electricity generation brings with it concerns regarding reliability and supply. Because renewable resources often generate power intermittently, some argue that more interconnected generators will increase reliability,² because if disruption of renewable generation occurs in one location, renewable generation in another region may provide alternative supply. Regional and international cooperation could also address supply adequacy. While studies show that enough renewable resources exist to power the globe,³ those resources are not always located near their respective demand. Projects like the Ouarzazate concentrated solar power system in Morocco, which may provide Europe with solar energy generated in the Sahara Desert,⁴ inspire us to envision powering the world with renewable electricity, even if generated far away.

The book *International Trade in Sustainable Electricity* addresses trade in electricity in light of the global push for decarbonization and the integration of higher volumes of renewable power. Based on papers presented at the 2014 World Trade Forum, Thomas Cottier and Ilaria Espa have assembled a multi-disciplinary perspective on trade and investment in renewable electricity. The book comprises a series of stand-alone chapters grouped loosely into four categories. Part I introduces the concept of the global grid and the challenges it faces. Part II surveys regional experiences in promoting renewable energy adoption and trade. The remainder of the book aims to explain the biggest hurdles to international trade in sustainable energy, with Part III discussing interconnectivity issues and Part IV addressing regulatory challenges. The book considers international electricity trade through a host of lenses, including economic, technical, and policy-oriented perspectives, and provides insights and ideas for the reader to consider. However, it offers no singular solution for promoting renewable energy trade or expanding current grid infrastructure to meet capacity needs.

¹ R.B. Fuller & K. Kuromiya, *Cosmography: A Posthumous Scenario for the Future of Humanity* (MacMillan, 1993).

² S. Becker et al., 'Transmission Grid Extensions during the Build-up of a Fully Renewable Pan-European Electricity Supply' (2014) 64 *Energy*, pp. 404–18.

³ M.Z. Jacobson & M.A. Delucchi, 'Providing All Global Energy with Wind, Water, and Solar Power' (2011) 39(3) *Energy Policy*, pp. 1154–69.

⁴ S. Ceurstemont, 'The Colossal African Solar Farm that Could Power Europe', *BBC News*, 26 Nov. 2016, available at: <http://www.bbc.com/future/story/20161129-the-colossal-african-solar-farm-that-could-power-europe>.

Part I contains five chapters that envision the universal benefits of a global grid, pinpointing the building blocks necessary to achieve that vision, and identifying existing challenges. Thomas Cottier and Ilaria Espa open the discussion with an informative account of the function of a global grid in supporting the renewable transition of the electricity sector. Chapter 1 helpfully explains how drivers of decarbonization fuel a push for less restrained trade in sustainable electricity. The chapter also describes the role of technology in facilitating long-distance electricity trade, and it explores the benefits associated with large regional transmission networks and a global grid. While recognizing that a global grid is a long-term vision, the authors lay the foundation for its realization by offering a plan for and direction towards the rapidly evolving landscape of international trade in sustainable electricity.

The remaining chapters in Part I aim to advance the investigation by Cottier and Espa and assess the need for transnational and transregional grids, barriers to efficient organization of cross-border trade, economic and geopolitical forces that drive trade in renewable electricity, and governance of a global grid. Of note, Steivan Defilla, Director of the Energy Charter Secretariat, attempts to tackle a huge topic in Chapter 5, 'Good Governance for a Global Electricity Grid: What Are the Ingredients?'. After first identifying the regulatory challenges created by various technological developments in the electricity sector, Defilla follows with suggestions for good governance of a global electricity grid. The chapter identifies several potential institutions with a part to play in governing a global grid, including the World Trade Organization (WTO), the Energy Charter, and the United Nations (UN) Conference on Trade and Development. However, while many of these institutions address issues that intersect with governance of electricity trade, Defilla notes that no existing organization is designed to govern international trade in electricity. The chapter's embrace of the role of governmental and non-governmental organizations in the governance of a global grid has great merit, as these organizations are best poised to implement binding rules once states have agreed to them. However, the chapter delivers a somewhat abrupt appraisal of the capacity of these organizations to fill that position. Out of the seven organizations he identifies, Defilla spends a paragraph each on six of them. He offers slightly more consideration of the Energy Charter, although here too he fails to make clear the role it should play in governance of a global grid. Defilla identifies many actors that should play a part in global governance, but the chapter neither fully explains what good governance in fact involves nor how a global governance system should be constructed, ultimately falling short of living up to its title. The other chapters in Part I, while narrower in their scope, are more successful in explaining what global trade in international electricity should involve.

Part II switches focus to detail the regional experiences of the European Union (EU), the United States (US), the Association of South East Asian Nations (ASEAN), Africa, and Latin America. In Chapter 8, Sufian Jusoh offers ASEAN as a prime example of effective regional cooperation in electricity trade. Though comprising ten separate nations, members of ASEAN are already taking steps towards a regionally

integrated grid. The ASEAN Economic Community Blueprint⁵ calls for the development of an ASEAN power grid involving 14 interconnection projects throughout the region. This series of interconnection projects exemplifies the potential benefits of transnational grids discussed in earlier essays, allowing nations with abundant renewable energy resources – such as Indonesia and the Lao People’s Democratic Republic – to export electricity across the region, offsetting energy needs otherwise generated from coal or gas.

Turning to a different region, Fereidoon Sioshansi analyzes the North American experience in Chapter 7, focusing primarily on US efforts to promote renewable generation and trade. Though Sioshansi’s assessment of federal initiatives to reduce greenhouse gases (GHGs) focuses on obligations that the current administration has removed – such as those contained in the Paris Agreement⁶ and the Clean Power Plan⁷ – his overall evaluation of the system remains an apt description of the North American experience. He argues that through mechanisms such as renewable portfolio standards (RPSs), states and localities are responsible for progress in promoting renewable energy. Similarly, in the absence of federal leadership, renewable energy advocates should look to cities and states to drive trade in sustainable energy.

Parts III and IV of the book then turn to consider two of the biggest hurdles in multilateral electricity trade: transportation and interconnectivity. The first three chapters of Part III examine the impact of investment and trade frameworks on the import and export of electricity and transport of electricity through fixed infrastructure. The final two essays in Part III address new challenges faced by transmission system operators (TSOs) and the advent of smart grid technology. These two essays exemplify some of the strengths and shortcomings of the book as a whole.

Yulia Selivanova presents an exceptionally accessible assessment of unique challenges associated with transmission of energy in international trade (Chapter 11). In doing so, she focuses on the insufficiency of the WTO framework in assuring liberalized energy trade. Noting many gaps in the current WTO rules, Selivanova deftly highlights the potential for discriminatory behaviour in the transmission of electricity and the difficulties for states to ensure WTO market-access compliance when private corporations control transmission systems. Importantly, she also proposes a solution and maps the way forward under the existing WTO framework via either an annex or a reference paper which could address competition issues in energy trade as well as devise specific WTO rules on energy transit.

Providing a contrasting view of challenges associated with interconnectivity, Karolis Gudas argues that, at least in the context of the EU, renewable energy incentives result in negative consequences for electricity trade and the operation of electric systems (Chapter 12). Gudas asserts that the preference given by EU law to

⁵ *ASEAN Economic Community Blueprint 2025* (ASEAN Secretariat, 2015), available at: <http://www.asean.org/storage/images/2015/November/aec-page/AEC-Blueprint-2025-FINAL.pdf>.

⁶ Paris (France), 13 Dec. 2015, in force 4 Nov. 2016, available at: http://unfccc.int/paris_agreement/items/9485.php.

⁷ 40 CFR §§ 60.5700–60.5880 (2017).

renewable energy generators in areas of connection, access to the grid, and dispatch of energy comes at a cost to market-based trade in electricity. Gudas focuses on the priority rules in the 2001 Renewable Energy Sources Directive⁸ and the 2012 Directive on Energy Efficiency.⁹ He argues firstly that these directives provide excessive benefits to renewable energy generators in the context of transmission and distribution. Specifically, Gudas asserts that conventional energy generators experience the same struggles as renewable energy generators and that the directives, which provide renewable energy priority in transmission, do not directly target renewable energy integration challenges that vary among EU Member States. Based on these assertions, he concludes that conventional energy generators deserve the same privileges as generators of renewable energy. While Gudas provides a well-supported discussion of grid integration challenges, the chapter seems to blame the priority directives for negative side effects and to fault the priority rules for failing to address every challenge the European grid faces. The first assignment of fault lacks evidence, as the only factual support comes from three sentences in the chapter's conclusion. As for Gudas's second critique of the directives, the chapter fails to elucidate why failure to address specific integration barriers in every Member State, or differing treatment of conventionally produced energy and renewable energy, makes the priority rules inherently bad or unjustifiable. Thus, although the chapter includes an interesting discussion of the merits of an electricity-regulatory system that ensures neutrality across technologies, its evaluation of the impacts of the priority directives is arguably too one-sided.

Finally, the first three chapters of Part IV look at regulatory challenges stemming from the proliferation of multilateral policy instruments aimed at supporting green energy. The last three chapters, in turn, concern investment and competition issues that complicate the promotion of renewable electricity. Specifically, they analyze the treatment of monopolies, technology transfers, and the role of regulatory takings. Technology transfer is undoubtedly necessary for the realization of a global grid. Frederick Abbott weighs the need for technology transfer against the rights and interests of governments and private corporations (Chapter 20). His chapter successfully maps the need for technology transfer, the associated hurdles, and a path forward. Abbott notes that computer software and digital technologies will be integral to a global grid. Yet, sharing these technologies globally raises concerns over intellectual property rights. From a development side, the chapter notes that technology transfer may dissuade private corporations from investing in the development of technologies if they might be shared with their competitors. Similarly, governments may be dissuaded from or unable to commit to technology transfers that implicate the intellectual property of their largest industries. As a potential solution to this challenge,

⁸ Directive 2001/77/EC on the Promotion of Electricity Produced from Renewable Energy Sources in the Internal Electricity Market [2001] OJ L 283/33 (no longer in force, repealed by Directive 2009/28/EC on the Promotion of Energy from Renewable Sources and Amended and Subsequently Repealing Directives 2001/77/EC and 2003/30/EC [2009] OJ L 140/16).

⁹ Directive 2012/27/EU on Energy Efficiency, Amending Directives 2009/125/EC and 2010/30/EU and Repealing Directives 2004/8/EC and 2006/32/EC [2012] OJ L315/1.

Abbott presents a compelling case study of the Medicines Patent Pool¹⁰ to illustrate that the sharing of technology and expertise across nations is plausible despite intellectual property concerns. Ultimately, the chapter reasons that global grid integration is unlikely to begin as an international effort and will probably evolve out of the series of regional grids currently developing. Likewise, Abbot argues, technology transfer should begin with smaller bilateral efforts.

Overall, *International Trade in Sustainable Electricity* offers a number of interesting multi-disciplinary analyses of the challenges associated with increasing international trade and investment in renewable electricity. While some of the chapters fall short of their objectives, the book is at its best in presenting a wealth of viewpoints challenging its readers to engage more fully with all issues – whether they are technical, economic, or political. The book contributes several novel ideas and compels its readers to re-envision the future of the electricity sector as we know it.

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Despite almost half a century of regulation, progress in reducing the emissions from certain segments of the United States (US) energy sector remains stymied by elderly grandfathers refusing to ‘shuffle off this mortal coil’.¹ Almost 50 years ago, the US enacted the modern version of the Clean Air Act (CAA).² Responding to an increase in public interest on the topic of air pollution, the US Congress passed an ambitious bill that aimed to decouple economic growth from environmental harm and ensure clean, healthy air for all Americans. The CAA empowered the newly created US Environmental Protection Agency (EPA) to set emissions standards and regulate sources of emissions, including power plants. However, the delegated regulatory authority for many common pollutants under the New Source Performance Standards (NSPS)³ extends only to newly constructed or modified facilities.⁴

¹⁰ See website at: <https://medicinespatentpool.org> (‘The Medicines Patent Pool (MPP) is a United Nations-backed public health organisation working to increase access to HIV, hepatitis C and tuberculosis treatments in low- and middle-income countries’).

¹ William Shakespeare, *Hamlet*, Act III, sc. 1.

² 42 U.S.C. §§ 7401–7671q (2012).

³ The CAA contains several regulatory schemes that regulate emissions from stationary sources. *Struggling for Air* focuses on the NSPS codified in s. 111 of the CAA: *ibid.*, § 7411.

⁴ s. 111 of the CAA defines ‘new source’ to mean ‘any stationary source, the construction or modification of which is commenced after the publication of [an applicable NSPS]’: *ibid.*, § 7411(a)(2). Modification