Transnational Environmental Law, 6:1 (2017), pp. 59–85 © 2016 Cambridge University Press
doi:10.1017/S2047102516000133

ARTICLE

The Impossible Transplant of the EU Emissions Trading Scheme: The Challenge of Energy Market Regulation

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First published online 7 June 2016

Abstract
Following the European Union (EU) experience, an increasing number of countries are establishing an Emissions Trading Scheme (ETS). The EU ETS often serves as a 'model' despite fundamental differences in the receiving environment. In the EU liberalized energy markets, carbon prices are intended to raise the cost of carbon-intensive energy and thereby stimulate cleaner alternatives. In contrast, many emerging economies continue to regulate energy investments and prices, which may insulate consumers and producers from the impact of an ETS. To avoid this risk, energy economists advocate EU-style energy market reforms as a prerequisite to the introduction of the ETS concept abroad. By focusing on the cases of China, Kazakhstan, and Russia, this article highlights the limits on the exportation of the EU liberalization model and argues that, instead of energy reform, the ETS must be reconceptualized as a mechanism that integrates the regulated energy market paradigm in emerging economies.

Keywords: Carbon trading, Legal transplant, Energy law, Emerging economies

1. INTRODUCTION

The European Union (EU) Emissions Trading Scheme (ETS) is the cornerstone of the EU's internal greenhouse gas (GHG) emissions reduction policy and, at the same time, plays a key role in the EU's external policy on climate change. By promoting

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The author is grateful to the participants of the workshop entitled '"Learning by Doing" in Global Carbon Markets', at the University of Edinburgh, School of Law, Edinburgh (United Kingdom), on 12 June 2015, for very useful comments on the preliminary conclusions of this article. Many thanks also to Huizhen Chen, Oleg Arkhipkin, Yan Xu, Yuan Xu, Navraj Ghaleigh, Liz Fisher, Sanja Bogojević, William Partlett, Frank Joshua, and Alexey Sankovski for most inspiring discussions on ETSs in emerging economies, to three anonymous *TEL* reviewers for their thorough comments, and to Meng Fang and Anna Harrisevans for research assistance. I would also like to thank David Wilmshurst, Academic Editor at CUHK, for editing the submission. The research underlying this article benefited from financial support by the CUHK Direct Research Grant. All views expressed in this article and any remaining errors are attributable solely to the author. The title of this article was inspired by Pierre Legrand's seminal article on 'The Impossibility of "Legal Transplants"' (1997) 4(1) *Maastricht Journal of European and Comparative Law*, pp. 111–24.

the adoption of ETSs abroad and the 'linking' of these schemes, the EU aims to develop a 'global network of emissions trading systems'.[1] This bottom-up approach to the creation of an international carbon market is a way for the EU, which profiles itself as a 'leader in international climate politics',[2] to promote action on climate change in the absence of new top-down international emissions reduction obligations.[3] On the face of it, this policy is working. As highlighted in the Intended Nationally Determined Contributions (INDCs) communicated by states in the framework of the latest international climate change mitigation initiative, states adopt an ETS as part of their emissions reduction strategy.[4] The EU ETS experience has influenced the design of such schemes around the world.[5] Most notably, under EU influence,[6] China introduced pilot ETSs in 2013 as a first step towards the establishment in 2017 of a national scheme.[7] Kazakhstan adopted an ETS in 2012,[8]

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1 European Commission, 'Questions and Answers on the Revised EU Emissions Trading System', MEMO/08/796, 17 Dec. 2008, available at: http://europa.eu/rapid/press-release_MEMO-08-796_en.htm. See also E. Morgera, K. Kulovesi & M. Muñoz, 'Environmental Integration and Multi-Faceted International Dimensions of EU Law: Unpacking the EU's 2009 Climate and Energy Package' (2011) 48(3) *Common Market Law Review,* pp. 829–91, at 862–3.

2 R. Wurzel & J. Connelly, 'Conclusion', in R. Wurzel & J. Connelly (eds), *The European Union as a Leader in International Climate Change Politics* (Routledge, 2011), pp. 271–89, at 271.

3 Conference of the Parties to the United Nations (UN) Conference on Climate Change, Adoption of the Paris Agreement, UN Doc. FCCC/CP/2015/L.9/Rev.1, 12 Dec. 2015, available at: http://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf (does not impose binding quantitative emissions reduction obligations on the Contracting Parties).

4 UN Framework Convention on Climate Change (UNFCCC) Secretariat, 'Synthesis Report on the Aggregate Effect of the Intended Nationally Determined Contributions', UN Doc. FCCC/CP/2015/7, 30 Oct. 2015, p. 33, available at: http://unfccc.int/resource/docs/2015/cop21/eng/07.pdf. Most notably, see National Development and Reform Commission (NDRC) of the People's Republic of China (PRC), 'Enhanced Actions on Climate Change: China's Intended Nationally Determined Contributions (2015)', available at: http://www4.unfccc.int/submissions/INDC/Published%20Documents/China/1/China's%20INDC%20-%20on%2030%20June%202015.pdf.

5 See, e.g., Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety of Germany, 'Emissions Trading: Basic Principles and Experiences in Europe and Germany', Aug. 2014, p. 1, available at: http://ets-china.org/wp-content/uploads/2015/07/ets_basic_principles_and_experiences_in_europe_and_germany_eng_online.pdf.

6 On EU influence on China's ETS policy, see, e.g., H. Chen, 'Towards a Market-Based Climate Regime in China? A Legal Perspective on the Design and Implementation of GHG Trading', PhD thesis, University of Maastricht (the Netherlands), Sept. 2015, p. 219; Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), 'Capacity Building for the Establishment of Emissions Trading Schemes in China', available at: http://ets-china.org; EU Commission, Climate Action, 'International Carbon Market', available at: http://ec.europa.eu/clima/policies/ets/linking/index_en.htm; European Council, 'EU-China Joint Statement on Climate Change', 29 June 2015, available at: http://www.consilium.europa.eu/en/press/press-releases/2015/06/29-eu-china-climate-statement; G. Yu & R. Elsworth, 'Turning the Tanker: China's Changing Economic Imperatives and Its Tentative Look to Emissions Trading', Sandbag Climate Campaign, Apr. 2012, p. 15, available at: https://sandbag.org.uk/site_media/pdfs/reports/Sandbag_Turning_the_Tanker_Final.pdf; A. Marcu, 'China's ETS: A Vote of Confidence in Carbon Markets Ahead of Paris', Centre for European Policy Studies, 10 Oct. 2015, available at: http://www.ceps.eu/system/files/Vote%20of%20Confidence%20for%20CMs.pdf.

7 NDRC, 'Interim Measures for Carbon Emissions Trading', NDRC Paper, 10 Dec. 2014, available at: http://qhs.ndrc.gov.cn/gzdt/201412/t20141212_652035.html; NDRC, 'China's Policies and Actions on Climate Change', NDRC Paper, Nov. 2014, p. 37–8, available at: http://en.ccchina.gov.cn/archiver/ccchinaen/UpFile/Files/Default/20141126133727751798.pdf; M. Duan, 'From Carbon Emissions Trading Pilots to National System: The Road Map for China' (2015) 9(3) *Climate & Carbon Law Review*, pp. 231–42.

8 Order of the Ministry of the Environment of Kazakhstan of 11 May 2012 No. 151-p on the Adoption of Rules for the Trade in GHG Allowances, art 17. In February 2016, under pressure from the electricity industry, a proposal was introduced to terminate the Kazakh ETS: O. Skiban, 'Kazakhstan Priostanovit

'using the EU ETS as a model'.[9] Similarly, in the climate law and policy literature, recommendations on the design of ETSs in foreign countries (China, for example) tend to be based on the EU experience.[10]

However, will the EU ETS model generate the expected environmental impact abroad, taking into account the possibility of significant regulatory, economic, political, historical, and social differences between the EU and the countries that adopt ETSs along European lines? In line with the founding emissions trading theories,[11] the EU ETS – itself influenced by the United States' (US) sulphur dioxide (SO_2) trading scheme[12] – was developed to fit the EU free-market environment. In the energy sector, where most GHG emissions reductions must take place, production and supply have been gradually opened to competition through deregulation.[13] Energy market liberalization is important for the functioning of the EU ETS because it determines the impact of the ETS on energy prices and investments and thus its influence on producer and consumer behaviour.[14] In contrast, many emerging economies continue to regulate energy prices and investments,[15] which may insulate consumers and producers from the impact of the ETS. Taking a comparative law perspective, this article examines whether the EU's market-based ETS model could successfully[16] drive the decarbonization of energy supply in China, Kazakhstan, and Russia – three of the world's most carbon-intensive economies[17] which share socialist political and legal legacies,[18] a tradition of government intervention with markets, and a political aversion to energy price increases.[19] Following the EU ETS

do 2018 g. Torgovliu Kvotami na Vybrosy Parnikovykh Gazov', *Zakon*, 24 Feb. 2016, available at: http://www.zakon.kz/4776924-kazakhstan-priostanovit-do-2018-g.html.

9 A. Musagazhinovoy, 'EU ETS Training Program for the Private Sector in Kazakhstan', Regional Environmental Center for Central Asia (CAREC), 2011, available at: http://www.old.carecnet.org/2011/08/04/eu-ets-training-program-for-the-private-sector-in-kazakhstan/?lang=en; Environmental Defense Fund (EDF), CDC Climat Research & IETA, 'Kazakhstan ETS Case Study', 2014, available at: https://ieta.memberclicks.net/assets/CaseStudy2015/kazakhstan_case_study_may2015.pdf; S. Sabitova, 'EU ETS Framework for Establishing a Domestic Emissions Trading System in Kazakhstan' (2011) 2(2) *Journal of Environmental Investing*, pp. 32–52.

10 See, e.g., F. Jotzo & A. Loeschel, 'Emissions Trading in China: Emerging Experiences and International Lessons' (2014) 75 *Energy Policy*, pp. 3–8, at 4. For more references on the EU-centred approach to the reform of ETSs and energy markets abroad, see the literature review in Section 5 below.

11 D. Montgomery, 'Markets in Licenses and Efficient Pollution Control Programs' (1972) 5(3) *Journal of Economic Theory*, pp. 395–418.

12 S. Weishaar, *Emissions Trading Design: A Critical Overview* (Edward Elgar, 2014), p. 4.

13 See Section 3 below on the EU approach to the ETS in the context of the liberalization of the EU energy markets.

14 F. Gullì, 'Modelling the Short-Run Impact of "Carbon Trading" on the Electricity Sector', in F. Gullì (ed.), *Markets for Carbon and Power Pricing in Europe: Theoretical Issues and Empirical Analyses* (Edward Elgar, 2008), pp. 36–79.

15 See Section 4 below.

16 D. Nelken, 'The Meaning of Success in Transnational Legal Transfers' (2001) 19 *Windsor Yearbook of Access to Justice*, pp. 349–66.

17 The World Bank, 'CO_2 Emissions (Metric Tons per capita) (2011–2015)', available at: http://data.worldbank.org/indicator/EN.ATM.CO2E.PC.

18 On the 'socialist legal family' see, e.g., K. Zweigert & H. Kötz, *An Introduction to Comparative Law*, 2nd edn (Clarendon Press, 1977), p. 297; P. Glenn, *Legal Traditions of the World: Sustainable Diversity in Law*, 5th edn (Oxford University Press, 2014), p. 347.

19 See Section 5 below.

https://doi.org/10.1017/S2047102516000133 Published online by Cambridge University Press

experience, these three countries have established or are considering the creation of an ETS.[20] At the same time, the repeated attempts of these countries to reform their national energy markets have remained incomplete and, in many ways, unsuccessful.[21]

The concept of the 'legal transplant', which refers to the legal borrowing or integration of 'foreign' norms into 'host' legal systems,[22] is not new in the environmental and climate law literature. It is central to the literature on global environmental law dealing with the globalization of environmental principles[23] and on transnational environmental law, as part of the transboundary communications that characterize the development of environmental regulation.[24] Following the division in the comparative law literature on the feasibility of legal transplants,[25] scholars disagree on the impact that the import of foreign regulation can have on environmental protection in the host legal systems. On the one hand, Yang and Percival, as well as Dudek, Stewart and Wiener, argue that the importation of foreign environmental tools (such as the ETS) can assist environmental law reform in both China[26] and Russia.[27] In the same vein, Bodansky and co-authors argue that national schemes can be linked to each other and that this process can be facilitated by a 'model rule' governing the ETS architecture.[28] On the other hand, Bogojević questions the possibility of successful transplantation by referring to the role of domestic institutions and the importance of the social, political and economic forces underlying the development of environmental law. Qualifying the EU ETS as

20 Russia referred to carbon pricing in its 2020 Energy Strategy (Government Regulation No. 1234-r of 28 Aug. 2003, replaced by Regulation No. 1715-r of 13 Nov. 2009) and in 2014 continued to explore the possibility of developing a national ETS: M. Carr & S. Nicola, 'Russia Considers Domestic Carbon Market in Global Warming Fight', *Bloomberg Business*, 12 Mar. 2014, available at: http://www.bloomberg.com/news/articles/2014-03-12/russia-considers-domestic-carbon-market-in-global-warming-fight.

21 On resistance to and the failure of energy market reform initiatives, see Section 5 below. In addition to these common characteristics, China, Kazakhstan, and Russia have important differences that could potentially affect the functioning of an ETS (e.g., economic growth; industrialization; resource-importing *versus* -exporting economies); however, these macroeconomic differences do not affect the sector-specific conclusions of this article on the electricity regulation challenge to the introduction of an ETS in emerging economies.

22 On the notion of legal transplant see, e.g., A. Watson, *Legal Transplants: An Approach to Comparative Law* (Scottish Academic Press, 1974), p. 96; P. Legrand, 'European Legal Systems Are Not Converging' (1996) 45(1) *International and Comparative Law Quarterly*, pp. 52–81.

23 See, e.g., J. Wiener, 'Something Borrowed for Something Blue: Legal Transplants and the Evolution of Global Environmental Law' (2001) 27(4) *Ecology Law Quarterly*, pp. 1295–371, at 1295; T. Yang & R. Percival, 'The Emergence of Global Environmental Law' (2009) 36(3) *Ecology Law Quarterly*, pp. 615–64, at 616; T. Yang, 'The Emerging Practice of Global Environmental Law' (2012) 1(1) *Transnational Environmental Law*, pp. 53–65.

24 V. Heyvaert & T.F.M. Etty, 'Introducing Transnational Environmental Law' (2012) 1(1) *Transnational Environmental Law*, pp. 1–11, at 4.

25 See Watson, n. 22 above, on the one hand, and Legrand, n. 22 above, on the other.

26 Yang & Percival, n. 23 above, p. 664.

27 D. Dudek, R. Stewart & J. Wiener, 'Environmental Policy for Eastern Europe: Technology-based Versus Market-based Approaches' (1992) 17(1) *Columbia Journal of Environmental Law*, pp. 1–52.

28 D. Bodansky et al., 'Facilitating Linkage of Climate Policies through the Paris Outcome' (2015) *Climate Policy*, pp. 1–17, at 13.

'an EU-specific legal construction', Bogojević considers that 'the legal architecture of this trading scheme – albeit appearing to be simple – is tied to complex questions concerning power allocation that are specific to the EU'.[29] On this basis, Bogojević is critical of the possibility of linking ETSs through the creation of a global carbon market.[30]

A missing dimension in the legal debate on the transferability of the ETS relates to the role that energy regulation plays in the integration – or, to use Teubner's words, the 'reconstruction'[31] – of the ETS in the recipient environment. Energy is of crucial relevance to emissions trading because most GHG emissions reductions must take place in this sector.[32] As highlighted by the EU experience with the ETS in liberalized markets[33] and the US experience with SO_2 and nitrogen oxide (NO_X) trading in regulated power markets,[34] regulatory choices regarding the organization of energy supply impact on the functioning of an ETS. The extent to which an ETS will succeed in reducing GHG emissions abroad will thus depend on how the design of this scheme 'fits'[35] within the local energy market structure.[36]

In contrast with the environmental law literature, climate and energy economists and policy scholars recognize that emissions trading cannot be studied independently from energy markets and, on this basis, highlight the challenges that energy regulation poses to ETS transplantation.[37] Interdisciplinarity is essential for the study of the interaction between carbon and energy markets, taking into account the economic nature and policy objectives (GHG emissions reduction and reliable energy supply) of these regulatory instruments.[38] At the same time, by highlighting the role

29 S. Bogojević, *Emissions Trading Schemes: Markets, States and Law* (Hart, 2013), p. 68.

30 Ibid., p. 164.

31 G. Teubner, 'Legal Irritants: Good Faith in British Law or How Unifying Law Ends up in New Divergences' (1998) 61(1) *The Modern Law Review,* pp. 11–32, at 12. Teubner recognizes that rules can be copied by other jurisdictions but that these foreign rules will be 'reconstructed' within the new social and legal environment, resulting in a different meaning to the original rules.

32 See, e.g., N. Gunningham, 'Confronting the Challenge of Energy Governance' (2012) 1(1) *Transnational Environmental Law,* pp. 119–35, at 119.

33 See, e.g., Gullì, n. 14 above, p. 36.

34 See, e.g., M. Fowlie, 'Emissions Trading, Electricity Restructuring, and Investment in Pollution Abatement' (2010) 100(3) *American Economic Review*, pp. 837–69, at 840.

35 D. Nelken, 'Comparatists and Transferability', in P. Legrand & R. Munda (eds), *Comparative Legal Studies: Traditions and Transitions* (Cambridge University Press, 2003), pp. 437–66, at 437.

36 See, e.g., J. Horst Keppler, 'Annex: The Interaction between the EU ETS and European Electricity Markets', in D. Ellerman, F. Convery & C. de Perthuis (eds), *Pricing Carbon: The European Union Emissions Trading Scheme* (Cambridge University Press, 2010), pp. 293–328.

37 Y.-G. Kim & J.-S. Lim, 'An Emissions Trading Scheme Design for Power Industries Facing Price Regulation' (2014) 75 *Energy Policy*, pp. 84–90; C. Hood, *Managing Interactions between Carbon Pricing and Existing Energy Policies* (International Energy Agency (IEA), 2013); J. Sijm, Y. Chen & B. Hobbs, 'The Impact of Power Market Structure on CO_2 Cost Pass-Through to Electricity Prices under Quantity Competition' (2012) 34(4) *Energy Economics*, pp. 1143–52.

38 On the importance of interdisciplinary research for energy and climate law, see C. Redgwell et al., 'Introduction', in M. Roggenkamp et al. (eds), *Energy Law in Europe* (Oxford University Press, 2016), pp. 3–9; N. Ghaleigh, 'Economics and International Climate Change Law', in C. Carlarne, K. Gray & R. Tarasofsky (eds), *The Oxford Handbook of International Climate Change Law* (Oxford University Press, 2016), pp. 73–97, at 74. More generally, on the importance of interdisciplinarity for comparative law research, see P. Legrand, 'How to Compare Now' (1996) 16(2) *Legal Studies*, pp. 232–42, at 232.

of social processes in the recipient society[39] and the role of domestic institutions,[40] a comparative law analysis of ETS transplants brings new perspectives to the economics and policy literature in the field.[41] In most existing economics and policy studies, the point of reference is the EU ETS and the liberalized EU energy market. Recommendations therefore remain limited to a plea in favour of opening foreign energy markets to competition, so as to facilitate the implementation of an ETS along the lines of the EU liberalization-based model.[42] This EU-centred approach does not do justice to the complex challenges that characterize the organization of energy supply in emerging economies, in particular in economies with socialist legacies where historically low energy prices were – and, largely, still are – considered a vested consumer right.[43]

By focusing on the local energy market environments in China, Kazakhstan, and Russia, this article highlights the limits to the exportation of the EU ETS as a best practice or universal model. Because energy price regulation is 'what is authentically local'[44] in many emerging economies, it is necessary to adapt an ETS to the existing structure of regulated energy markets instead of promoting additional market reform in the 'receiving' society.[45] The present analysis thus proposes a reconceptualization of emissions trading as a mechanism that integrates the regulated energy market paradigm in emerging economies. The objective is not to critically assess the merits of ETSs generally or the EU ETS mechanism specifically,[46] but to set out the assumptions about the ETS–energy regulation interaction that, to date, have not been clearly expressed in the environmental law literature. The approach governing the present analysis remains mainly theoretical. Further empirical research is needed to examine how, in regulated energy markets, tariff and anti-monopoly authorities deal with the cost of carbon allowances and investments in GHG emissions reductions, and how this regulatory treatment impacts on the decarbonization of energy supply.

The structure of the argument proceeds as follows. Section 2 critically reflects on the function of an ETS, in particular regarding investment in the decarbonization of energy supply. Section 3 introduces the free-market approach to the decarbonization

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39 See, e.g., Teubner, n. 31 above, p. 19; M. Chen-Wishart, 'Legal Transplant and Undue Influence: Lost in Translation or a Working Misunderstanding?' (2013) 62(1) *International & Comparative Law Quarterly*, pp. 1–30, at 28.

40 See, e.g., K. Pistor, 'The Standardization of Law and Its Effect on Developing Economies', UN Conference on Trade and Development, G-24 Discussion Paper Series, No. 4, June 2000, p. 5, available at: http://unctad.org/en/Docs/pogdsmdpbg24d4.en.pdf; D. Berkowitz, K. Pistor & J.F. Richard, 'Economic Development, Legality and the Transplant Effect' (2003) 47(1) *European Economic Review*, pp. 165–95, at 165.

41 On the benefits of the comparative law methodology in the field of climate law, see M. Mehling, 'The Comparative Law of Climate Change: A Research Agenda' (2015) 24(3) *Review of European, Comparative & International Environmental Law*, pp. 341–52.

42 See, e.g., Jotzo & Loeschel, n. 10 above, pp. 3–4, and the literature review in Section 5 below.

43 See Section 5 below.

44 Chen-Wishart, n. 39 above, p. 28.

45 See, e.g., Jotzo & Loeschel, n. 10 above, pp. 3–4.

46 Although there is a clear risk that governmental intervention will also affect the formulation of carbon prices in the ETS (see, e.g., A. Lo, 'Challenges to the Development of Carbon Markets in China' (2015) 16(1) *Climate Policy*, pp. 109–24, at 109), the focus of this article remains limited to the energy law challenges to the transplantation of the ETS.

of energy supply under the EU ETS. Section 4 introduces the main challenges that energy market regulation represents for the decarbonization of energy supply based on the EU ETS model. Section 5 suggests adjustments to the design of an ETS that reflects the paradigm of energy market regulation in emerging economies.

2. THE FUNCTION OF AN ETS

It is critical to the success of a legal transplant to understand the needs and problems which the 'foreign model' can help to address.[47] A comparative analysis of rules must take into account that, depending on the jurisdiction, different regulatory mechanisms can fulfil similar functions and that rules which are similar at first sight can be functionally different.[48] The primary function of an ETS is to stabilize (or reduce) GHG emissions. At the same time, the ETS can have a more specific function: to promote investment in low-carbon technologies.[49]

Regardless of the objective pursued, an ETS requires the establishment of a cap (a maximum limit) on emissions that may be released into the atmosphere by the installations falling within the scope of the scheme.[50] The cap is fixed at a certain level of absolute emissions reductions or relative emissions intensity. Moreover, under the cap-and-trade format, an ETS requires the creation of 'allowances' (the right to emit one tonne of carbon dioxide (CO_2) equivalent). Companies must, on a yearly basis, submit a number of allowances that cover the verified GHG emissions of their installations. Allowances may be freely traded. In the face of the market price of the ETS allowances and the cost of company-specific emissions reductions, companies will decide to continue to emit GHGs as usual or implement emissions reduction measures. Emissions reduction measures can consist of short-term changes to the operation of carbon-emitting installations or long-term investments in low-carbon technologies, including energy efficiency improvements or switching to renewable energy sources.

In addition to these general characteristics, the design of an ETS will vary in the light of the objectives pursued. If the objective of the ETS is to achieve absolute GHG emissions reductions, low carbon prices are not necessarily a sign of a malfunctioning ETS. Low carbon prices 'simply indicate that there is little need for additional abatement to meet the current target'.[51] However, if the objective of the ETS is to

47 U. Mattei, 'Efficiency in Legal Transplants: An Essay in Comparative Law and Economics' (1994) 14(1) *International Review of Law and Economics*, pp. 3–19.

48 On the functional method in comparative law, see, e.g., R. Michaels, 'The Functional Method of Comparative Law', in M. Reimann & R. Zimmermann (eds), *The Oxford Handbook of Comparative Law* (Oxford University Press, 2006), pp. 340–80.

49 T. Laing et al., 'Assessing the Effectiveness of the EU Emissions Trading Scheme', Centre for Climate Change Economics and Policy and Grantham Research Institute on Climate Change and the Environment, Jan. 2013, available at: http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2014/02/WP106-effectiveness-eu-emissions-trading-system.pdf; Ghaleigh, n. 38 above, p. 83; D. Kirat & I. Ahamada, 'The Impact of the European Union Emission Trading Scheme on the Electricity-Generation Sector' (2011) 33(5) *Energy Economics*, pp. 995–1003.

50 For an in-depth analysis, see Ellerman, Convery & de Perthuis, n. 36 above; Weishaar, n. 12 above.

51 European Commission, 'Impact Assessment Accompanying the Proposal for a Decision Concerning the Establishment and Operation of a Market Stability Reserve for the Union GHG Emission Trading Scheme and Amending Directive 2003/87/EC' COM(2014) 20 final (Commission Staff Working Paper), p. 5.

stimulate investment in the decarbonization of energy supply, then low and volatile carbon prices are a major problem, as illustrated by the recent EU ETS experience.[52] In the EU, the initial objective of the ETS Directive was to help the EU to 'promote reductions of GHG emissions in a cost-effective and economically efficient manner'.[53] Emissions reductions could theoretically result from economic slowdown and the closure or reduced output of industrial plants – not necessarily from the realization of low-carbon investments. The question of investment in low-carbon technologies started to gain importance following the collapse of carbon prices towards the end of the first trading period (2005–07).[54]

More recently, low-carbon investments, and thus the question of the appropriate magnitude of carbon prices, were central issues in the context of the 2015 reform of the EU ETS.[55] The main ETS objective remains the achievement of emissions reductions in a cost-effective way; however, the EU institutions now realize that the cost-effectiveness of the ETS in the long term depends on the realization of low-carbon investments in the short term in order to avoid being locked into a carbon-intensive path.[56] The reform of the EU ETS aims to achieve this investment objective by improving the stability and predictability of carbon prices.

The question of low-carbon investment has not, so far, gained particular attention in emerging economies. China's climate policy is characterized by a high degree of uncertainty concerning the exact objectives pursued by the ETS.[57] China's Twelfth Five-Year Plan[58] and Thirteenth Five-Year Plan[59] introduced a national ETS as one of the main pillars of China's GHG emissions reduction policy without further specifying how it is expected to generate the necessary investments in the decarbonization of energy supply.[60] Regarding the regional schemes, the pilot ETSs

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52 See, e.g., M. Wråke et al., 'What Have We Learnt from the European Union's Emissions Trading Scheme?' (2012) 41(1) *AMBIO*, pp. 12–22; T. Laing & M. Grubb, 'Low Carbon Electricity Investment: The Limitations of Traditional Approaches and a Radical Alternative', Cambridge University Energy Policy Research Group (EPRG), Sept. 2010, p. 15, available at: http://www.eprg.group.cam.ac.uk/wp-content/uploads/2010/09/Binder12.pdf.

53 Directive 2003/87/EC establishing a Scheme for Greenhouse Gas Emission Allowance Trading within the Community and Amending Council Directive 96/61/EC [2003] OJ L 275/32, Art 1.

54 European Commission, 'Proposal for a Directive Amending Directive 2003/87/EC so as to Improve and Extend the Greenhouse Gas Emission Allowance Trading System of the Community' COM(2008) 16 final, p. 3.

55 Decision (EU) 2015/1814 concerning the Establishment and Operation of a Market Stability Reserve for the Union Greenhouse Gas Emission Trading Scheme and Amending Directive 2003/87/EC [2015] OJ L 264/1.

56 European Commission, n. 51 above.

57 A. Lo & M. Howes, 'Power and Carbon Sovereignty in a Non-Traditional Capitalist State: Discourses of Carbon Trading in China' (2015) 15(1) *Global Environmental Politics*, pp. 60–82, at 65.

58 State Council of the People's Republic of China (PRC), *The Twelfth Five-Year Plan for National Economic and Social Development* (MoraQuest LLC Central Compilation and Translation Press, 2011).

59 State Council of the PRC, 'Proposal on Formulating the 13th Five-Year Plan (2016–2020) on National Economic and Social Development', available at: http://news.xinhuanet.com/fortune/2015-11/03/c_1117027676.htm; State Council of the PRC, 'The 13th Five-Year Plan for National Economic and Social Development',17 Mar. 2016, available at: http://www.gov.cn/xinwen/2016-03/17/content_5054992.htm (in Chinese).

60 However, see NDRC, 'Market Readiness Proposal (MRP): Establishing a National Emissions Trading Scheme in China', Feb. 2013, available at: https://www.thepmr.org/system/files/documents/China_MRP_final_19-02-2013rev_0.pdf (briefly referring to long-term low-carbon investments). On ETS

have not been designed in a way that reflects the basic needs of energy investment. The trading period is limited to two years, which negates the predictability needed to make investment decisions in new power plants.[61] In Russia, the authorities have not outlined the exact objectives that they are aiming to achieve with the possible – but still highly hypothetical – ETS.[62] In Kazakhstan, the government expressly established the objective of investment in low-carbon technologies: 'Carbon prices must stimulate investment in the development and introduction of more ecological technologies'.[63] However, the government has not elaborated on how such an ETS is supposed to send the right signals to the energy producers and improve the environmental performance of their installations. More importantly, the Kazakhstan government carefully limits the impact that the ETS could have on the economic standing of existing energy facilities by specifying that an ETS must 'maintain the financial viability of producers'.[64]

The vagueness of and limitations to ETS objectives in China, Russia, and Kazakhstan raise questions about the function of an ETS in these countries. Following the early EU approach, ETSs are being developed based on the unquestioned assumption that carbon trading will automatically result in 'reductions of GHG emissions in a cost-effective and economically efficient manner'.[65] In the absence of clear decarbonization objectives and critical reflection on how an ETS will generate emissions reductions in practice, it is unclear how an ETS is expected to play its role as a driver of low-carbon investments in the energy sector. As discussed below, local energy regulation represents an important obstacle to the realization of low-carbon investments on the basis of ETS carbon price signals in China, Russia, and Kazakhstan. Government regulation of energy investments – not the ETS – fulfils the function of determining investment in the decarbonization of energy supply. This is a fundamental difference with the free-market approach to the functioning of an ETS and energy markets in the EU.

3. THE EU ETS AND THE INTERNAL ENERGY MARKET

According to the founding emissions trading theories, ETSs are cost-efficient because they offer a market-based approach to the achievement of reductions in carbon emissions. As Montgomery states, '[i]n a full-information, competitive setting, no

objectives in China, see, e.g., W. Shu & D. Maosheng, 'Design of China's National Emissions Trading Scheme', presentation at 'Tackling Climate Change: Pricing Carbon to Achieve Greenhouse Gas Mitigation', 13 Mar. 2013, The World Bank, available at: https://www.thepmr.org/system/files/documents/China-ETS%20presentation.pdf; C. Sun, 'China's Macro Policy of Controlling GHG Emissions', Partnership for Market Readiness (PMR), 2012, available at: https://www.thepmr.org/country/china-0.

61 On the negative impact that short trading (and allocation) periods had on energy investments in the EU, see European Commission, 'Communication on Building a Global Carbon Market' COM(2006) 676 final, p. 8.

62 Carr & Nicola, n. 20 above.

63 Decree of the Government of Kazakhstan on the Concept of Development of the Energy Complex by 2030, No. 724, 28 June 2014.

64 Ibid.

65 Directive 2003/87/EC, n. 53 above, Art. 1.

alternative regulatory scheme can achieve a given environmental goal at a lower cost' than emissions trading.[66] Applied to the energy sector, this signifies that the ETS should be introduced into fully liberalized energy markets.

In principle, liberalization of energy markets implies 'deregulated' (free market) energy prices, cost-based operation (dispatching) of power plants, and the determination of investments by companies based on expected profits.[67] Deregulation means that energy prices and investments are formulated based on the forces of supply and demand.[68] In contrast, in regulated energy markets, investments and prices are centrally determined; the government or tariff authority, in cooperation with the national utility, determines the type of infrastructure to be built and its location, and fixes the price that consumers pay for their electricity.[69] In 'hybrid' (or 'quasi-regulated') markets, energy prices are, in principle, subject to the forces of the market, but only up to certain limits.[70] The government, or tariff authority, sets price caps (maximum limits that prices may not exceed) and closely regulates the investment activities of energy producers.

The EU electricity and natural gas markets function on a liberalized basis. According to EU energy law, prices, dispatching and investments must be determined on a deregulated (free market) basis.[71]

3.1. *Deregulated Energy Prices*

According to the EU Internal Electricity Market Directive, the objective of the EU internal energy market is to 'secure competition and the supply of electricity at the most competitive price'.[72] Energy price formation is therefore subject to the forces of

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66 Montgomery, n. 11 above, p. 395. See also J. Coggins & V. Smith, 'Some Welfare Effects of Emission Allowance Trading in a Twice-Regulated Industry' (1993) 25(3) *Journal of Environmental Economics and Management*, pp. 275–97.

67 See, e.g., M. Baritaud, 'Securing Power during the Transition: Generation Investment and Operation Issues in Electricity Markets with Low-Carbon Policies, IEA, *Insights Series*, 2012, available at: http://www.iea.org/publications/insights/insightpublications/SecuringPowerTransition_Secondeedition_WEB.pdf. See also P. Joskow, 'Lessons Learned from Electricity-Market Liberalization' (2008) 29(2) *The Energy Journal*, pp. 9–42; D. Spence, 'Can Law Manage Competitive Energy Markets' (2008) 93(4) *Cornell Law Review*, pp. 765–817.

68 Deregulation in the context of energy market reforms does not necessarily mean less regulation. In relation to the liberalization of energy supply it generally requires the development of more complex regulatory architecture: see P. Mäntysaari, *EU Electricity Trade Law: The Legal Tools of Electricity Producers in the Internal Electricity Market* (Springer, 2015), p. 93.

69 See, e.g., Baritaud, n. 67 above.

70 See, e.g., A. Boute, *Russian Electricity and Energy Investment Law* (Brill, 2015), p. 696. On 'hybrid' or 'dual' electricity markets (i.e., markets that 'combine elements of a state-centered and a market-centered electric power system'), see D. Victor & T. Heller, 'Major Conclusions', in D. Victor & C. Heller (eds), *The Political Economy of Power Sector Reform: The Experiences of Five Major Developing Countries* (Cambridge University Press, 2007) pp. 254–306, at 260.

71 On the principles of EU energy law, see, e.g., A. Johnston & G. Block, *EU Energy Law* (Oxford University Press, 2012); K. Talus, *EU Energy Law and Policy: A Critical Account* (Oxford University Press, 2013). It must be noted that network-related activities remain subject to central command-and-control.

72 Recital 8 of Directive 2009/72/EC concerning Common Rules for the Internal Market in Electricity and Repealing Directive 2003/54/EC [2009] OJ L 211/55 (EU Internal Electricity Market Directive). See also Directive 2009/73/EC concerning Common Rules for the Internal Market in Natural Gas and Repealing Directive 2003/55/EC [2009] OJ L 211/94.

supply and demand. According to the Court of Justice of the EU (CJEU) in the *Federutility* case:

> [T]he price for the supply of [electricity and] natural gas must, as from 1 July 2007, be determined solely by the operation of supply and demand; that requirement follows from the very purpose and the general scheme of that directive, which … is designed progressively to achieve a total liberalization of the [energy] market.[73]

Price regulation is authorized only in exceptional circumstances (for example, necessity to protect consumers from unjustified price increases in the absence of competition) and for a duration that is limited 'to what is strictly necessary in order to achieve its objective'.[74] Taking into account the declared consumer protection objective, price regulation in the EU is a Public Service Obligation.

Endorsing the competition (liberalization) paradigm advocated in the early emissions trading literature, the EU ETS aims to achieve GHG emissions reductions by internalizing the carbon externality into free-market energy prices.[75] For the power generation sector, this means that the EU ETS should increase the operating costs of fossil-fuel electricity generation and thus favour cleaner alternatives.[76] Depending on the level of competition in the electricity market, the cost of carbon should reduce the profit margin of carbon-intensive modes of electricity production and eventually lead to their exclusion from the 'merit curve' (the cost-based ranking of electricity production sources).[77] In theory, pushing carbon-intensive installations out of the merit curve should eventually result in their exclusion from the power market, for the benefit of cleaner alternatives.

3.2. *Passing on Carbon Costs to Consumers*

The objective of carbon trading is not simply to influence the cost of energy production so as to reduce the energy and carbon intensity of power plants. By internalizing the carbon externality into energy prices, an ETS also aims to influence the consumption of energy, so as to give consumers an incentive to reduce their energy use or shift to low-carbon alternatives. The influence that an ETS can exercise on consumer behaviour depends on the extent to which producers are able to reflect, in consumer prices, the cost of carbon emissions associated with the goods they produce.[78]

The rate at which carbon costs are passed on in the EU energy sector is substantial.[79] In principle, liberalized energy prices enable suppliers to recover the

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73 Case C-265/08, *Federutility and Others* v. *Autorità per l'energia elettrica e il gas* [2010] ECR I-03377. See also Case C-242/10, *Enel Produzione SpA* v. *Autorità per l'energia elettrica e il gas*, Judgment, 21 Dec. 2011, ECLI:EU:C:2011:861.

74 *Federutility*, ibid., para. 35; *Enel Produzione SpA*, ibid., para. 70.

75 European Commission, 'Proposal for a Directive Establishing a Scheme for Greenhouse Gas Emission Allowance Trading' COM(2001) 581 final, [2002] OJ C 75E/33.

76 European Commission, n. 54 above, pp. 3, 13.

77 More generally, see Ellerman, Convery & de Perthuis, n. 36 above.

78 Kim & Lim, n. 37 above, p. 85 (referring to the carbon cost pass-through rate as 'the barometer for the efficiency of market mechanisms').

79 J. Sijm, K. Neuhoff & Y Chen, 'CO_2 Cost Pass Through and Windfall Profits in the Power Sector' (2006) 6(1) *Climate Policy*, pp. 49–72; Sijm, Chen & Hobbs, n. 37 above.

cost of carbon from end users. However, the current low level of carbon prices limits the impact that the EU ETS has on consumer behaviour. By influencing the quantity of auctioned allowances, the 2015 reform of the EU ETS aims to support the level of carbon prices and so incentivize more sustainable energy use in the EU.

In Member States that continue to regulate energy prices based on the Public Service Obligation regime of the EU Internal Energy Market Directive,[80] price caps limit the transfer of carbon costs to consumers.[81] However, in line with the requirements of CJEU case law, price regulation – and thus limited carbon cost transfer – remain the exception to free-market pricing. The European Commission is launching infringement proceedings against Member States that continue to regulate energy prices in violation of EU law.[82] In addition to the pure energy market rationale, these procedures will have the indirect benefit of improving the functioning of the EU ETS by facilitating the transfer of carbon costs to energy consumers.

3.3. *Cost-based Operation of Energy Installations*

The merit curve effect that an ETS is supposed to have on energy markets in order to level the playing field for low-carbon investments depends not only on the organization of commercial energy exchanges. The impact of an ETS on energy producers depends also on the technical operation (dispatching) of power plants by the system operators (dispatching authorities). In principle, an ETS should provide the operators of power plants with incentives to adapt the short-term and daily operation of their power plants and, where technically possible, to switch to cleaner fuels, in order to save on the cost of carbon emissions.[83]

The EU ETS is built on the cost-based operation of energy systems. According to the EU Internal Electricity Market Directive, dispatching authorities must issue operational orders by taking into account the 'economic precedence of electricity from available generating installations and the technical constraints on the system'.[84] In this context, the EU ETS is expected to influence the 'economic precedence' of power plants by making it more expensive to produce electricity from carbon-intensive sources, and thereby push these installations down the merit curve. Inefficient plants should not be artificially kept in operation through public support. A significant exception to the cost-based dispatching of power plants in the EU is that heat and power installations which combine renewable energy and high efficiency have the right to access the network in priority to other sources. According to the

[80] European Commission, 'Communication on Delivering the Internal Electricity Market and Making the Most of Public Intervention' COM(2013) 7243 final, p. 6; European Regulators Group for Electricity and Gas (ERGEG), 'Status Review of End-User Price Regulation as of 1 January 2010', E10-CEM-34-03, 8 Sept. 2010, available at: http://www.energy-regulators.eu/portal/page/portal/EER_HOME/EER_PUBLICATIONS/CEER_PAPERS/Customers/Tab1/E10-CEM-34-03_price%20regulation_8-Sept-2010.pdf.

[81] See Laing et al., n. 49 above; D. Ellerman & P. Joskow, *The European Union's Emissions Trading System in Perspective* (Pew Center on Global Climate Change, 2008), pp. 24–9; European Commission, 'Guidance for the Design of Renewables Support Schemes' SWD(2013) 439 final, p. 14.

[82] European Commission, 'Making the Internal Energy Market Work' COM(2012) 663 final, pp. 12–3.

[83] Laing et al., n. 49 above.

[84] EU Internal Electricity Market Directive, n. 72 above, Art. 15.

European Commission, this right of priority access (and thus dispatching) will become less relevant in the context of the gradual exposure of renewable energy to market forces.[85]

3.4. *Freedom of Investment*

In addition to the impact on the short-term operation of existing power plants, the European Commission expects the ETS to have a long-term impact by accelerating the decommissioning of inefficient power plants and the construction of cleaner alternatives.[86] According to the European Commission, 'a well-functioning carbon market is necessary together with properly designed energy taxes to give investors clear and strong incentives to invest in low carbon technologies and their development'.[87] This approach implies a free-energy market in which investors, not the government or the regulator, make investment decisions on the development of new generating facilities.

The EU energy market is organized according to the principle of freedom of investment. The European Commission has explained the reasoning underlying the opening of energy investments to competition in the EU as follows:

> In a liberalized market … private investors are expected to ensure that sufficient capacity is available to meet demand. In general terms, the price mechanism is the way that this is expected to be achieved in the competitive market.[88]

Although renewable energy investments are still largely made on the basis of guaranteed minimum prices (such as feed-in tariffs), carbon and energy market prices are expected to deliver the decarbonization of energy supply in the EU in the medium to long term. According to the EU Internal Electricity Market Directive, 'a well-functioning internal market in electricity should provide producers with the appropriate incentives for investing in … electricity from renewable energy sources'.[89] Member States are gradually opting to expose renewable energy investments to market prices.[90] The European Commission is taking action to phase out feed-in tariffs and integrate renewable energy investments into the market. Moreover, as discussed in Section 2 above, the 2015 reform of the EU ETS aims to reinforce the ETS as an investment driver by supporting the stability and predictability of carbon prices.[91] According to the European Commission, 'as the renewables sector and technologies mature and grow – and as costs decline – it is

85 European Commission, n. 80 above, p. 7.

86 Ibid., p. 9.

87 European Commission, 'Renewable Energy: A Major Player in the European Energy Market' COM(2012) 271 final, p. 4.

88 European Commission, 'Proposal for a Directive concerning Measures to Safeguard Security of Electricity Supply and Infrastructure Investment' COM(2003) 740 final, p. 4.

89 EU Internal Electricity Market Directive, n. 72 above, Recital 6.

90 European Commission, Commission Staff Working Document accompanying the Document 'Renewable Energy: A Major Player in the European Energy Market', SWD(2012) 164 final.

91 Decision (EU) 2015/1814, n. 55 above. For a critical analysis of this reform, see, e.g., J. Richstein, E. Chappin & L. de Vries, 'The Market (In-)Stability Reserve for EU Carbon Emission Trading: Why It May Fail and How to Improve It' (2015) 35 *Utilities Policy*, pp. 1–18.

important that production and investment decisions are driven increasingly by the market and not by guaranteed price levels determined by public authorities'.[92]

4. TRANSPLANTING AN ETS IN REGULATED ENERGY MARKETS

In China, Russia, and Kazakhstan, the extent of government intervention in energy prices, dispatching and investment is not only more systematic but also far more pronounced or intrusive than is the case in the EU, where the European Commission is pursuing an active enforcement policy of the internal market *acquis*. In China, despite repeated announcements of electricity market reforms,[93] prices remain regulated. China's most recent reform programme reiterated the objective of competition and market pricing, but at the same time confirmed the importance of government control over prices to protect consumers.[94] In Kazakhstan and Russia, the electricity market has, to a certain extent, been opened to competition, but electricity prices are far from being left to the forces of the market.[95] Prices must remain within centrally determined limits, and regulators do not hesitate to intervene in the market to protect consumers against 'unreasonable' price increases.[96]

Government intervention in energy markets in China, Kazakhstan, and Russia represents an important challenge to the impact that an ETS, designed around the EU liberalization model, is supposed to have on energy producers and consumers. Regulated energy prices distort the internalization of the carbon externality and the transfer of the carbon cost to consumers. In a regulated energy market environment, tariff authorities and not the merit curve determine how energy producers adapt their production schedule and investment programme to carbon prices.

4.1. *The Challenge of Regulated Energy Prices*

In contrast to the merit order effect in liberalized markets, the reaction of power producers in regulated energy markets to the scarcity of allowances depends primarily on the regulatory treatment of allowances by the tariff authorities. This is highlighted

92 European Commission, n. 80 above, p. 15.

93 See, most recently, State Council of the PRC, 'Deepening Power Sector Reform', Doc. No. 9, 15 Mar. 2015, available at: http://www.ne21.com/news/show-64828.html. For a criticism, see M. Dupuy & F. Weston, 'A New Framework for China's Power Sector, The Regulatory Assistance Project', Regulatory Assistance Project (RAP), 23 Mar. 2015, available at: http://www.raponline.org/featured-work/a-new-framework-for-chinas-power-sector.

94 State Council of the PRC, 'Promoting the Reform of Pricing Mechanisms', 12 Oct. 2015, available at: http://www.gov.cn/xinwen/2015-10/15/content_2947548.htm; NDRC, 'Implementation Opinions on the Promotion of Electricity Market Development', 30 Nov. 2015, available at: http://www.ndrc.gov.cn/zcfb/zcfbtz/201511/W020151130295800083469.pdf. See also L. Xiying & K. Lingcheng, 'A New Chapter in China's Electricity Market Reform', Energy Studies Institute, 21 Mar. 2016, available at: http://esi.nus.edu.sg/docs/default-source/esi-policy-briefs/a-new-chapter-in-china-s-electricity-market-reform.pdf.

95 A. Mehta, S. Rao & A. Terway, 'Power Sector Reform in Central Asia: Observations on the Diverse Experiences of Some Formerly Soviet Republics and Mongolia' (2007) 15(2) *Journal of Cleaner Production*, pp. 218–34, at 218–9; A. Boute, *Towards Secure and Sustainable Energy Supply in Central Asia: Electricity Market Reform and Investment Protection* (Energy Charter Secretariat, 2015); Boute, n. 70 above.

96 Boute, n. 70 above, p. 360.

by the US experience with the ETS in regulated power markets.[97] Electricity tariff methodologies determine whether regulated power producers will buy allowances to offset excess emissions or reduce these emissions by implementing emissions mitigation measures.[98] With 'cost-plus tariff' methodologies (the determination of tariffs based on producers' operating costs plus a reasonable profit) producers have an incentive to inflate their operating costs. In theory, this would motivate producers to purchase allowances in order to increase their tariff basis and thus their profit.[99] In contrast, in accordance with the 'return on investment' tariff methodology (the determination of tariffs based on invested capital plus a reasonable return), the operators of power plants have an incentive to inflate their capital expenses.[100] Theoretically, producers would therefore have an interest in investing in emissions reduction measures instead of purchasing allowances.[101]

In China, the Price Department of the National Development and Reform Commission of China (NDRC) regulates electricity tariffs per type of installation, with a degree of tariff differentiation, depending on the province in which the power plant is located.[102] The local Development and Reform Commissions (DRCs) have some flexibility to adjust production prices to the specific cost conditions of the installations located within their area of responsibility.[103] Tariff adjustments to the specific cost structure of power production installations require an assessment of the reasonableness of the individual costs of these installations.[104] The State Council and local DRCs thus play a key role in determining the extent to which power producers may reflect the cost of allowances and emissions reduction measures in their electricity price.[105]

Regulated power producers have faced difficulties in recent years in recovering increases in the partly deregulated price of coal,[106] which is indicative of the

97 Fowlie, n. 34 above, p. 840; D. Bohi & D. Burtraw, 'Utility Investment Behavior and the Emission Trading Scheme' (1992) 14(1) *Resources and Energy*, pp. 129–53, at 130–1; Coggins & Smith, n. 66 above, p. 288; G. Hart, 'Southern Company's BUBA Strategy in the SO_2 Allowance Market', in R. Kosobud (ed.), *Emissions Trading: Environmental Policy's New Approach* (Wiley, 2000), pp. 204–8; A.D. Ellerman et al., *Markets for Clean Air: The U.S. Acid Rain Program* (Cambridge University Press, 2000), pp. 190–5.

98 Fowlie, n. 34 above, p. 840; Bohi & Burtraw, ibid., pp. 130–1; Coggins & Smith, n. 66 above, p. 288.

99 Bohi & Burtraw, n. 97 above, p. 149.

100 H. Averch & L. Johnson, 'Behavior of the Firm under Regulatory Constraint' (1962) 52(5) *American Economic Review*, pp. 1052–69.

101 Bohi & Burtraw, n. 97 above, p. 149.

102 NDRC, 'Announcement on Reform of Electricity Pricing', 28 Mar. 2005, available at: http://www.sdqc.gov.cn/fzgggz/jggl/zcfg/200505/t200505274698.html; T. Edwards, *China's Power Sector Restructuring and Electricity Price Reform* (Brussels Institute of Contemporary China Studies, 2012), p. 17; J. Ma, 'On-Grid Electricity Tariffs in China: Development, Reform and Prospects' (2011) 39 *Energy Policy*, pp. 2633–45, at 2644.

103 Edwards, ibid., p. 17; L. Zhang, 'Electricity Pricing in a Partial Reformed Plan System: The Case of China' (2012) 43 *Energy Policy*, pp. 214–25, at 218.

104 Zhang, ibid., pp. 218–19.

105 A. Kossoy & P. Guigon, *State and Trends of the Carbon Market 2012* (The World Bank, 2012), pp. 94–8.

106 Y. Zhang & Y. Chen, 'Vertical Relationships in China's Electricity Industry: The Quest for Competition' (2011) 19(3) *Utilities Policy*, pp. 142–51.

challenges that lie ahead for China's ETS. The tension between increasing market prices for coal and fixed electricity tariffs have led to financial losses in the power generation sector and, in some cases, to the interruption of electricity supply.[107] To avoid similar problems following the introduction of the ETS, China will have to introduce specific tariff mechanisms to enable producers to reflect the cost of carbon in energy prices.[108] If the regulator refuses to authorize tariff increases to compensate power producers for the cost of purchasing allowances, energy companies will face financial losses.[109] According to the International Energy Agency (IEA), if financial losses cause producers to reduce their output and thus their contribution to economic growth, this could possibly lead to the termination of the ETS.[110]

Taking into account that allowances are, to a large extent, allocated free of charge in the first phases of the Chinese pilot ETSs,[111] the risk of non-recovery of the cost of carbon is currently limited to excess GHG emissions, that is, the emissions that power producers release in excess of the number of allowances allocated free of charge. In regulated energy markets, free allocation limits the positive signals that the ETS can send to consumers.[112] Indeed, based on existing methodologies, tariff authorities are unlikely to authorize energy producers to reflect the 'opportunity cost' of holding allowances allocated free of charge (that is, the cost of refraining from selling these allowances on the carbon market) into energy tariffs.[113] Since free allowances must be excluded from the tariff basis of the regulated entities, the passing on of carbon emissions-related costs to end users is jeopardized. If states decide to gradually replace free allocation with auctioning, the passing on of the cost of carbon to consumers will increase. In parallel, the risk for producers of non-recovery of the cost of carbon will increase if tariff authorities fail to reflect the cost of carbon allowances in energy tariffs.

China's latest electricity market reform initiative is a renewed attempt at introducing market principles into the energy price formation process. In theory, this should facilitate the passing on of the cost of carbon to consumers. However, the

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107 F. Teng, X. Wang & L.V. Zhiqiang, 'Introducing the Emissions Trading System to China's Electricity Sector: Challenges and Opportunities' (2014) 75 *Energy Policy*, pp. 39–45, at 41–2.

108 R. Baron et al., *Policy Options for Low-Carbon Power Generation in China: Designing an Emissions Trading System for China's Electricity Sector* (IEA, 2012), p. 9.

109 C. Munnings et al., 'Assessing the Design of Three Pilot Programs for Carbon Trading in China', Resources for the Future, Discussion Paper 14-36, Oct. 2014, pp. 19–20, available at: http://www.rff.org/files/sharepoint/WorkImages/Download/RFF-DP-14-36.pdf; G. Han et al., *China's Carbon Emission Trading: An Overview of Current Development*, FORES Study 2012:1 (FORES, 2012), p. 18, available at: http://www.sei-international.org/mediamanager/documents/Publications/china-cluster/SEI-FORES-2012-China-Carbon-Emissions.pdf.

110 Baron et al., n. 108 above, p. 40.

111 The free allocation of allowances will be adopted in the first phases of China's national ETS: NDRC, 'Interim Measures for the Management of Voluntary GHG Emission Reduction Transaction', available at: http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2894.pdf.

112 Kim & Lim, n. 37 above, p. 85; B. Lanz & S. Rausch, 'Emissions Trading in the Presence of Price-Regulated Polluting Firms: How Costly Are Free Allowances', Graduate Institute Geneva & Centre for International Environmental Studies, Research Paper 34, Jan. 2015, p. 33, available at: http://graduateinstitute.ch/files/live/sites/iheid/files/sites/cies/shared/Research%20Papers%20&%20Publications/Research%20Papers/2015/CIES_WP34-1.pdf.

113 Baron et al., n. 108 above, p. 49.

government explicitly retains the right to intervene in the market to maintain prices within a 'reasonable range'.[114]

In a way that is somewhat comparable with China, maximum electricity price limits in Kazakhstan are set according to the type of power plant, with the possibility that investors may negotiate specific tariffs for new power-generating installations. Electricity prices in Kazakhstan consist of a variable component, which aims to cover the operating costs of power generation, and a fixed component, which covers the capital costs of electricity investments.[115] In theory, the variable tariff component is linked to the cost of fuel and could thus reflect the cost of carbon allowances that power producers must purchase to cover the emissions in excess of their allocated quota. The fixed tariff component could reflect the capital expenses of emissions reduction measures. However, in practice, electricity prices in Kazakhstan are under heavy political pressure,[116] the prime objective being to protect consumers from 'unreasonable' price increases. As in the case of China, Kazakhstan currently allocates carbon allowances free of charge, thus limiting the impact of the ETS on both power producers and consumers.

In Russia, the market authorities have the power to interfere with the electricity price formulation process so as to exclude price bids that exceed certain levels.[117] In the event that this intervention is insufficient to bring prices down, prices may be temporarily re-regulated.[118] Investors regularly complain that government intervention with prices prevents them from recovering their costs, including the capital expenses of investment in energy efficiency improvements.[119] By preventing investors from recovering the costs of energy efficiency improvements, the government creates barriers to reductions in GHG emissions.

Preventing producers from recovering their costs could be considered a breach of the principle of the 'economically well founded nature of prices' or 'cost repayment plus return' recognized under Russian,[120] Kazakh,[121] and Chinese tariff law.[122]

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114 State Council of the PRC, n. 94 above, Items 18 and 26.

115 Decree of the Kazakh Government on the Approval of Tariff Limits, 25 Mar. 2009, No. 392; Decree of the Kazakh Ministry of Energy on the Approval of Rules for the Approval of Tariff Limits for Electricity and Availability, 27 Feb. 2015, No. 147.

116 Boute, n. 95 above, p. 39.

117 Decree of the Russian Government on the Procedure for the State Regulation of Electricity, with Subsequent Amendments', 14 Nov. 2009, No. 929, *SZRF* (23 Nov. 2009), No. 47, Item 5667.

118 Ibid. See also Boute, n. 70 above, p. 314.

119 See, e.g., 'Mosenergo Trims Investment after Regulator Caps Prices', *The Moscow Times*, 19 Jan. 2009, available at: http://www.themoscowtimes.com/sitemap/free/2009/1/article/mosenergo-trims-investment-after-regulator-caps-prices/373651.html; 'Reactions to the Project of Order of the Federal Anti-Monopoly Service on the Approval of the Requirements of Economic Justification of Price Bids for the Sale of Electricity', 11 Feb. 2013, available at: http://www.fas.gov.ru/legislative-acts/legislative-acts_51086.html.

120 Electricity Law of the Russian Federation, 26 Mar. 2003, No. 35-FZ, *SZRF* (2003), No. 13, Item 1177, Art. 20.

121 Kazakh Law on Natural Monopolies, 9 July 1998, No. 272-I, Art. 15-1.

122 PRC Electricity Law, 28 Dec. 1995, Art. 36; Ma, n. 102 above, p. 2635; C. Gao & Y. Li, 'Evolution of China's Power Dispatch Principle and the New Energy Saving Power Dispatch Policy' (2010) 38 *Energy Policy*, pp. 7346–57, at 7347; Y.-F. Zhang, 'The Regulatory Framework and Sustainable Development of China's Electricity Sector' (2015) 222 *The China Quarterly*, pp. 475–98, at 487.

According to this principle, providers of regulated services have the right to apply tariffs that reflect costs, or be compensated for the economic losses caused by tariffs set below the real cost of production.[123] The application of the principle of the 'economically well founded nature of costs' to the cost of carbon allowances raises specific challenges for the integrity of emissions trading in regulated energy markets. On the one hand, producers must be able to recover their legitimate expenses and pass on to consumers the costs relating to carbon emissions. The right to determine prices that reflect costs is necessary to avoid breaching the economic rights of energy producers. On the other hand, allowing power producers to automatically recover the cost of carbon allowances does not give producers any incentive to invest in emissions reduction measures. With a guarantee of cost recovery, producers are less sensitive to fluctuations in the price of carbon allowances, which reduces the extent to which the pricing mechanism can send emissions reduction signals to the operators of carbon-emitting energy installations.

4.2. *The Dispatching Challenge*

In China, Russia, and Kazakhstan, the regulation of the operating regime of power plants is characterized by a degree of rigidity, which can distort the message that carbon prices are meant to send to energy producers and consumers.

The Kazakh electricity system is characterized by a limited amount of flexible capacity. This creates challenges for the reliable and secure functioning of the electricity system. The Kazakh government imposes stringent production obligations on power plants,[124] which limit the possibility for power producers to adapt their generation patterns to GHG emissions constraints under the Kazakh ETS. Rigid dispatching requirements thus negatively influence the short-term impact that the ETS should have on the operation of power plants in Kazakhstan.

In Russia, the decommissioning of existing production capacity is subject to strict approval procedures for reasons of security and reliability of supply. These procedures seriously limit the scope for investors to close obsolete installations and replace them with more efficient facilities.[125] The System Operator (the entity that issues dispatching orders to power plants) has the right to request operators of obsolete production equipment to keep their installations on line in order to ensure the reliability of the system in the event of a supply shortage. Obstacles to the decommissioning of power plants contribute to the prolongation of the service lives of obsolete installations and, therefore, to the GHG emissions intensity of the Russian electricity production sector.

In China, cost-based (merit curve) dispatching has not yet been introduced.[126] Instead of a power plant dispatching on the basis of the cost of power generation,

123 Russian Constitutional Court, Judgment, 29 Mar. 2011, No. 2-P.

124 See, e.g., Decree of the Kazakh Government on the Provision of Dispatching Services, 23 Mar. 2013, No. 300.

125 D. Cooke, *Russian Electricity Reform 2013 Update* (IEA, 2013), p. 36; Boute, n. 70 above, p. 292.

126 F. Kahrl, J. Williams & J. Hu, 'The Political Economy of Electricity Dispatch Reform in China' (2013) 53 *Energy Policy*, pp. 361–69, at 362.

China uses a system of fixed quotas. As a result, operational (generating) hours are centrally allocated to the respective installations in annual generation plans.[127] Power plant operators produce a minimum amount of electricity irrespective of the efficiency of their installations. To support cleaner energy production, China implemented pilot dispatching projects at the provincial level based on energy efficiency benchmarks.[128] This benchmarking approach is unlikely to provide a solution to the dispatching obstacle that the ETS faces in China. Although efficiency criteria replace the quotas, dispatching continues to be organized according to centrally determined criteria instead of market price signals.[129] In 2015, China announced the adoption of a national system of 'green power dispatch, giving priority, in distribution and dispatching, to renewable power generation and fossil fuel power generation of higher efficiency and with lower emission levels'.[130] The NDRC recently proposed a market-based reform of power plant dispatching but, at the same time, established a long list of exceptions with the aim of prioritizing clean energy and energy efficient installations, as well as those installations that contribute to the achievement of China's energy strategy.[131] In a context of administrative dispatching, the EU approach to an ETS – where carbon prices are expected to influence the merit curve and thus dispatching by power plants – cannot generate the expected decarbonization results.[132]

4.3. *The Challenge of Regulated Energy Investments*

Besides regulated (or quasi-regulated) prices and rigid dispatching, the regulation of investments in energy generation in China, Russia, and Kazakhstan is a structural obstacle to the transplantation of the free-market approach to low-carbon energy investments under the EU ETS.

In China, although there is a degree of competition between companies for the construction of new facilities, decisions on the decommissioning and construction of

127 State Council of the PRC, 'Grid Dispatch Regulation 2011', 8 Jan. 2011, available at: http://www.gov.cn/gongbao/content/2011/content_1860843.htm. See Baron et al., n. 108 above, pp. 9, 23; Gao & Li, n. 122 above; Kahrl, Williams & Hu, ibid., p. 361; Teng, Wang & Zhiqiang, n. 107 above, p. 42; M. Dupuy et al., 'Low-Carbon Power Sector Regulation: Options for China', RAP Report for the World Bank, Feb. 2015, pp. 24–7.

128 NDRC, 'China's Policies and Actions for Addressing Climate Change 2013', 5 Nov. 2013, available at: http://en.ndrc.gov.cn/newsrelease/201311/P020131108611533042884.pdf.

129 Kahrl, Williams & Hu, n. 126 above, pp. 367, 369; Gao & Li, n. 122 above, p. 7350.

130 The White House, Office of the Press Secretary, 'U.S.-China Joint Presidential Statement on Climate Change', 25 Sept. 2015, available at: https://www.whitehouse.gov/the-press-office/2015/09/25/us-china-joint-presidential-statement-climate-change; M. Dupuy, 'Obama-Xi Joint Presidential Statement on Climate Change Promises Much-Needed Reform of Generator Dispatch in China', RAP, 25 Sept. 2015, available at: http://www.raponline.org/featured-work/obama-xi-joint-presidential-statement-on-climate-change-promises-much-needed-reform-of-generator-dispatch-in.

131 NDRC, 'Implementation Opinions on the Liberalization of Electricity Dispatch', 30 Nov. 2015, available at: http://www.ndrc.gov.cn/zcfb/zcfbtz/201511/W020151130295800116751.pdf. See also W. Xuan & F. Kahrl, 'Lower Emissions, Costs Possible with Two-Part Pricing and Dispatch Reform in China', RAP, 1 Apr. 2016, available at: http://www.raponline.org/featured-work/lower-emissions-costs-possible-with-two-part-pricing-and-dispatch-reform-in.

132 Y. Xu, C.-J. Yang & X. Xuan, 'Engineering and Optimization Approaches to Enhance the Thermal Efficiency of Coal Electricity Generation in China' (2013) 60 *Energy Policy*, pp. 356–63.

power plants are taken by the provincial DRCs and the NDRC.[133] Both organizations must approve the type of production facility to be built, its location and capacity, as well as the price at which power will be sold.[134] Similarly, in Kazakhstan and Russia, investments are made primarily on the basis of yearly tenders organized on the basis of the government's perception of future capacity deficit.[135] This central command-and-control approach to investment in the electricity sector has the following consequences for the functioning of the ETS.

Firstly, investments are made based on government forecasts and thus not on the basis of electricity market forces. In this context, the merit curve effect that underlies the EU ETS cannot play its investment function. Taking into account pressure on the need to balance supply and demand, government forecasts aim primarily to identify risks to the future reliability and security of the electricity system.[136] Climate change considerations are of secondary importance, if taken into account at all.

Secondly, investments in the modernization of existing fossil fuel-powered capacity – although generally not driven by the climate change agenda – result in emissions reductions that can distort the equilibrium of the ETS.[137] The modernization of power plants based on non-ETS mechanisms (such as through long-term investment agreements) reduces the amount of GHG emissions released by ETS installations – a phenomenon observed in the EU in the context of the EU renewable and energy efficiency policy.[138] These emissions reductions are not as a result of the ETS carbon price signal, and thus risk the creation of a surplus of carbon allowances that will negatively impact on the effectiveness of the ETS. The risk is particularly important for sectors other than electricity production, which can be flooded by the surplus of allowances resulting from the power sector. In China, the impact of non-ETS mechanisms on the ETS emissions cap is particularly acute, taking into account the government's ambitions in the field of energy efficiency.[139] In 2013 alone, China closed down 4.47 GW of small thermal-power units as part of its national energy efficiency policy.[140] This policy measure directly influenced the GHG emissions

133 State Council of the PRC, 'Decision on Reform of the Investment System', 16 July 2004, available at: http://unpan1.un.org/intradoc/groups/public/documents/apcity/unpan036724.pdf; C. Guelff & L. Adkins, *Emissions Trading in the People's Republic of China: A Simulation for the Power Sector* (IEA, 2014), p. 12.

134 State Council of the PRC, ibid.; Baron et al., n. 108 above, p. 7.

135 Cooke, n. 125 above; Boute, n. 70 above, pp. 293–313; Boute, n. 95 above, p. 35.

136 On electricity planning in China, see M. Dupuy et al., n. 127 above, p. 12. On electricity planning in Russia, see Boute, n. 70 above, pp. 293–314. On electricity planning in Kazakhstan, see S. Chikanayev, 'Investing in Kazakhstan's Power Industry: The Legal Framework' (2014) *Investor's Voice*, pp. 18–21, at 18, available at: http://www.gratanet.com/uploads/user_14/files/Investing_in_Kazakhstan_s_power_industry_the__legal_framework.pdf.

137 See, e.g., Munnings et al., n 109 above, p. 11.

138 N. Koch et al., 'Causes of the EU ETS Price Drop: Recession, CDM, Renewable Policies or a Bit of Everything? New Evidence' (2014) 73 *Energy Policy*, pp. 676–85.

139 Munnings et al., n 109 above, p. 11; W. Lin et al., 'Aligning Emissions Trading and Feed-in Tariffs in China' (2016) 16(4) *Climate Policy*, pp. 1–22.

140 NDRC, 'China's Policies and Actions on Climate Change', NDRC Policy Paper, Nov. 2014, p. 5, available at: http://en.ccchina.gov.cn/archiver/ccchinaen/UpFile/Files/Default/20141126133727751798.pdf. See, more generally, B. Gilley, 'Authoritarian Environmentalism and China's Response to Climate Change' (2012) 21(2) *Environmental Politics*, pp. 287–307.

intensity of electricity production and thus the volume of emissions in the Chinese electricity sector.

5. ENERGY MARKET REFORM *VERSUS* ADJUSTMENT TO THE ETS

To address the incompatibility between the EU liberalization model and the regulated (or 'hybrid') market approach in emerging economies, energy economics and policy scholars have advocated EU-style energy market reforms as a prerequisite to the introduction of an ETS. The literature focuses mostly on the case of China, with limited attention paid to Kazakhstan[141] and Russia.[142] According to Jotzo and Loeschel, 'China's economy still has strong elements of state control, and regulation is ubiquitous in the energy sector. Effective and cost-efficient emission pricing can only be achieved with energy market reform'.[143] Similarly, Teng, Wang and Zhiqiang argue that 'any low-carbon power policy should be considered as part of a whole policy package aiming at further liberalising the electricity sector in China'.[144] Fan and others defend a similar view and state that 'the electricity market reform is a prerequisite for the development of carbon pricing'.[145] Kahrl and others highlight the necessity to 're-orientate sector institutions still rooted in central planning, and strengthen independent regulation'.[146] Similarly, Lo defends the view that:

> the success of China's carbon market reform crucially depends on the ability of the new [ETS] institutions to transform the distorted state–market relationship. To strengthen the carbon markets, policy makers should reconsider the role of macroeconomic agencies, such as the Department of Price, and state ownership of big GHG emitters.[147]

Moreover, the European Commission actively supports energy market reforms in the former Soviet Union based on the EU liberalization principles, in parallel with the promotion of the EU ETS.[148]

These pleas for EU-style liberalization reforms follow from microeconomic theory but do not recognize the overwhelming social and ideological importance that strict energy regulation represents for many emerging economies, with crucial implications for the possible transplantation of foreign concepts to these energy markets.[149]

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141 K. Upston-Hooper & J. Swartz, 'Emissions Trading in Kazakhstan: Challenges and Issues of Developing an Emissions Trading Scheme' (2013) 7(1) *Carbon & Climate Law Review*, pp. 71–3.

142 N. Chernenko, 'Carbon Pricing on the Russian Electricity Market', University of Cambridge Electricity Policy Research Group, 10 Nov. 2012, available at: http://www.eprg.group.cam.ac.uk/carbon-pricing-on-the-russian-electricity-market-2.

143 Jotzo & Loeschel, n. 10 above, pp. 3–4.

144 Teng, Wang & Zhiqiang, n. 107 above.

145 J. Fan et al., 'Carbon Pricing and Electricity Market Reforms in China' (2014) 16(5) *Clean Technologies and Environmental Policy*, pp. 921–33.

146 F. Kahrl et al., 'Challenges to China's Transition to a Low-Carbon Electricity System' (2011) 39 *Energy Policy*, pp. 4032–41.

147 Lo, n. 46 above.

148 European Commission, 'The Development of Energy Policy for the Enlarged European Union, Its Neighbours and Partner Countries' COM(2003) 262 final, pp. 14–7.

149 On the high social importance of energy law in general, see A. Bradbrook, 'Energy Law as an Academic Discipline' (1996) 14(2) *Journal of Energy & Natural Resources Law*, pp. 193–217, at 206; Redgwell et al., n. 38 above.

Indeed, from a comparative law perspective, the degree of connectivity of an area of law with the recipient society matters.[150] According to Teubner, '[w]hile in the loosely coupled areas of law a transfer [of foreign rules] is comparably easy to accomplish, the resistance to change is high when law is tightly coupled in binding arrangements to other social processes'.[151] In areas of tight interaction, foreign rules to some extent can be absorbed but are unlikely to 'eradicat[e] what is authentically local' in the recipient environment.[152]

Strict control over prices and investments is a fundamental characteristic of the socialist and post-socialist approach to electricity market regulation and reflects the historical importance of electricity supply for the socialist project. Following the motto that 'Communism is equal to the Soviet power plus the electrification of the whole country',[153] electricity in the former Soviet Union and China was – and, largely, still is – viewed as a 'symbol of the social compact between state and citizen'.[154] The social importance of the electricity sector and its link with the legitimacy of authorities continued to strongly influence its organization during the post-socialist transition period, and persists in the current market environment.[155] According to Hirschhausen and Opitz, 'an important informal institution in the post-socialist context was the idea of energy, in particular electricity, being a basic "human right", a heritage of socialist times and the strong ideological role of electricity therein'.[156] Similarly, Lampietti and Junge explain resistance to energy market reforms by referring to the 'sense of entitlement associated with the legacy of the socialist social compact'.[157] In many post-socialist countries, low electricity tariffs continue to be seen by authorities as a mechanism for holding back inflation, for compensating for the high-energy intensity of industrial production, and for maintaining social peace and stability.[158]

Resistance to the implementation of liberalization reforms based on the high social importance of energy supply has affected the development of the Chinese, Kazakh,

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150 See, however, Watson, n. 22 above, p. 96 (arguing, based on a positivist approach to law, that legal transplants are 'extremely common' and 'socially easy' because 'legal rules are not peculiarly designed for the society in which they operate).

151 Teubner, n. 31 above, p. 19.

152 Chen-Wishart, n. 39 above, p. 28.

153 V. Lenin, *Doklad VIII S'ezda Sovetov Gosudarstvennoi Komissii po elektrifikatsii Rossii* (1920), quoted in V. Bushuev (ed.), *Energetika Rossii 1920–2020. Tom 1 Plan GOELRO* (Energiia, 2006), p. 5.

154 The World Bank, *Reforming Power Markets in Developing Countries: What Have We Learned?* (The World Bank, 2006).

155 S. Wengle, *Post-Soviet Power* (Cambridge University Press, 2015), p. 58.

156 C. von Hirschhausen & P. Opitz, 'Power Utility Re-Regulation in East European and CIS Transformation Countries (1990–1999): An Institutional Interpretation', 246 *Discussion Papers of DIW Berlin German Institute for Economic Research*, 2001, p. 8.

157 J. Lampietti & N. Junge, 'Europe and Central Asia Power Sector Reform', in A. Coudouel, A. Dani & S. Paternostro (eds), *Poverty and Social Impact Analysis of Reform* (The World Bank, 2006), pp. 213–34, at 214.

158 See, e.g., A. Kuzovkin, *Reformirovanie elektroenergetiki i energeticheskaia bezopasnost'* (Institut Mikroekonomiki, 2006), p. 105; Wengle, n. 155 above, pp. 68–71. More generally, see Victor & Heller, n. 70 above, p. 258 (highlighting that, in developing countries, 'most governments have found it extremely difficult to remove themselves from the process of setting tariffs. Yet one of the central premises in market reform is that the market itself, or an independent regulator, will set tariffs').

and Russian energy markets. In China, according to Ma, 'the concerns on social stability and economic growth have refrained the government from significant changes on electricity pricing. … the government intends to maintain control over the power industry, recognising its strategic importance to [the] overall economy'.[159] China's most recent reform plan is based on liberalization principles but government control is maintained over the market, in particular over the price formation process. In Russia, the 2003 liberalization reform of the electricity market did not prevent the federal government, in 2013, from removing regional governors who failed to contain electricity price increases.[160] In 2009, the government introduced a new 'phase of state regulation in the electricity sector'[161] in direct contradiction with the free-market principles that supposedly govern the Russian electricity market. Despite Kazakhstan being one of the first countries of the former Soviet Union to reform its electricity market in 1996, the Kazakh government recently announced the reintroduction of long-term electricity price regulation to stimulate investment.[162]

Against this background of stalled reforms, it is reasonable to expect that tariff authorities and the central governments are – and, for the foreseeable future, will remain – key domestic institutions that govern the functioning of energy markets in China, Russia, and Kazakhstan. Energy regulation is 'what is authentically local'[163] in these countries, so it is unrealistic to advocate the reform of these domestic institutions as a prerequisite to the introduction of an ETS. Energy challenges are shaping climate change mitigation strategies at the domestic level, not the other way around.[164] It is therefore necessary to examine how an ETS can be adjusted to the energy market regulation paradigms in China, Russia, and Kazakhstan. An ETS in regulated and 'hybrid' energy markets must be designed so as to incentivize consumers and producers to implement emissions reduction measures in a context of government control over energy prices and investments.

From a consumer perspective, a possible regulatory alternative with which to address the limited extent to which carbon costs are passed on to end users is the regulation and pricing of indirect emissions associated with electricity consumption. This would entail applying the ETS emissions cap to both the direct emissions of

159 Ma, n. 102 above, p. 2644. On earlier, largely unsuccessful, reform attempts, see, e.g., M. Zeng et al., 'The Power Industry Reform in China 2015: Policies, Evaluations and Solutions' (2016) 57 *Renewable & Sustainable Energy Reviews*, pp. 94–110; L. Yao & Y. Chang, 'Shaping China's Energy Security: The Impact of Domestic Reforms' (2015) 77 *Energy Policy*, pp. 131–9; P. Andrews-Speed, 'Reform Postponed: The Evolution of China's Electricity Markets', in F. Sioshansi (ed.), *Evolution of Global Electricity Markets* (Elsevier, 2013), pp. 531–70.

160 Prime, 'Murmansk Region Energy Minister Fired after Putin's Criticism', *News Daily*, 26 Feb. 2013, p. 14.

161 Decree of the Russian Government on the Procedure for the State Regulation of Electricity, with Subsequent Amendments, n. 117 above.

162 Boute, n. 95 above. The social sensitivity of electricity pricing in the Central Asian region was highlighted in 2010, when the decision of the Kyrgyz government to increase prices triggered the Second Kyrgyz Revolution. See, e.g., D. Wood, 'Electricity Plays Key Role in Kyrgyzstan Uprising', World Resources Institute, 19 Apr. 2010, available at: http://www.wri.org/blog/2010/04/electricity-plays-key-role-kyrgyzstan-uprising.

163 Chen-Wishart, n. 39 above, p. 28.

164 J. Lewis, *Green Innovation in China* (Columbia University Press, 2013), p. 11.

power producers and indirect emissions by consumers.[165] This option has been adopted in most Chinese pilot ETSs in anticipation of the fact that the cost of carbon would not be passed on to the end consumer.[166] For example, regarding electricity used in large public and office buildings, the electricity supplier must submit allowances to compensate for the GHG emissions released during the power generation process.[167] At the same time, the owner or tenant of these buildings must submit a similar amount of allowances.[168] Imposing a carbon obligation on electricity consumers (in addition to electricity producers) aims to internalize the cost of carbon in the absence of a carbon cost pass-through via the energy price formation process. If efficient, Kazakhstan and potentially Russia could adopt this approach in the design of their national ETSs, taking into account similar challenges for China in terms of the passing on of emissions-related costs in a quasi-regulated energy market environment.

From the perspective of a producer, an ETS must be designed in a way that guarantees predictability for investors in order to facilitate the transfer of capital and technology to the decarbonization of energy supply.[169] Regulatory predictability and stability are important for the design of an ETS in both liberalized and regulated energy markets. However, the central role of tariff authorities in the latter market environment extends the need for predictability and stability to the treatment by energy regulators of carbon-related costs. To enable investors to properly plan their carbon mitigation strategy, tariff authorities must provide clear guidance on the regulatory treatment of carbon allowances and low-carbon investment costs. Indeed, an ETS can only be successful in influencing the investment proposals that power producers submit for regulatory approval if producers understand in advance how the investment costs of carbon reduction measures will be recovered. Moreover, power producers must know how the cost of purchasing and the profit derived from selling allowances will influence the energy tariffs that apply to their installations.[170]

From the government's perspective, guarantees are needed that low-carbon investments will not generate 'double dividends' – that is, profit from the sale of an allowance while all investment costs are recovered through energy tariffs. Tariff authorities must also avoid a situation where regulated (or quasi-regulated) producers fulfil their ETS obligations primarily by purchasing carbon allowances and recovering this cost from consumers without implementing a GHG emissions mitigation strategy.

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165 On the benefits of this approach, see Kim & Lim, n. 37 above, p. 89.

166 Munnings et al., n. 109 above, p. 35; S. Qi, B. Wang & J. Zhang, 'Policy Design of the Hubei ETS Pilot in China' (2014) 75 *Energy Policy*, pp. 31–8, at 32; J.J. Jiang, B. Ye & X.M. Ma, 'The Construction of Shenzhen's Carbon Emission Trading Scheme' (2014) 75 *Energy Policy*, pp. 17–21, at 19.

167 Teng, Wang & Zhiqiang, n. 107 above, p. 44. The dual direct and indirect carbon cap is limited in scope, with variations among the pilot ETSs. Large industrial players (e.g. iron and steel, cement, chemical industry) submit allowances for their direct emissions only.

168 Ibid.

169 European Commission, n. 61 above; N. Stern, *The Economics of Climate Change: The Stern Review* (Cambridge University Press, 2006), p. 325.

170 K. Rose, 'Electric Industry Restructuring and the SO_2 Emissions Trading Program', in R. Kosobud (ed.), *Emissions Trading: Environmental Policy's New Approach* (Wiley, 2000), pp. 209–15.

On the positive side, tariff guarantees for new power plants can potentially ensure the investment stability required to decarbonize the energy infrastructure, provided that the right investments are targeted. In the US electricity sector, Fowlie has demonstrated that 'rate of return' assurances stimulated the operators of regulated plants to commit relatively more capital in pollution abatement measures than plants operating in a liberalized market environment.[171] In liberalized power markets, producers were less likely to invest in capital-intensive pollution control technologies and instead relied on the purchase of allowances.[172]

6. CONCLUSION

Under the influence of the EU ETS experience, emissions trading became central to many INDCs communicated by states in the context of the most recent international climate change mitigation initiative.[173] ETSs are often designed on the basis of the EU ETS model.[174] The bottom-up approach that characterizes international GHG regulation under the December 2015 Paris Agreement[175] is thus, to an extent, dependent on the successful transplantation of the EU ETS to other jurisdictions. However, as highlighted by the cases of China, Kazakhstan, and Russia, the key aims of the EU approach to emissions trading face substantial obstacles in light of local energy regulation in the receiving country. Without significant modification, the EU ETS cannot be exported as the basis for a best practice or universal model in a global carbon market.

In contrast to the free-market paradigm underlying the development of the EU ETS, government regulation or quasi-regulation of energy prices in China, Russia, and Kazakhstan distorts the signals that an ETS is supposed to send to energy producers and consumers. Also, government regulation of investments in energy production is incompatible with the market-based idea underlying the EU ETS, according to which investors, and not the government, determine how to reduce GHG emissions. Government intervention in electricity prices, dispatching and investment is not unique to China, Russia, and Kazakhstan.[176] EU Member States also organize capacity tenders, subsidize investment and introduce price caps in a way that can affect the functioning of an ETS, particularly the rates at which emissions-related costs are passed on to consumers. However, government intervention in energy markets is far more intrusive in China, Russia, and Kazakhstan than it is in the EU. Strict control over prices and investments in order to avert 'unreasonable' price increases is of overwhelming social and ideological importance in China, Russia, and Kazakhstan.[177]

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171 Fowlie, n. 34 above, p. 837.

172 Ibid., p. 863. In China, Russia, and Kazakhstan, the 'rate of return' stability is, to a certain extent, affected by the sensitivity of energy pricing and the risk of public interference with investments.

173 UNFCCC Secretariat, n. 4 above; NDRC, n. 4 above.

174 See, e.g., Federal Ministry for the Environment of Germany, n. 5 above, p. 1; Chen, n. 6 above, p. 219; GIZ, n. 6 above; Sabitova, n. 9 above, p. 32; Musagazhinovoy, n. 9 above; EDF, n. 9 above.

175 N. 3 above.

176 A. Boute, 'Toward an EU-Russian Energy Agreement: Principles of Liberalization under EU and Russian Energy Law' (2015) 40(2) *Review of Central and East European Law*, pp. 109–41.

177 See, e.g., Ma, n. 102 above, p. 2644; von Hirschhausen & Opitz, n. 156 above, p. 8.

Given the pressing need to achieve emissions reductions in the carbon-intensive energy sectors of emerging economies, the functioning of emissions trading cannot be dependent on the improbable future implementation of energy market reforms. Because energy price regulation is 'what is authentically local'[178] in many emerging economies, it is unrealistic to require, as energy economists and policy scholars do,[179] that local energy markets be reformed as a precondition to the transplantation of an EU-style ETS. The EU-centred and liberalization-based approach to the transplantation of emissions trading underestimates the fundamental importance of continued government control over energy prices for many countries that might be the recipients of an imported ETS. The socialist legacy of low energy prices, a tradition of intervention in the market, and the ideological importance of energy supply all determine the interpretation that domestic institutions[180] will – and perhaps ought to – apply to the design of an ETS.

The design of such scheme must therefore be adapted to the local institutional and administrative framework of the recipient country, not the other way around. Advocating a textbook reform of energy markets[181] as a panacea for the problems of emissions trading in emerging economies deflects attention from essential issues that must be answered to ensure the functioning of an ETS in regulated energy markets, including the limited passing on of the carbon cost to energy consumers, the treatment of carbon allowances by energy tariff authorities and the regulation of investment in GHG emissions reduction.

To an extent, China has already adapted the ETS to its regulated energy market environment. To facilitate the transfer of carbon costs to end users, certain categories of energy consumers must submit carbon allowances for the indirect emissions associated with their energy use. This development illustrates the re-evaluation and modification process that, as highlighted in the transnational law literature, can characterize the integration of foreign legal norms in the host jurisdictions.[182] Following a 'learning by doing' approach to the regulation of carbon markets,[183] Kazakhstan and Russia could consider adopting China's dual emissions cap to address the limited onward transfer of the carbon costs in their quasi-regulated energy markets.

The introduction of a dual cap covering both the direct and indirect emissions of energy supply is a necessary but not a sufficient modification to the design of an ETS in regulated energy markets. In addition, it is essential to recognize the central role

178 Chen-Wishart, n. 39 above, p. 28.

179 See, e.g., Jotzo & Loeschel, n. 10 above, pp. 3–4; Teng, Wang & Zhiqiang, n. 107 above, p. 39; Kahrl et al., n. 146 above, p. 4032; Fan et al., n 145 above, p. 921.

180 Pistor, n. 40 above, p. 5.

181 See, e.g., Jotzo & Loeschel, n. 10 above, pp. 3–4; Kahrl et al., n. 146 above, p. 4032; Teng, Wang & Zhiqiang, n. 107 above, p. 39.

182 G. Shaffer, 'Transnational Legal Process and State Change: Opportunities and Constraints' (2012) *University of Minnesota Law School Legal Studies Research Paper Series*, p. 40, available at: http://www.iilj.org/publications/2010-4.Shaffer.asp.

183 C. Arup & H. Zhang, 'Lessons from Regulating Carbon Offset Markets' (2015) 4(1) *Transnational Environmental Law*, pp. 69–100.

that governments and tariff authorities play in assessing the cost of carbon allowances and expenditure on GHG emissions reductions. In regulated and 'hybrid' energy markets, investors require stable and predictable guidance on how the cost of buying allowances and the profit derived from selling allowances will influence energy tariffs. Moreover, investors need stability and predictability regarding the recovery of the investment costs of low-carbon projects. We ought not simply to assume that an ETS can make a contribution to the promotion of investment in GHG emissions reductions and thus to the decarbonization of energy supply. Regulated energy tariff guarantees can stimulate investment in low-carbon energy by improving the certainty of investment conditions, but this requires appropriate regulatory guidance on how energy prices and investments will be adjusted to the ETS. This approach marks a paradigm shift in comparison with the free-market principles governing the functioning of the ETS in the EU energy sector.

https://doi.org/10.1017/S2047102516000133 Published online by Cambridge University Press