The European Union's Emissions Trading System: Climate Policymaking Model, or Muddle? (Part II)

Wil Burns*

In the first half of this Article,[1] I outlined the genesis of the European Union's Emissions Trading System (EU-ETS) and the history of its implementation during its first two phases from 2005 to 2008. In the second half of this Article, I will 1) outline the contours of implementation of the EU-ETS in Phase 3; 2) examine the implications of recent decisions by the European Council and Commission for implementation of Phase 4; 3) assess the effectiveness of the EU-ETS to date in meeting key climate and energy objectives in what continues to be characterized as the "cornerstone" of climate policymaking in Europe,[2] and 4) suggest some potential methods to strengthen the framework, or move away from it as the primary climate policy mechanism to reduce emissions.

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* © 2017 Wil Burns. Dr. Wil Burns is the founding Co-Executive Director of the Forum for Climate Engineering Assessment. He also serves as a Senior Research Fellow for the Centre for International Governance Innovation (CIGI) and as a Research Fellow for the Center for Science, Technology and Medicine in Society at the University of California-Berkeley. He also serves as the Co-Chair of the International Environmental Law Committee of the American Branch of the International Law Association. He is the former President of the Association for Environmental Studies & Sciences and former Co-Chair of the International Environmental Law interest group of the American Society of International Law and Chair of the International Wildlife Law Interest group of the Society. He has published over eighty articles and chapters in law, science, and policy journals and books, and has co-edited four books.

1. Wil Burns, *The European Union's Emissions Trading System: Climate Policymaking Model, or Muddle? (Part I)*, 30 TUL. ENVTL. L.J. 189 (2017).

2. ANDREI MARCU ET AL., ICTSD, 2017 STATE OF THE EU-ETS REPORT 1 (2017), https://www.i4ce.org/wp-core/wp-content/uploads/2017/05/17-05-State_of_eu_ets_report_2017_updated.pdf.

IV. IMPLEMENTATION OF THE EU-ETS: PHASES 3 AND 4

A. Overview

Emissions from regulated entities under the EU-ETS declined by 14% in the first two phases of implementation.[3] Phase 3 of implementation of the EU-ETS began in 2013 and extends to the end of 2020.[4] The European Union (EU) hoped that expansion of the compliance period from five to seven years would help send a longer-term price signal that would engender more investment certainty for companies contemplating investment in greenhouse gas emissions reduction projects.[5] The new seven-year time frame also aligns the EU-ETS with the second phase of the Kyoto Protocol, which the EU ratified in 2015.[6]

In the third trading period, the EU-ETS will regulate the emissions of approximately 11,000 power plants and manufacturing installations, as well as emissions from approximately 520 airlines flying between European airports.[7] The EU-ETS remained the world's largest carbon

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3. Georg Zachmann, *You'd Better Bet on the ETS*, BRUEGEL POL'Y BRIEF, Apr. 2013, at 2.

4. Richard Baillie, *Renewables and Emissions Trading: Do Schemes Like the EU ETS Work?*, RENEWABLE ENERGY WORLD (Sept. 14, 2017), http://www.renewableenergyworld.com/articles/print/volume-15/issue-5/solar-energy/renewables-and-emissions-trading.html.

5. BLAS LUIS PÉREZ HENRÍQUEZ, ENVIRONMENTAL COMMODITIES MARKETS AND EMISSIONS TRADING 213 (2013).

6. *Council Adopts Ratification of Second Phase of Kyoto Protocol*, EUR. COMMISSION (July 14, 2015), https://ec.europa.eu/clima/news/articles/news_2015071401_en.

7. European Comm'n, *Report from the Commission to the European Parliament and the Council: Report on the Functioning of the European Carbon Market*, COM (2017) 48 final (Jan. 2, 2017). The aviation sector cap in Phase 3 was provisionally set at 210,349,264 aviation allowances per year, 5% below the average annual level of aviation emissions in the 2004-2006 base period. *Emissions Cap and Allowances*, EUR. COMMISSION, https://ec.europa.eu/clima/policies/ets/cap_en (last visited Sept. 5, 2017). The number of allowances was subsequently increased by 116,524 from January 1, 2014, onward to reflect Croatia's full integration in the EU. *Allocation to Aviation*, EUR. COMMISSION, https://ec.europa.eu/clima/policies/ets/allowances/aviation_en (last updated Oct. 31, 2017). Civil aviation accounts for 11% of the emissions covered by the EU-ETS, with the lion's share of these emissions coming from international aviation. J.A. LEGETT, B. ELIAS & D.T. SHEDD, CONGR. RESEARCH SERV., AVIATION AND THE EUROPEAN UNION'S EMISSIONS TRADING SCHEME 11 (June 11, 2012), https://fas.org/sgp/crs/row/R42392.pdf. The EU's Aviation Directive was designed to regulate aviation emissions from "all flights which arrive at or depart from an aerodrome situated in the territory of a Member State." Directive 2008/101, of the European Parliament and of the Council of 19 November 2008 Amending Directive 2003/87/EC so as to Include Aviation Activities in the Scheme for Greenhouse Gas Emission Allowance Trading Within the Community, 2009 O.J. (L 8) 3. However, in the face of opposition to the Directive by non-EU States, especially the United States and China, who contended, *inter alia*, that the Directive was preempted by the International Civil Aviation Organization (ICAO), and that it illegally regulated emissions outside of the EU. Burns, *supra* note 1, at 198-99 n.45. The EU ultimately decided to limit the scope of the regulation to flights within the European Economic Area (the twenty-eight EU Member States,

market by far at the outset of Phase 3 of implementation, accounting for more than 75% of international carbon trading in 2013.[8] This percentage translates into approximately 2 billion tons of carbon dioxide and other greenhouse gases, which represent about 4% of the world's greenhouse gas emissions.[9]

The parties to the EU-ETS committed themselves to reducing greenhouse gas emissions in regulated installations by 21% below 2005 emissions levels by 2020.[10] The EU anticipated that this would contribute two-thirds of the emissions reductions required for the EU to meet its commitment to an overall 20% reduction in greenhouse gases by 2020.[11]

As indicated in the first part of this Article, the EU-ETS was substantially amended in 2009 to achieve more effective implementation in its third phase. The amendments included expansion of the scope of regulated gases and sectors, establishment of an annual Linear Reduction Factor (LRF)[12] of 1.74% of the midpoint of the cap in Phase 2 for the

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plus Iceland, Liechtenstein, and Norway) until 2016 to facilitate work on aviation emissions by the ICAO. The European Commission has proposed continuing this configuration of the Aviation Directive beyond 2016 in light of the ICAO's adoption of CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation) at the 39th ICAO assembly. CORSIA seeks to stabilize aviation carbon dioxide emissions by 2020. *Reducing Emissions from Aviation*, EUR. COMMISSION, https://ec.europa.eu/clima/policies/transport/aviation_en (last visited Oct. 31, 2017); *see also* Int'l Civil Aviation Org. (ICAO) Res. A39-3 (2016), https://www.icao.int/environmental-protection/Documents/Resolution_A39_3.pdf; *Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)*, ICAO, https://www.icao.int/environmental-protection/Pages/market-based-measures.aspx (last visited Sept. 5, 2017). However, there is a division of opinion between the European Parliament, which has suggested limiting the exemption of aviation emissions under the EU-ETS until 2020, and Member States, who contend that the exemption should be permanent in light of CORSIA. Andrew Murphy, *On the Rise?*, CARBON MECHANISMS REV. Sept.-Oct. 2017, at 24. Aviation emissions have been growing during the first three phases of the EU-ETS, and international aviation emissions have doubled since 1990. *Climate Change—Driving Forces,* EUROSTAT STAT. EXPLAINED, http://ec.europa.eu/eurostat/statistics-explained/index.php/Climate_change_-_driving_forces (last visited Oct. 9, 2017).

8. GREGOR EHRBACH, EUROPEAN PARLIAMENT, REFORM OF THE EU CARBON MARKET: FROM BACKLOADING TO THE MARKET STABILITY RESERVE 3 (Oct. 2014), http://www.europarl.europa.eu/RegData/etudes/BRIE/2014/538951/EPRS_BRI%282014%29538951_REV1_EN.pdf.

9. DENNY ELLERMAN ET AL., EUROPEAN UNION INST., ROBERT SCHUMAN CTR. FOR ADVANCE STUDIES, THE EU ETS: EIGHT YEARS AND COUNTING 1 (2014).

10. Directive 2009/29/EC of the European Parliament and of the Council of 23 April 2009 Amending Directive 2003/87/EC so as to Improve and Extend the Greenhouse Gas Emissions Allowance Trading Scheme of the Community, at para. 5, 2009 O.J. (L 140) 63 (EC) [hereinafter Directive 2009/29/EC].

11. *Id.* para. 5; CLAUDIA KETTNER ET AL., WORKING PAPERS, NO. 368/2010, THE EU EMISSION TRADING SCHEME: INSIGHTS FROM THE FIRST-TRADING YEARS WITH A FOCUS ON PRICE VOLATILITY 2 (2010).

12. "The Linear Reduction factor determines how much the available number of allowances are reduced every year." *CAN Europe's Position on the ETS Reforms*, CLIMATE

number of emissions allowances,[13] establishment of a EU-wide allowance allocation to replace previous National Allocation Plans, and a steady reduction of the number of free allowances allocated to regulated entities.[14]

Despite these efforts to strengthen the EU-ETS, however, Phase 3 began under extremely unpropitious circumstances, as a burgeoning surplus[15] of European Union Allowances (EUAs) depressed price signals.[16] The causes of this surplus included the "Great Recession" in Europe between 2003 and 2007, which may have depressed demand for allowances by 5% annually during this period;[17] the impact of other EU climate policies, such as renewable energy mandates; the use of credits from outside of the EU; and an infusion of allowances from sources such as the New Entrants Reserve.[18]

At the outset of 2013, the estimated surplus of allowances reached approximately 2 billion,[19] a figure equivalent to approximately a year of

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ACTION NETWORK EUR. (Mar. 21, 2016), http://www.caneurope.org/docman/emissions-trading-scheme/2828-ppt-can-europe-position-detailed-ets-reform-recommendations/file.

13. The 1.74% LRF established in Phase 3 of EU-ETS implementation translates into approximately 38.3 million tons annually. INT'L CARBON ACTION P'SHIP, EMISSIONS TRADING WORLDWIDE: INTERNATIONAL CARBON ACTION PARTNERSHIP (ICAP) STATUS REPORT 2017, at 29 (2017), https://icapcarbonaction.com/en/?option=com_attach&task=download&id=447.

14. Burns, *supra* note 1, at 206-09.

15. A surplus occurs in carbon markets when more allowances are issued than are being used by market participants. Zachmann, *supra* note 3, at 3.

16. DALLAS BURTRAW ET AL., MISTRA INDIGO, A PRICE FLOOR SOLUTION TO THE ALLOWANCE SURPLUS IN THE EU ETS 4 (2013), http://economics.handels.gu.se/digitalAssets/1484/1484466_price-floor-eu-ets.pdf.

17. *Id.* at 3. As a consequence of the economic downturn, "the total verified emissions of the facilities covered by the EU ETS decreased by 12 per cent between 2008 and 2012 . . . and remained persistently well below the cap . . . from 2009 onwards." GODEFROY GROSJEAN ET AL., MERCATOR RESEARCH INST. ON GLOB. COMMONS & CLIMATE CHANGE, AFTER MONETARY POLICY, CLIMATE POLICY: IS DELEGATION THE KEY TO EU ETS REFORM? 12 (2014), https://www.mcc-berlin.net/fileadmin/data/pdf/Publikationen/Grosjean_et_al_2014_Is_Delegation_the_Key_to_EU_ETS_Reform_May2014.pdf.

18. GROSJEAN ET AL., *supra* note 17, at 12; KARSTEN NEUHOFF ET AL., DIW BERLIN, BANKING OF SURPLUS EMISSIONS ALLOWANCES: DOES THE VOLUME MATTER? 4 (2012), https://www.diw.de/documents/publikationen/73/diw_01.c.394484.de/dp1196.pdf. Article 10(a)(8) of the 2009 revised Emissions Trading Directive provided for the provision of up to 300 million allowances "to help stimulate the construction and operation of up to 12 commercial demonstration projects that aim at the environmentally safe capture and geological storage (CCS) of CO2 as well as demonstration projects of innovative renewable energy technologies, in the territory of the Union." Directive 2009/29/EC, *supra* note 10. This is denominated the New Entrant Reserve, or NER300. *NER 300 Programme*, EUR. COMMISSION, https://ec.europa.eu/clima/policies/lowcarbon/ner300_en (last visited Sept. 26, 2017).

19. European Comm'n, *Commission Staff Working Document, Executive Summary of the Impact Assessment—Accompanying Document to the Proposal for a Decision of the European Parliament and of the Council Concerning the Establishment and Operation of a Market Stability Reserve for the Union Greenhouse Gas Emission Trading Scheme and*

emissions by Member States,[20] and double the 2011 surplus.[21] Indeed, the 2.039 billion allowances in 2013 was 2.88% greater than 2009 emissions in regulated sectors.[22]

Moreover, the European Commission projected that the surplus would grow to 2.6 billion by 2020 and gradually decline to 2.1 billion allowances by 2028.[23] This projected surplus would constitute a sizeable 34% increase above 2009 levels.[24] This surplus, in turn, exerted a serious downward pressure on prices. Indeed, while the Commission projected that allowance prices would rise to twenty-five euros by 2020 and thirty-nine euros by 2030,[25] prices hovered at around five euros at the outset of Phase 3.[26]

The decline in carbon prices associated with the glut in allowance prices could ensure that EU Member States would not have to take any additional abatement measures during Phase 3.[27] This could reduce the dynamic efficiency of the EU-ETS as a market-based mechanism by creating a disincentive for investment in the coming years,[28] which in turn would lead to higher future costs for emissions reductions and a large

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Amending Directive 2003/87/EC, at 2, SWD (2014) 18 final (2014), http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52014SC0018&from=EN.

20. CARBON MKT. WATCH, WHAT'S NEEDED TO FIX THE EU'S CARBON MARKET: RECOMMENDATIONS FOR THE MARKET STABILITY RESERVE AND FUTURE ETS REFORM PROPOSALS 3 (2014).

21. EHRBACH, *supra* note 8, at 3.

22. DAMIEN MORRIS & BRYONY WORTHINTON, SANDBAG, CAP OR TRAP?: HOW THE EU ETS RISKS LOCKING-IN CARBON EMISSIONS 53 (2010).

23. *See* SANDBAG, A TALE OF TWO SURPLUSES: MSR CANCELLATION OPTIONS FOR PHASE 4 2 (2017), https://sandbag.org.uk/wp-content/uploads/2017/05/A-tale-of-two-surpluses-May-2017-v2.pdf (surplus of EUAs could rise to over 2 billion tons into the 2030s under a "low emissions" scenario, i.e. coal plants closing more quickly than currently anticipated).

24. MORRIS & WORTHINGTON, *supra* note 22, at 22.

25. Directorate-General for Energy, *EU Energy Trends to 2030—Update 2009*, at 18 (Aug. 4, 2010), https://ec.europa.eu/energy/sites/ener/files/documents/trends_to_2030_update_2009.pdf.

26. WILLIAM ACWORTH, DIW BERLIN, CAN THE MARKET STABILITY RESERVE STABILISE THE EU ETS: COMMENTATORS HEDGE THEIR BETS 2 (2014), https://www.diw.de/documents/publikationen/73/diw_01.c.465929.de/diw_roundup_23_en.pdf.

27. Nicolas Berghmans, *Reforming the EU ETS: Give It Some Work!*, Climate Brief, No. 28 (Feb. 2013), https://www.i4ce.org/wp-core/wp-content/uploads/2015/09/13-03-06-Climate-Brief-n%C2%B028_Structural-Reform.pdf. Studies concluded that the surplus built up during Phase 2 would not be fully exhausted before 2025, at which point "internal abatement" could begin to transpire again. Jing Hu et al., *Ex-Ante Evaluation of EU ETS During 2013-2030: EU-Internal Abatement*, 77 ENERGY POL'Y 152, 158 (2015).

28. The European Commission concluded that the surplus "is expected to continue to erode [the EU ETS's] role as a technology neutral, cost-effective and EU-wide driver for low carbon investment." *Commission Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions—A Policy Framework for Climate and Energy in the Period from 2020 to 2030*, at 8, COM (2014) 15 final (Jan. 22, 2014).

concentration of investments during a short time span.[29] Moreover, depressed carbon prices in the short to medium term associated with a glut of allowances could result in continued investments in carbon-intensive capital stock. Indeed, there was foreboding evidence in 2012 and 2013 of industrial facilities in the EU shifting from natural gas to coal for electricity production.[30] Low allowance prices have discouraged investment in energy efficiency measures.[31]

The EU sought to counter these foreboding trends by implementing two policies: emissions backloading and the Market Stability Reserve (MSR).

B. Reform Measures in Phase 3

1. Emissions Backloading

The European Commission released a memorandum in November 2012 in which it acknowledged that the European carbon market faced a burgeoning surplus of allowances in Phase 3.[32] Moreover, it contended that this surplus, largely precipitated by the economic crisis in Europe earlier in the decade, would be exacerbated by the large increase in the supply of allowances between the transition from Phase 2 to Phase 3, which was attributable to a variety of factors including the inclusion of new sectors and gases in the EU-ETS.[33] The Commission expressed the need to implement a mechanism that could help re-balance supply and demand of allowances as a means to increase market confidence in the EU-ETS.[34] Moreover, the Commission sought to avoid the fragmentation and reduction of transparency that might ensue if individual Member States enacted national or subnational climate instruments.[35]

To address these concerns, the Commission proposed postponing the auction of 900 million EUAs over the course of three years during Phase 3 of EU-ETS implementation.[36] However, after months of highly

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29. *See* EHRBACH, *supra* note 8, at 4; LARS ZETTERBERG ET AL., MISTRA INDIGO, EU ETS REFORM—ASSESSING THE MARKET STABILITY RESERVE 5 (2014).

30. EHRBACH, , *supra* note 8, at 5-6.

31. CARBON MKT. WATCH, *supra* note 20, at 3; Alex Scott, *EU Carbon Emissions Trading Scheme in Freefall*, CHEMICAL & ENGINEERING NEWS (Feb. 18, 2013), http://cen.acs.org/articles/91/i7/EU-Carbon-Emissions-Trading-Scheme.html.

32. European Commission Memo/12/861, Q&A Emissions Trading: Commission Outlines Two-Step Process To Reform the European Carbon Market § 1 (Nov. 14, 2012), http://europa.eu/rapid/press-release_MEMO-12-861_en.htm

33. *Id.* § 2.

34. *Id.* § 17.

35. *Id.*

36. *Id.* § 3.

contentious debate and substantial lobbying against the proposal by the industry,[37] the European Parliament rejected the Commission's proposal by nineteen votes in April 2013.[38] The Parliament's rejection of the Commission's proposal left the EU-ETS market in shambles, as allowance prices plunged to a low of 2.63 euros per ton,[39] a 50% drop from 2012.[40] However, the proposal lived to fight another day, as the Parliament sent it back to its environment committee for further debate.[41] The Parliament adopted the proposal in December of that year,[42] and the Council adopted the proposal soon thereafter.[43]

The so-called "backloading" Directive of 2013[44] was adopted as an amendment to the EU's Auctioning Regulation.[45] The Directive provides for a one-time postponement of the auctioning of 900 million allowances over the course of three years: 400 million allowances in 2014, 300 million in 2015, and 200 million in 2016.[46] It was contemplated that 300 million of these allowances would be returned to the auction market in 2019, and the remaining 600 million that had been "backloaded" would be returned to the market in 2020.[47]

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37. Arthur Neslen, *Barroso Urged To Take a Stand on EU Carbon Market Fix*, EURACTIV (Apr. 26, 2013), http://www.euractiv.com/section/climate-environment/news/barroso-urged-to-take-a-stand-on-eu-carbon-market-fix/.

38. Ben Garside & Barbara Lewis, *EU Parliament Rejects Carbon Market Rescue Fix*, REUTERS (Apr. 16, 2013), http://www.reuters.com/article/us-eu-ets-vote/eu-parliament-rejects-carbon-market-rescue-fix-idUSBRE93F0NT20130416.

39. *Id.*

40. Alessandro Vitelli & Nicholas Brautlecht, *EU Carbon Posts Biggest Weekly Gain as Merkel Urges Surplus Fix*, BLOOMBERG (May 3, 2013), https://www.bloomberg.com/news/articles/2013-05-03/carbon-soars-to-2-week-high-as-merkel-urges-work-on-surplus-fix.

41. *ETS, RIP?*, ECONOMIST (Apr. 20, 2013), https://www.economist.com/news/finance-and-economics/21576388-failure-reform-europes-carbon-market-will-reverberate-round-world-ets.

42. *European Parliament Votes To Cut Carbon Permit Supply*, REUTERS (Dec. 10, 2013), http://www.reuters.com/article/eu-parliament-carbon/update-2-european-parliament-votes-to-cut-carbon-permit-supply-idUSL6N0JP2AT20131210.

43. *2012/0202(COD) Greenhouse Gas Emission Allowance Trading: Timing of Auctions*, EUR. PARLIAMENT/LEGIS. OBSERVATORY, http://www.europarl.europa.eu/oeil/popups/ficheprocedure.do?lang=en&reference=2012/0202%28COD%29 (last visited Sept. 6, 2017).

44. Decision No. 1359/2013/EU of the European Parliament and of the Council of 17 December 2013 Amending Directive 2003/87/EC Clarifying Provisions on the Timing of Auctions of Greenhouse Gas Allowances, 2013 O.J. (L 342/1).

45. Commission Regulation (EU) No 176/2014 of 25 February 2014 Amending Regulation (EU) No 1031/2010 in Particular To Determine the Volumes of Greenhouse Gas Emission Allowances To Be Auctioned in 2013-20, 2014 O.J. (L56/11).

46. *Id.*

47. *Id.* at 3.

The adoption of the backloading allowance initially raised prices modestly in the short term[48] and contributed to a decline in allowance surpluses in the past few years.[49] However, as many analysts predicted, the relatively modest number of backloaded allowances,[50] which were slated to return to the market at the end of the Phase 3, virtually ensured that prices would remain depressed for at least another decade.[51]

2. The Market Stability Reserve

In recommending the adoption of the backloading proposal, the Commission emphasized that "only deployment of a structural measure" could effectively address the oversupply of allowances in the EU-ETS carbon market. The Commission contended that the structural measure was critical to ensure the kind of investor certainty that could drive

48. Silvio Marcacci, *EU Parliament Approaches Backloading Fix to Cap and Trade Market*, CLEAN TECHNICA (July 3, 2013), https://cleantechnica.com/2013/07/03/eu-parliament-approves-backloading-fix-to-cap-and-trade-market/.

49. MARCU ET AL., *supra* note 2, at 29 ("The surplus has peaked at more than 2.1 billion EUAs in 2013 and reached 1.45 billion EUAs at the end of 2016.").

50. A number of experts had suggested backloading of a much higher number of allowances in the range of 1.2-2.6 billion allowances to substantially increase allowance prices. *See EU ETS at a Crossroads: Recalibrating an Oversupplied Market To Spur Investments and Innovation*, CLIMATE ACTION NETWORK EUR. (Jan. 24, 2013), http://www.caneurope.org/publications/reports-and-briefings/465-eu-ets-at-a-crossroads (suggesting the postponement of 1.2 billion allowances); SANDBAG, RESPONSE TO THE PUBLIC CONSULTATION ON THE EU ETS BACKLOADING PROPOSAL (2013) (backloading 2.2 billion allowances "equivalent to the absolute difference between 2008-2020 BAU emissions as projected in the 2008 impact assessment and 2008-2020 BAU emissions as expected today"); European Comm'n, *Commission Staff Working Document Impact Assessment Accompanying the Document Commission Regulation (EU) No 176/2014 of 25 February 2014 Amending Regulation (EU) No 1031/2010 in Particular To Determine the Volumes of Greenhouse Gas Emission Allowances To Be Auctioned in 2013-2020*, at 9, SWD (2014) 50 final (Feb. 25, 2014), http://ec.europa.eu/smart-regulation/impact/ia_carried_out/docs/ia_2014/swd_2014_0050_en.pdf (SSE Plc proposed postponement of auctioning of 2.6 billion allowances). The Commission analyzed the impact of backloading 400 million, 900 million, and 1.2 billion allowances. It ultimately rejected the 1.2 billion allowance option, contending that it would potentially exert high pressure on prices in the early stages of Third Phase implementation of the EU-ETS, as well as a corresponding drop in prices later in the Third Phase. It argued that backloading 900 million allowances would have a more "proportional impact," better balancing supply and demand, resulting in a more gradual build-up of the structural surplus of allowances, which would reduce the risk of market price volatility in the transition between the Second and Third phases. European Commission Memo/12/861, *supra* note 32, § 5.

51. CARBON MKT. WATCH, *supra* note 20, at 5; PBL NETH. ENVTL. ASSESSMENT AGENCY, EVALUATION OF THE EUROPEAN COMMISSION'S PROPOSAL TO SET ASIDE EMISSION ALLOWANCES 7 (2012); European Comm'n, *Commission Staff Working Document*, *Impact Assessment Accompanying the Document Proposal for a Decision of the European Parliament and of the Council Concerning the Establishment and Operation of a Market Stability Reserve for the Union Greenhouse Gas Emission Trading Scheme and Amending Directive 2003/87/EC*, SWD (2014) 18 final (Jan. 22, 2014), http://www.ipex.eu/IPEXL-WEB/dossier/files/download/082dbcc54314a3a30143bef8bd221ca3.do.

efficient long-term investments to effectuate de-carbonization.[52] Thus, in conjunction with the release of a framework for climate and energy policy in 2030,[53] the European Commission put forward a legislative proposal in January 2014 to introduce such a structural mechanism, denominated as the Market Stability Reserve (MSR). The MSR was ultimately adopted in 2015.[54]

The overarching purpose of the MSR is to serve as a "market thermostat," automatically adjusting the quantity and supply of emissions allowances, and thus, indirectly, carbon prices in the EU.[55] It reflects the recognition that while in "natural markets" supply reacts to changes in demand, in the EU-ETS supply is "fixed through the EU Directive . . . independent of whether the assumptions made when the auction schedule was set, including economic projections, are still true, or whether [the Commission is] seeing significant deviations during the trading period."[56]

The MSR seeks to address excess liquidity engendered by the structure of the system by constraining the total surplus of allowances within a pre-defined range of 400 million to 833 million allowances.[57] Moreover, the Commission believed that the MSR would help to restore the functioning of the carbon market in the short term and beyond, and engender greater investor certainty by increasing the resilience of the EU-ETS against unanticipated and sudden future demand shocks in the future.[58]

Under the MSR, where there is a relatively glutted carbon market with more than 833 million allowances in circulation, 12% of allowances are withdrawn annually and placed in reserve.[59] Conversely, in relatively

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52. European Commission Memo/12/861, *supra* note 32, § 17.

53. *European Commission Proposal for a Directive of the European Parliament and of the Council Amending Directive 2003/87/EC To Enhance Cost-Effective Emission Reductions and Low Carbon Investments*, COM (2015) 337 final (July 15, 2015) [hereinafter *Emission Reductions*].

54. *2014/0011(COD) Union Greenhouse Gas Emission Trading Scheme: Establishment and Operation of a Market Stability Reserve*, EUR. PARLIAMENT/LEGIS. OBSERVATORY, http://www.europarl.europa.eu/oeil/popups/ficheprocedure.do?reference=2014/0011%28COD%29&l=en (last visited Sept. 6, 2017).

55. Torbjørg Jevnaker & Jørgen Wettestad, *Ratcheting Up Carbon Trade: The Politics of Reforming EU Emissions Trading*, 17 GLOBAL ENVTL. POL. 105, 106 (2017).

56. ANDREI MARCU, THE MARKET STABILITY RESERVE IN PERSPECTIVE 5 (2014).

57. OTTMAR EDENHOFER ET AL., EUROPEAN COUNCIL OF ACADS. OF APPLIED SCIS., TECHNS. & ENG'G, REFORM OPTIONS FOR THE EUROPEAN EMISSIONS TRADING SYSTEM (EU ETS) 20 (2014).

58. Decision (EU) 2015/1814 of the European Parliament and of the Council of 6 October 2015 Concerning the Establishment and Operation of a Market Stability Reserve for the Union Greenhouse Gas Emission Trading Scheme and Amending Directive 2003/87/EC, paras. 4-5, 2015 O.J. (L264/1-2) [hereinafter Decision (EU) 2015/1814].

59. *Id.* para. 5.

tight markets with less than 400 million allowances in circulation, the MSR requires removal of 100 million allowances from the reserve and adding them to the auction for the current year.[60] Trotignon and others have portrayed this as an "asymmetric mechanism" because allowances in the current environment will likely be removed easily but injected sparsely.[61] The MSR also addresses the concern of many analysts that re-injection of the 900 million backloaded allowances into the system at the end of Phase 3 would simply depress carbon prices again.[62] The MSR instead provides for placing these allowances in the reserve.[63]

The Commission's original proposal provided for the MSR to start at the outset of Phase 4 of EU-ETS implementation in 2021. The Commission contended that delaying implementation would preserve legislative certainty during Phase 3 and provide market participants with adequate time to prepare for the new system.[64] However, in the face of calls by some EU Member States for earlier start dates ranging from 2017-2019,[65] it was ultimately decided to launch the MSR in 2018[66] and to begin placing allowances in the reserve in January 2019.[67] The MSR decision also required the Commission to monitor the reserve, with an initial review within three years of the start of its operation, and at five-year intervals thereafter. The Commission can submit proposals to the European Parliament and Council on the basis of these reviews to adjust, *inter alia*, the number of allowances placed in the reserve, the number of

60. *Id.* para. 6. The MSR also seeks to address the concern about excessive price fluctuations reflected in Article 29a of the EU-ETS, i.e., if, for more than six consecutive months, the allowance price is more than three times the average EUA price during the two preceding years. Under such circumstances, the MSR mandates that 100 million allowances will be released from the reserve and added to the volume of allowances to be auctioned. Where fewer than 100 million allowances are in the reserve, all allowances in the reserve shall be released. *Id.* para. 7.

61. Raphael Trotignon, Frédéric Gonand & Christian de Perthuis, *EU ETS Reform in the Climate-Energy Package 2030: First Lessons from the ZEPHYR Model*, at 2, CLIMATE ECON. CHAIR (Jan. 20, 2014), https://www.chaireeconomieduclimat.org/wp-content/uploads/2015/10/14-03-07-Policy-Brief-2014-01-EN-v2.pdf.

62. Susanna Williams, *Make CO2 Backloading Permanent, Says MEP*, ENDS EUR. (Nov. 18, 2014), https://www.endseurope.com/article/37767/make-co2-backloading-permanent-says-mep.

63. Decision (EU) 2015/1814, *supra* note 58, para. 8.

64. EHRBACH, *supra* note 8, at 7.

65. *Legislative Train Schedule: Resilient Energy Union with a Climate Change Policy*, EUR. PARLIAMENT, http://www.europarl.europa.eu/legislative-train/theme-resilient-energy-union-with-a-climate-change-policy/file-market-stability-reserve-for-the-eu-ets (last updated Nov. 20, 2017).

66. Decision (EU) 2015/1814, *supra* note 58, para. 5.

67. *Id.* para. 1.

allowances released from the reserve, and the numerical threshold value for the total number of allowances in circulation.[68]

However, the MSR's prospective effectiveness is highly contested. It is unclear if the upper and lower ranges of the surplus band in the reserve will effectively address plummeting carbon prices in the EU,[69] a fact conceded by the Commission itself.[70] One analyst concluded that the MSR was a "strong outcome" that would raise the EU-ETS carbon price to twenty euros per ton by 2020, and ultimately to forty euros per ton by 2030.[71] Another study projected that prices could rise even higher under a scenario where market participants choose to reduce emissions early and bank a high quantity of allowances, to fifty euros per ton at the outset of Phase 4.[72]

Conversely, a number of other analyses have concluded that the MSR may have little impact on market prices for allowances. For example, Desai and others contended that its impact would be "marginal" and "limited" in the long run.[73] Similarly, members of the emission market task force of the European Federation of Energy Traders projected that the median price of allowances might rise modestly to somewhere between 8.25 and ten euros at the beginning of Phase 4 of EU-ETS implementation.[74]

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68. *Id.* para. 3.

69. EDENHOFER ET AL., *supra* note 57, at 22.

70. European Comm'n, *supra* note 19, at 10.

71. Sonja van Renssen, *Historic Deals in Brussels: EU Decides the Future of Its Carbon Market*, ENERGY POST (May 6, 2015), http://energypost.eu/historic-deal-brussels-eu-decides-future-carbon-market/.

72. Trotignon et al., *supra* note 61, at 4; *see also* P. Capros et al., E^{3}M-Lab, *Development and Evaluation of Long-Term Scenarios for a Balanced European Climate and Energy Policy Until 2030*, BUNDESMINISTERIUMS FÜR WIRTSCHAFT UND ENERGIE 3, https://www.bmwi.de/Redaktion/EN/Downloads/shortpaper-uni-athen.pdf?__blob=publicationFile&v=2 (last visited Dec. 10, 2017) (MSR "could increase overall predictability and consistency of instruments, thus succeeding to stabilize the ETS market and delivering continued and balanced carbon price signals . . . .").

73. Zuheir Desai, Emilie Alberola & Nicolas Berghmans, *Introducing Short Term Flexibility in the EU ETS To Assure Its Long-Term Credibility: A Multi-Criteria Analysis of Policy Options*, 45 CLIMATE REP. (CDC Climat Research, Paris, Fr.) July 2014, at 3, 45, http://www.cdcclimat.com/IMG/pdf/14-07_cdc_climat_report_no45__multicritieria_analysis_on_eu_ets_reforms.pdf. The authors argue that the impact of the MSR would be de minimis because "the annual amount of allowances 'in circulation' should be within the 400-800 Mt range by 2030," and "if the consistency of policies sufficiently limit their potential overlap with the EU ETS' CO2 objective upstream and, in the absence of unanticipated external shocks, the role of the reserve will remain marginal." *Id.* at 4.

74. Matthew Carr, *Polluting Is Getting Expensive in Europe Again: Carbon & Climate*, BLOOMBERG (Dec. 18, 2014), https://www.bloomberg.com/news/articles/2014-12-19/polluting-is-getting-expensive-in-europe-again-carbon-climate. For an array of expert opinions on the likely impact of the MSR, see ACWORTH, *supra* note 26.

Moreover, pre-implementation signals may not ultimately bode well for the impact of the MSR. Many business associations appear largely indifferent to the MSR in terms of research and development investments in low-carbon technologies.[75] Also, while the passage of the MSR resulted in an immediate price increase in allowances, prices once again dropped to around five euros by 2016[76] and currently remain below seven euros.[77]

Structurally, the MSR may also be ill-designed to address the maladies currently facing the EU-ETS. Substantial concerns have been raised regarding the temporality of the mechanism. Because the MSR is triggered by observed data, it ensures that infusion or withdrawal of allowances will only occur after a two-year lag.[78] This delay could both denude the effectiveness of the instrument and potentially increase price volatility.[79] Moreover, while the MSR provides more flexibility to respond to factors that may create price shocks, such as economic downturns, it may not effectively address the core problems that have generated the current surplus; as a result, these problems are likely to persist through most of Phase 3.[80] Finally, it is quite unclear if the MSR can address some of the most momentous events that have shaken the foundation of the EU-ETS in the past. As Acworth observes, the MSR is not designed to respond to "a range of possible unknowns" that might profoundly affect the carbon markets, for example, the European economic recession of 2011 and 2012.[81]

C. Looking Forward to Phase 4 of the EU-ETS

Phase 4 is slated to begin in 2021 and run until 2030.[82] Absent new EU legislation in the interim, Phase 4 will be subject to the same rules as

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75. Brigitte Knopf & Ottmar Edenhofer, *Save the EU Emissions Trading Scheme: Set a Price Band*, ENERGY POST (Oct. 21, 2014), http://energypost.eu/eu-emissions-trading-scheme-can-saved-price-band/.

76. Jevnaker & Wettestad, *supra* note 55, at 119.

77. CARBON PULSE: EU ETS, https://carbon-pulse.com/category/eu-ets/ (last visited Sept. 27, 2017).

78. STEPHEN WOODHOUSE & SIMON HENRY, PÖYRY, ASSESSMENT OF THE ALLOWANCE SUPPLY ADJUSTMENT MECHANISM 1 (June 2013), http://www.poyry.co.uk/sites/www.poyry.co.uk/files/media/related_material/assessment-of-the-allowance-supply-adjustment-mechanism.pdf; EDENHOFER ET AL., *supra* note 57, at 21.

79. ACWORTH, *supra* note 26, at 4. For the proposition that the MSR could exacerbate the already serious market volatility of the EU-ETS, see also Trotignon et al., *supra* note 61, at 4. *See also* EHRBACH, supra note 8, at 7.

80. ACWORTH, supra note 26, at 4.

81. *Id.* at 5.

82. *Climate Action: Revision for Phase 4 (2021-2030)*, EUR. COMMISSION, https://ec.europa.eu/clima/policies/ets/revision_en (last visited Sept. 26, 2017).

Phase 3.[83] However, in the early stages of Phase 3, both the Council and Commission recognized the need to strengthen the climate policymaking framework in the EU to meet its long-term objectives,[84] including its obligations under the Paris Agreement.

In 2014, the European Council agreed to a 2030 Climate and Energy Policy Framework (Framework) for the EU.[85] The Council endorsed a binding EU target of at least a 40% reduction in greenhouse gas emissions by 2030 compared to 1990 levels.[86] The Framework calls for the EU-ETS sector to effectuate 43% reductions in emissions and 30% reductions in non-ETS sectors by 2030 compared to 2005 levels.[87]

Recognizing that a well-functioning EU-ETS will be the primary instrument to meet the EU's emissions reduction objectives, the Framework outlined several changes, including the following:

(1) To ensure that the EU-ETS can meet the goal of a 43% reduction in emissions by 2030, the annual Linear Reduction Factor (LRF) was increased from 1.74% to 2.2% from 2021 onwards,[88] equivalent to an additional emissions reduction of 556 tons between 2020 and 2030;[89]
(2) The New Entrant Reserve of the EU-ETS, established to help drive development of carbon capture and storage and renewable energy projects,[90] will be renewed. The initial endowment of EUAs is slated to be increased to 400 million, and the scope of eligible projects expanded to encompass low-carbon innovation in industrial sectors;[91]
(3) A new reserve of 2% of EU-ETS allowances will be set aside to investment needs in Member States with gross domestic product (GDP) per capita 60% below the EU average.[92]

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83. EHRBACH, *supra* note 8, at 3.

84. The Union has stated that it aims to reduce its emissions 80%-95% from 1990 levels by 2050. *Emission Reductions*, *supra* note 53, at 2; *EU Climate Action*, EUR. COMMISSION, https://ec.europa.eu/clima/citizens/eu_en (last visited Sept. 26, 2017);.

85. EUROPEAN COUNCIL, 2030 CLIMATE AND ENERGY POLICY FRAMEWORK, EUCO 169/14 (2014).

86. *Id.* para. 2.

87. *Id.* para. 2.1.

88. *Id.* para. 2.3.

89. *Tackling Climate Change: Reform of the EU Emissions Trading Scheme*, EUR. COUNCIL, http://www.consilium.europa.eu/en/policies/climate-change/reform-eu-ets/ (last visited Sept. 26, 2017).

90. *See supra* text accompanying note 18.

91. EUROPEAN COUNCIL, *supra* note 85, para. 2.6.

92. *Id.* para. 2.7.

In 2015, the European Commission, observing that the Council's objective of reducing EU-ETS sector emissions by 43% in 2030 required revision of the existing framework,[93] released a proposed Directive to reform the EU-ETS.[94] Among the revisions to the EU-ETS that the Directive proposed are the following:

(1) Increase the LRF by 2.2% from 2021 onward;[95]
(2) Increase Member States' share of allowances for auction by 57% from 2021 onward;[96]
(3) Set aside 400 million allowances into an Innovation Fund to support development of carbon capture and storage demonstration projects, innovative renewable energy projects, and low-carbon technologies in the industrial sector;[97]
(4) Establish a Modernization Fund during Phase 4 of EU-ETS implementation to support investment in the modernization of energy systems and improvement of energy efficiency in Member States with a GDP per capita below 60% of the Union average in 2013;[98]
(5) Revise the system of free allocation of allowances provided to certain sectors to avoid "carbon leakage,"[99] defined as "the shifting of productive capacity from one country to another as a consequence of differential emission pricing poli[cies]."[100] By allocating free allowances to avoid leakage while avoiding financial windfalls for industry, this proposal seeks to more closely assess pertinent factors such as technological progress over time and current production levels.[101]

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93. *Emission Reductions*, *supra* note 53, at 5.
94. *Id.*
95. *Id.* art. 1(3).
96. *Id.* art. 1(4).
97. *Id.* art. 1(5)(f).
98. *Id.* art. 10(d).
99. *Id.* art. 1(5).
100. Tim Laing et al., *Centre for Climate Change Economics & Policy, Assessing the Effectiveness of the EU Emissions Trading System* 16 n.9 (Centre for Climate Change Econ. & Policy, Working Paper No. 126, Grantham Research Inst. on Climate Change & the Env't, Working Paper No. 106, 2013), http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2014/02/WP106-effectiveness-eu-emissions-trading-system.pdf. Carbon leakage can result in a net increase in global greenhouse gas emissions, see CARBON MARKET WATCH, CARBON LEAKAGE MYTHBUSTER (2015), as well as adversely affect countries engaged in climate regulation by reducing output, employment and tax revenues. Ralf Martin et al., *On the Empirical Content of Carbon Leakage Criteria in the European Emissions Trading Scheme*, 105 ECO. ECON. 78, 78 (2014).
101. *Emission Reductions*, *supra* note 53, at 6.

A series of proposals released by the Commission in 2016 under the rubric of "Clean Energy for All Europeans" are similarly pertinent to the operation of the EU-ETS.[102] The proposals included the following:

(1) An update to the Renewable Energy Directive,[103] including, *inter alia*, new sustainability criteria for biofuels to include greenhouse gas emissions;[104]
(2) An update to the EU's Energy Efficiency Directive,[105] identifying energy efficiency measures as a cost-effective way for Member States to meet their obligations under the EU-ETS.[106] The proposal, *inter alia*, calls for a legally binding target of 30% (compared with a hypothetical projection for EU primary energy consumption) in each Member State by 2030;[107]
(3) An update to the Energy Performance of Buildings Directive,[108] which provides for, *inter alia*, establishment of roadmaps, including milestones, by Member States to deliver on the objective of decarbonizing national building stocks by 2050;[109] aggregation of projects to stimulate investments;[110] and linkage of financial measures for energy efficiency improvements in the renovation of buildings to energy savings associated with such renovation.[111]

The next Parts of this Article will seek to assess the EU-ETS's effectiveness to date and will suggest methods to strengthen climate policy-making in Europe.

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102. European Commission Press Release IP/16/4009, Clean Energy for All Europeans—Unlocking Europe's Growth Potential (Nov. 30, 2016), http://europa.eu/rapid/press-release_IP-16-4009_en.htm.

103. *European Commission Proposal for a Directive of the European Parliament and of the Council on the Promotion of the Use of Energy from Renewable Sources (Recast)*, COM (2016) 767 final/2 (Feb. 23, 2017).

104. *Id.* art. 26(1).

105. *European Commission Proposal for a Directive of the European Parliament and of the Council Amending Directive 2012/27/EU on Energy Efficiency*, COM (2016) 761 final (Nov. 11, 2016).

106. *Id.* at 3.

107. *Id.* at 14, art. 1(1).

108. *European Commission Proposal for a Directive of the European Parliament and of the Council Amending Directive 2010/31/EU on the Energy Performance of Buildings*, COM (2016) 765 final (Nov. 30, 2016).

109. *Id.* art. 1(2)(b).

110. *Id.* art. 3(a).

111. *Id.* art. 6(a).

V. THE EFFECTIVENESS OF THE EU-ETS TO DATE

The ultimate goal of any climate change program is "its suitability for directing long-term investment toward a low-carbon future."[112] In assessing the EU-ETS's effectiveness during its first twelve years of operation, it should be noted at the outset that the EU-ETS has clearly reduced emissions in regulated sectors. According to the most recent *State of the EU-ETS Report*, the EU is attaining its target of reducing emissions in EU-ETS sectors by 21% below 2005 emissions ahead of time.[113] Indeed, by 2015, greenhouse emissions in sectors regulated by the EU-ETS had already decreased by 24% from 2005 levels and may be 26% lower in 2016.[114]

This decline in emissions appears almost entirely attributable to the EU-ETS's LRF. As Zachmann observes, "As the number of allocated allowances is irresistibly declining by 37 million EU allowances (EUAs) each year, emissions will have to continue to decline."[115]

The LRF does fulfill one of the salutary objectives of cap and trade systems, at least in the short term, by ensuring a high degree of certitude in meeting emissions reductions targets. As Eden and others explain:

> By setting an absolute cap, the maximum quantity of emissions under an ETS is clearly defined. Although there are a range of economic, political and social factors that can influence emissions levels, the quantity-based approach of ETS ensures emissions remain at or below a specified limit across the covered sectors, as determined by the cap. Provided that ETS legislation is robust and stable over time, ETS therefore enables emissions reduction targets to be met with a high degree of certainty. By focusing on emissions reductions, the fixed cap of an ETS lends integrity to climate policy as the environmental outcome takes precedence.[116]

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112. LARRY PARKER, CONG. RESEARCH SERV., CLIMATE CHANGE: THE EUROPEAN UNION'S EMISSIONS TRADING SYSTEM (EU-ETS) 21 (July 31, 2006).

113. *See also* MARCU ET AL., *supra* note 2, at 4.

114. *Id.*; *see also* EUROSTAT STATISTICS EXPLAINED, EUROPE 2020 INDICATORS—CLIMATE CHANGE AND ENERGY 3 (2017). The Union's Effort Sharing Decision establishes binding targets for reduction of greenhouse emissions in sectors not regulated under the EU-ETS. Decision No 406/2009/EC of the European Parliament and of the Council of 23 April 2009 on the Effort of Member States To Reduce Their Greenhouse Gas Emissions To Meet the Community's Greenhouse Gas Emission Reduction Commitments Up to 2020, 2009 O.J. (L 140) 136. EU Member States are on track to reduce emissions by 10% in these sectors by 2020 compared to 2005 levels. The collective emission reductions between the EU-ETS and non-EU-ETS sectors put EU Member States on track to reduce their emissions by 14% below 2005 levels by 2020, equaling a 20% reduction from 1990 levels. *Id.*

115. Zachmann, *supra* note 3, at 2.

116. ALEXANDER EDEN ET AL., INT'L CARBON ACTION P'SHIP, BENEFITS OF EMISSIONS TRADING 10 (July 2016), https://icapcarbonaction.com/en/?option=com_attach&task=download&id=389; *see also* A. Danny Ellerman, Claudio Marcantonini, & Aleksandar Zaklan, *The*

However, if the only objective were to reduce emissions on a scheduled basis, it might be more salutary to employ a simpler performance-based command and control approach.[117] But the clear benefit of a cap and trade instrument is that it can, if engineered and operationalized correctly, capitalize on the allocative power of the market to effectuate emissions reductions at the lowest possible costs.[118] The EU-ETS's governing Directive embraces these objectives, emphasizing that the EU-ETS was enacted "to promote reductions of greenhouse gas emissions in a cost-effective and economically efficient manner."[119]

Cap and trade systems focus allowance holders on the options of either surrendering allowances commensurate with their emissions, or reducing emissions. This focus compels regulated entities to place a value on allowances that reflects the cost of emissions reductions that can be avoided by surrendering allowances.[120] This price signal, if adequate, can promote the development and deployment of innovative and transformational low-carbon technologies, fuel-switching, and substantial expenditures on energy efficiency.[121]

Unfortunately, the operation of the EU-ETS to date has proven disappointing. Indeed, several studies concluded that the EU-ETS contributed to emission abatement during Phase 1 of its implementation. Overall, these studies found emission abatement ranging between -2.5% and -5% for Phase 1,[122] with estimated abatement of greenhouse gas emissions between thirteen and 100 tons per year.[123]

European Union Emissions Trading System: Ten Years and Counting, 10 REV. ENVTL. ECON. & POL'Y 89, 97 (Winter 2016).

117. Joseph E. Aldy & Robert N. Stavins, *The Promise and Problems of Pricing Carbon: Theory and Experience*, 2 J. ENV'T & DEV. 152, 153 (2012).

118. *See* EDEN ET AL., *supra* note 116, at 3-4; OECD, ENVTL. DIRECTORATE, INTERACTIONS BETWEEN EMISSION TRADING SYSTEMS AND OTHER OVERLAPPING POLICY INSTRUMENTS 4 (2011), http://www.oecd.org/env/tools-evaluation/Interactions%20between%20Emission%20Trading%20Systems%20and%20Other%20Overlapping%20Policy%20Instruments.pdf; Carsten Helm, *International Emissions Trading with Endogenous Allowance Choices*, 87 J. PUB. ECON. 2737, 2737 (2003).

119. Directive 2009/29/EC, *supra* note 10, para. 1.

120. ALDY & STAVINS, *supra* note 117, at 157; Michael Grubb, *The European Emissions Trading Scheme: An Overview of Operation and Lessons*, 5(4) CESIFO DICE REP. 17, 17 (2007), http://www.cesifo-group.de/DocDL/dicereport407-forum4.pdf.

121. EDEN, *supra* note 118, at 15-18.

122. Frank Venmans, *A Literature-Based Multi-Criteria Evaluation of the EU ETS*, 16 RENEWABLE & SUSTAINABLE ENERGY REV. 5493, 5497 (2012); *see* Barry Anderson & Corrado Di Maria, *Abatement and Allocation in the Pilot Phase of the EU ETS*, 48 ENVTL. & RES. ECON. 83 (2011); Erik Delarue, Kris Voorspools & William D'Haeseleer, *Fuel Switching in the Electricity Sector Under the EU ETS: Review and Prospective*, 134 J. ENERGY ENG. 40 (2008); A. Denny Ellerman & Barbara K. Buchner, *The European Union Emissions Trading Scheme: Organs, Allocation, and Early Results*, 1 REV. ENVTL. ECON. & POL'Y 66, 87 (2007).

123. Venmans, *supra* note 122, at 5497.

However, the picture of EU-ETS effectiveness has not been nearly as propitious since then, as evidence of emissions abatement has been largely wanting in Phases 2 and 3.[124] Overall, Bel and Joseph attributed only 11.47% to 13.84% of the decline in greenhouse gas emissions that transpired in Phase 2 to the EU-ETS.[125]

In regard to the EU-ETS's specific role in driving fuel-switching, a 2012 study by Clò and Vendramin indicated that during the first seven years of operation, fuel-switching was only supported for eighty-five weeks, a period representing only 1.6% of verified emissions. Thus, the study concluded that the EU-ETS "failed to give any meaningful incentive to abate emissions."[126] Other analyses have indicated that EUA prices would need to rise to approximately twenty euros to drive fuel-switching in base-load power production from coal plants to modern gas plants.[127] By the end of Phase 2, the European Commission itself concluded that low allowance prices were leaving many gas plants idle and rendering the EU-ETS "increasingly less important" in its impact on investment decisions.[128] In fact, low allowance prices have driven *increases* in coal consumption in recent years in EU Member States, as several states are planning or constructing new coal-fired power plants at the outset of Phase 3.[129]

Moreover, fuel-switching can only be a relatively minor component of what will be necessary to ultimately de-carbonize the European economy. According to a recent study, while fuel-switching has the potential to reduce emissions by up to 300 million tons of carbon dioxide

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124. Frédéric Branger, Oskar Lecuyer & Philippe Quirion, *The European Union Emissions Trading Scheme: Should We Throw the Flagship Out with the Bathwater?*, 6 WIREs CLIMATE CHANGE 9, 10 (2014).

125. Germà Bel & Stephan Joseph, *Emission Abatement: Untangling the Impacts of the EU ETS and the Economic Crisis*, 49 ENERGY ECON. 531, 537 (2015); *see also* Frank Maarten & Jan Venmans, *The Effect of Allocation Above Emissions and Price Uncertainty on Abatement Investments Under the EU ETS*, 126 J. CLEANER PRODUCTION 595, 595 (2016).

126. Stephano Clò & Emanuele Vendramin, *Is the ETS Still the Best Option*, INSTITUTIO BRUNO LEONI SPECIAL REP., May 10, 2012, at 9; *see also* Jan Horst Keppler & Michel Cruciani, *Rents in the European Power Sector Due to Carbon Trading*, 36 ENERGY POL'Y 4280, 4285 (2010).

127. Haege Fjellheim, *How To Boost CO2 Prices in the European Carbon Market*, ENERGY POST (Dec. 22, 2016), http://energypost.eu/boost-co2-prices-european-carbon-market/; Damian Carrington, *EU Carbon Price Crashes to Record Low*, GUARDIAN (Jan. 24, 2013), https://www.theguardian.com/environment/2013/jan/24/eu-carbon-price-crash-record-low.

128. European Comm'n, *supra* note 50, at 11.

129. CLIMATE ACTION NETWORK EUROPE, ET AL., EU ETS AT A CROSSROADS: RECALIBRATING AN OVERSUPPLIED MARKET TO SPUR INVESTMENTS AND INNOVATION 1 (Jan. 2013); Michael Birnbaum, *Europe Consuming More Coal*, WASH. POST (Feb. 7, 2013), https://www.washingtonpost.com/world/europe-consuming-more-coal/2013/02/07/ec21026a-6bfe-11e2-bd36-c0fe61a205f6_story.html.

annually, this is only approximately 10% of what will be necessary to meet the EU's 2050 target of reducing emissions by 80% from 1990 levels.[130] There is increasing recognition of the importance of technological innovation to reduce greenhouse gas emissions.[131] Moreover, technological change is recognized as the primary contributor to dynamic cost efficiency,[132] one of the paramount objectives of the EU-ETS Directive.[133]

The European Commission identified the EU-ETS as "critical in driving a wide range of low carbon technologies into the market."[134] Emissions trading programs can provide an incentive for technological innovation. If sources of greenhouse gas emissions can reduce emissions cheaply through technological innovation, relative to other higher marginal abatement sources, regulated entities can sell excess allowances at whatever cost the market will bear.[135] Moreover, carbon-reducing technologies can help regulated entities avoid the purchase of expensive emissions credits.[136]

Unfortunately, the anemic price signals in the EU-ETS market are proving wholly inadequate to effectuate low and no-carbon technological transformation in Europe. During Phase 2, a survey of investors revealed that less than 10% believed that the EU-ETS was sending a price signal strong enough to incentivize a shift from high to low carbon investments.[137] Another study concluded that a mere 2% of post-2005 patents could be attributed to the EU-ETS, "suggest[ing] that the System so far has had at best a very limited impact on the overall pace and

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130. Raphael Calel & Antoine Dechezleprêtre, *Environmental Policy and Directed Technological Change: Evidence from the European Carbon Market*, 98 REV. ECON. & STAT. 173, 176 (2016).

131. Sarah M. Jordaan et al., *The Role of Energy Technology Innovation in Reducing Greenhouse Gas Emissions: A Case Study of Canada*, 78 RENEWABLE & SUSTAINABLE ENERGY REV. 1397, 1397 (2017); *see* Michael Grubb, *Technology Innovation and Climate Change Policy: An Overview of Issues and Options*, 41 KEIO ECON. STUDIES 103 (2004).

132. Venmans, *supra* note 122, at 5503; *see also* Margaret R. Taylor, *Innovation Under Cap-and-Trade Programs*, 109 PNAS 4804, 4804 (2012).

133. Directive 2009/29/EC, *supra* note 10, para. 1.

134. *European Commission Communications from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions*, at 6, COM (2011) 112 final (Mar. 8, 2011).

135. Taylor, *supra* note 132, at 4804.

136. Xiangsheng Dou, *Low Carbon Technology Innovation, Carbon Emissions Trading and Relevant Policy Support for China's Low Carbon Economy Development*, 7 INT'L J. ENERGY ECON. & POL'Y 172, 179-80 (2017).

137. EMMANUEL GUÉRIN & THOMAS SPENCER, IDDRI, STRENGTHENING THE EUROPEAN UNION CLIMATE AND ENERGY PACKAGE (Oct. 2011), http://www.iaea.org/inis/collection/NCLCollectionStore/_Public/43/035/43035206.pdf.

direction of technological change."[138] However, Muûls and others have argued that the impact of the EU-ETS might be greater, concluding that the EU-ETS has resulted in an 8.1% increase in patenting by regulated companies.[139] At the same time, another recent study also suggested that patent trends may not be a reliable proxy for assessing technological innovation. Martin and others drawing upon responses from facility managers commenting on process and product innovations, concluded that there was no significant difference between firms regulated under the EU-ETS and non-EU-ETS firms.[140]

Either way, it is also clear that the number of patents for low carbon technologies has fallen constantly during the course of the past four years, a trend that tracks the dynamic of carbon prices in Europe.[141] The EU's Energy Commissioner also concluded that allowance prices of approximately six euros are not sufficient to transform the continent's energy system.[142] Similarly, even Ellerman, one of the EU-ETS's most fulsome supporters, concluded that "current prices do not seem likely to lead to the kind of technological transformation that would greatly reduce Europe's reliance on fossil fuels."[143]

Chronically low carbon prices in the short to medium term may result in regulated entities continuing to invest in carbon-intensive capital stocks.[144] Moreover, weak price signals may result in so-called "carbon lock-in," "leading investors to commit to high carbon assets that future Governments may be reluctant to render uneconomic."[145] The weak price

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138. Calel & Dechezleprêtre, *supra* note 130, at 174; *see also* CORP. EUROPE OBSERVATORY ET AL., EU ETS MYTH BUSTING: WHY IT CAN'T BE REFORMED AND SHOULDN'T BE REPLICATED 8 (Apr. 2013), https://corporateeurope.org/sites/default/files/publications/eu_ets_myths.pdf.

139. MIRABELLE MUÛLS ET AL., IMPERIAL COLL. LONDON, GRANTHAM INST. BRIEFING PAPER NO 21, EVALUATING THE EU EMISSIONS TRADING SYSTEM: TAKE IT OR LEAVE IT? AN ASSESSMENT OF THE DATA AFTER TEN YEARS 8 (Oct. 2016), https://www.imperial.ac.uk/media/imperial-college/grantham-institute/public/publications/briefing-papers/Evaluating-the-EU-emissions-trading-system_Grantham-BP-21_web.pdf.

140. Ralf Martin, Mirabelle Muûls & Ulrich J. Wagner, *The Impact of the European Union Emissions Trading Scheme on Regulated Firms: What Is the Evidence after Ten Years?*, 10 REV. ENVTL. ECON. & POL'Y 129, 141 (2016).

141. MARCU ET AL., *supra* note 2, at 10.

142. Sonja van Renssen, *The Fate of the EU Carbon Market Hangs in the Balance*, EUR. ENERGY REV. (Apr. 12, 2012), http://www.eurelectric.org/media/34186/2012_04_12_eer_-_the_fate_of_eu_carbon_market_hangs_in_the_balance.pdf.

143. Ellerman et al., *supra* note 116, at 103.

144. Oliver Sartor, *The EU ETS Carbon Price: To Intervene or Not Intervene?*, 12 CLIMATE BRIEF (CDC Climat Research, Paris, Fr.), Feb. 2012, http://www.cdcclimat.com/IMG/pdf/12-02_climate_brief_12_-_the_eu_ets_carbon_price_-_to_intervene_or_not_to_intervene.pdf.

145. EUROPEAN CLIMATE FOUNDATION, FROM ROADMAPS TO REALITY 15 (2013), https://europeanclimate.org/wp-content/uploads/2014/11/From-Roadmaps-to-Reality.pdf. The

signal anticipated through 2020 may suggest that the EU faces a "lost decade."[146] Thus, while the EU emissions cap will likely be met *de facto*, "the short-term investments in low carbon technologies and infrastructure necessary to reach the EU long-term goal of reducing emissions by at least 80% by 2050 at acceptable costs will be delayed."[147]

Additionally, while carbon lock-in may result in much lower costs for regulated entities in the short term, in the long term the induced path of abatement in the EU-ETS will ultimately effectuate the cap in an "unnecessarily expensive way."[148] Higher costs will ensue because the costs associated with emissions reduction measures are anticipated to be lower if requisite long-term investments transpire earlier.[149]

Beyond the fact that carbon lock-in would obviate the EU's goal to ensure cost-effective and dynamically efficient outcomes, it might also imperil the Union's long-term goals of reducing emissions by 80% by 2050.[150] If mitigation costs escalate in ensuing decades due to carbon lock-in, regulated entities may seek to exert political pressure to water down future emissions reductions mandates.[151] Indeed, there is empirical evidence of reneger from climate commitments in other jurisdictions.[152] Moreover, the EU's 80% reduction goal could easily be weakened in the future, since it is merely aspirational at this point.[153]

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risk of technological lock-in is particularly strong in the energy sector. Low operating costs create powerful incentives for opting to simply update operations rather than moving to zero-carbon options. Joshua Meltzer, *A Carbon Tax as a Driver of Green Technology Innovation and the Implications for International Trade*, 35 ENERGY L.J. 45, 50 (2014).

146. GUÉRIN & SPENCER, *supra* note 137.

147. *Id.*; *see also* J.J. DE SÉPIBUS, SWISS NAT'L CTR. OF COMPETENCE IN RESEARCH, NCCR TRADE REGULATION, WORKING PAPER NO. 2008/18, LINKING THE EU EMISSIONS TRADING SCHEME TO JI, CDM AND POST-2012 INTERNATIONAL OFFSETS 2 (2008).

148. STEPHEN W. SALANT, RES. FOR THE FUTURE, WHAT AILS THE EUROPEAN UNION'S EMISSIONS TRADING SYSTEM? 2 (June 2015), http://www.rff.org/files/sharepoint/WorkImages/Download/RFF-DP-15-30.pdf; *see also* Paul Lehmann & Erik Gawel, *Why Should Support Electricity Complement the EU Emissions Trading Scheme?*, 52 ENERGY POL'Y 597, 602 (2013); Knopf & Edenhofer, *supra* note 75.

149. European Comm'n, *Commission Staff Working Document—Accompanying the Document Proposal for a Decision of the European Parliament and of the Council Concerning the Establishment and Operation of a Market Stability Reserve for the Union Greenhouse Gas Emission Trading Scheme and Amending Directive 2003/87/EC*, at 9, SWD (2014) 17 final; Sartor, *supra* note 144, at 3.

150. Calel & Dechezleprêtre, *supra* note 130.

151. CTR. FOR CLEAN AIR POLICY-EUROPE, THE NEW DEAL: AN ENLIGHTENED POLICY FOR THE EU THROUGH STRUCTURAL EU ETS REFORM 10 (2013), http://ccap.org/assets/The-New-Deal-An-Enlightened-Industrial-Policy-for-the-EU-through-Structural-EU-ETS-Reform_CCAP-Europe_Feb-2013.pdf.

152. ACWORTH, *supra* note 26, at 3-4.

153. Thomas Spencer & Emmanuel Guérin, *Time To Reform the EU Emissions Trading Scheme*, ELEKTOR (Jan. 23, 2012), https://www.elektormagazine.com/news/Time-to-reform-the-EU-Emission-Trading-Scheme.

Finally, the EU-ETS has been plagued by highly volatile allowance prices throughout its operation. During Phase 1, EUA prices reached almost thirty euros in April 2006 but were down to only six euros by the end of the year.[154] EUA prices further plummeted to a low of 0.03 euros by the end of Phase 1.[155] In Phase 2, prices recovered to almost thirty euros again in 2008 but were down to fifteen euros in 2009, and then plummeted further to around four euros at the outset of Phase 3.[156] Future prices have also experienced severe volatility.[157]

Some price volatility is inevitable in markets of this nature as they adjust to changing information.[158] However, the excessive amounts of volatility that have characterized the EU-ETS to date can undermine investments in decarbonization by making it difficult to ascertain the price trajectory of allowances, which can result in delays or cancellation of investments.[159] Moreover, price volatility can have adverse impacts on climate finance because price swings can reduce the value of climate change assistance by adversely affecting the level and composition of investment.[160]

VI. THE WAY FORWARD?

At this point, the European Commission's effusive praise for the EU-ETS as the EU's "flagship tool for tackling climate change and an effective instrument to cut emissions cost effectively"[161] strains credulity in the face of compelling evidence that it has done little to reduce

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154. SUSTAINABLE PROSPERITY, A CARBON BANK: MANAGING VOLATILITY IN A CAP-AND-TRADE SYSTEM 4 (Aug. 2011), http://institute.smartprosperity.ca/sites/default/files/publications/files/A%20Carbon%20Bank.pdf.

155. FRIENDS OF THE EARTH EUROPE, THE EU EMISSIONS TRADING SYSTEM: FAILING TO DELIVER 4 (Oct. 2010).

156. MUÛLS ET AL., *supra* note 139, at 5.

157. Gilbert E. Mecalf, *Designing a Carbon Tax To Reduce U.S. Greenhouse Gas Emissions*, 3 REV. ENVTL. ECON. & POL'Y 63, 77 (2009).

158. SUSTAINABLE PROSPERITY, *supra* note 154, at 4.

159. Simone Borghesi & Massimiliano Montini, *The European Emission Trading System: Flashing Lights, Dark Shadows and Future Prospects for Global ETS Cooperation* 5 (Transworld, Working Paper 26, May 2013), http://www.transworld-fp7.eu/wp-content/uploads/2013/05/TW_WP_26.pdf; Michael LaBelle, *Constructing Post-Carbon Institutions: Assessing EU Carbon Reduction Efforts Through an Institutional Risk Governance Approach*, 40 ENERGY POL'Y 390, 398 (2012); SUSTAINABLE PROSPERITY, *supra* note 154, at 4.

160. Abigail Jones, Nigel Purvis & Cecilia Springer, *Trading Up: The Case for an International Carbon Market Reserve To Reduce Volatility at the Limits in 2020 and Beyond* 7 (Brookings Glob. Econ. & Dev., Working Paper 63, Dec. 2013), https://www.brookings.edu/wp-content/uploads/2016/06/Trading-Up_WebReady3.pdf.

161. European Comm'n, *Report from the Commission to the European Parliament and the Council: Report on the Functioning of the European Carbon Market*, at 34, COM (2017) 48 final (Jan. 2, 2017).

emissions to date and is unlikely to drive critical innovation in the future. If the EU-ETS is to remain a viable instrument, there may be a need for reforms that go beyond the ones described above. The alternative for many European countries seeking to fulfill their Paris Agreement commitments might be unilateral national policies. This could ultimately increase costs for regulated entities and create competitive distortions in the internal market.[162]

Among the options that are currently being discussed to enhance the effectiveness of the EU-ETS to meet its objectives are establishment of a price floor and ceiling for EUAs, establishment of a central authority to regulate the supply of EUAs, and a variety of other proposals.

Both the European Commission, as well as a number of commentators, have suggested the possibility of imposing a floor on EUA prices,[163] while some experts have suggested establishment of both a floor and ceiling,[164] the latter of which might guard against positive demand shocks.[165] A price floor could establish a price trajectory that would drive emissions reductions that comport with future EU targets.[166] Moreover, a floor could send a better price signal to investors, driving the development and adoption of transformative technologies.[167] A price

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162. INT'L EMISSIONS TRADING ASS'N, THE MARKET STABILITY RESERVE: WHERE ARE WE WITH THE REFORM OF THE EU ETS? 2 (July 3, 2015), http://www.ieta.org/resources/EU/2030-Package/MSR_Market_Stability_Reserve/The_Market_Stability_Reserve-where_are_we_with_the_reform_of_the_EU_ETS_july2015.pdf; *see also* OSCAR REYES, CORP. EUROPE OBSERVATORY, LIFE BEYOND EMISSIONS TRADING 1 (Jan. 2014), https://corporateeurope.org/sites/default/files/attachments/life_beyond_ets_web.pdf. For example, in 2013, the U.K. established a carbon price floor of £18 per ton of carbon from 2016-2017 until 2019-2020, citing the objective of driving increased investment in low-carbon power generation. U.K., HM REVENUE & CUSTOMS, CARBON PRICE FLOOR: REFORM AND OTHER TECHNICAL AMENDMENTS (2013), https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/293849/TIIN_6002_7047_carbon_price_floor_and_other_technical_amendments.pdf.

163. European Comm'n, *Report from the Commission to the European Parliament and the Council: The State of the European Carbon Market in 2012*, at 10, COM (2012) 652 final (Nov. 14, 2012); Benoit Leguet, *The EU ETS, a Good Example of "Zombie" Public Policy*, TENDANCES CARBONE (CDC Climat Research, Paris, Fr.), May 2013, https://www.i4ce.org/wp-core/wp-content/uploads/2015/09/Tendances-Carbone-CDC-Climat-Research-n%C2%B080-VENG.pdf; EDENHOFER ET AL., *supra* note 57, at 17.

164. Knopf, *supra* note 75; SUSTAINABLE PROSPERITY, *supra* note 154, at 8.

165. EDENHOFER ET AL., *supra* note 57, at 24; Dallas Burtraw, Karen Palmer & Danny Kahn, *A Symmetric Safety Valve*, 38 ENERGY POL'Y 4921 (2010).

166. INT'L CARBON ACTION P'SHIP, *supra* note 13, at 8; Severin Borenstein, *Fixing a Major Flaw in Cap-and-Trade*, ENERGY INST. BLOG (Aug. 15, 2016), https://energyathaas.wordpress.com/2016/08/15/fixing-a-major-flaw-in-cap-and-trade/. One study estimated that a price floor could reduce emission by 5% below a Reference Scenario. PBL NETH. ENVTL. ASSESSMENT AGENCY, *supra* note 51, at 10.

167. INT'L CARBON ACTION P'SHIP, *supra* note 13, at 8; PBL NETH. ENVTL. ASSESSMENT AGENCY, *supra* note 51, at 8; Corjan Brink, Herman R.J. Vollebergh & Edwin van der Werf,

floor could be established through a number of different mechanisms, including establishing an EUA auction reserve price or variable complementary tax to the EU-ETS.[168]

However, there are several potential political barriers to implementing such a proposal. Perhaps the most serious question is whether it would be politically viable to set the price floor at the level that experts believe would be necessary to drive emissions reductions and technological intervention—a floor approaching forty euros or more by 2030.[169] Conversely, if the price was set too low to be triggered, the floor would not meet its objective.[170] Additionally, a price floor could be construed as a "tax," under EU law, thereby requiring agreement by all Member States under its unanimity rule for all fiscal measures.[171] As indicated in the first part of this Article, this consideration scuttled the European Commission's proposal for a carbon energy tax in the 1990s.[172] There is also concern that a price floor could increase the economic burden on businesses during a recession, since allowance prices would remain higher than they otherwise would under reduced-demand conditions.[173]

Commentators have made a number of proposals in recent years to establish an independent entity within the EU-ETS to adjust the supply of allowances similar to the way that the Federal Reserve system in the United States manages the money supply.[174] The EU would need to determine the potential scope of authority of such an entity. The approach could be fairly restrictive, with an independent agency operating within a predefined mandate established by the EU. Alternatively, the approach could be more permissive, whereby the EU

Carbon Pricing in the EU: Evaluation of Different EU ETS Reform Options, 97 ENERGY POL'Y 603, 613 (2016).

168. Brink, Vollebergh & van der Werf, *supra* note 167, at 613.

169. EDENHOFER ET AL., *supra* note 57, at 24; JOCHEN DIEKMANN, UNWELT BUNDESAMT, EU EMISSIONS TRADING: THE NEED FOR CAP ADJUSTMENT IN RESPONSE TO EXTERNAL SHOCKS AND UNEXPECTED DEVELOPMENTS? 30 (Feb. 2013), https://www.umweltbundesamt.de/sites/default/files/medien/461/publikationen/4399.pdf (electricity producers and industrial companies have rejected the concept of minimum allowance prices).

170. European Comm'n, *supra* note 163, at 10.

171. EDENHOFER ET AL., *supra* note 57, at 27; *Unanimity*, EUR-LEX, http://eur-lex.europa.eu/summary/glossary/unanimity.html (last visited Oct. 12, 2017).

172. Burns, *supra* note 1, at 193.

173. MARK ANDOR, MANUEL FRONDEL & STEPHAN SOMMER, RWI POSITIONEN, THE RIGHT WAY TO REFORM THE EU EMISSIONS TRADING SYSTEM 11 (May 28, 2015), http://www.rwi-essen.de/media/content/pages/publikationen/rwi-positionen/rwi-position_65_eu_emissions_trading_system.pdf.

174. Sartor, *supra* note 144, at 7.

would relinquish most decisional powers to the entity, including full control over caps and prices.[175]

Among other proposals were former British Prime Minister Gordon Brown's call for the establishment of an independent European Carbon Bank,[176] and de Perthuis's and Trotignon's proposal for an Independent Carbon Management Authority.[177] This institutional arrangement could entrust the bank with the authority to manage and adjust the long-term supply of allowances and timing of auctions in the shorter term.[178] Proponents suggest that such an institution could ensure that short-term EUA prices are concordant with the long-term target.[179] Also, control of such decisions by an independent entity might create more stable expectations about how decisions are made,[180] which could help drive investments in low carbon technologies.[181]

However, this approach would also pose challenges. It is unclear if such a bank could be established by legislation or would require other changes in EU law,[182] the latter of which might substantially extend the potential timeline for implementation. Perhaps, more fundamentally, it is unclear if politicians would be willing to delegate substantial authority to an entity on a matter with such potentially salient political implications.[183] Additionally, some experts question whether regulators will necessarily be more adept than the market at ascertaining the "right" carbon price for an optimal long-term price trajectory.[184]

There also are a number of other options that might ultimately help strengthen the EU-ETS. These include, but are not limited to, the launch of an EU political process to send long-term price signals, the expansion of sectors regulated under the EU-ETS, and the auction of allowance

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175. GROSJEAN ET AL., *supra* note 17, at 24.

176. CHRISTIAN EGENHOFER ET AL., CTR. FOR EUROPEAN POLICY STUDIES, THE EU EMISSIONS TRADING SYSTEM AND CLIMATE POLICY TOWARDS 2050, 23 (2011), http://observgo.uquebec.ca/observgo/fichiers/88303_The%20EU%20ETS%20and%20Climate%20Policy%20towards%202050-5.pdf.

177. Christian de Perthuis & Raphael Trotignon, *Governance of CO2 Markets: Lessons from the EU ETS*, 75 ENERGY POL'Y 100, 101 (2014).

178. Ottmar Edenhofer, *Reforming Emissions Trading*, 4 NATURE CLIMATE CHANGE 663, 664 (2014).

179. Nicholas Koch et al., *Causes of the EU ETS Price Drop: Recession, CDM, Renewable Policies or a Bit of Everything?*, 73 ENERGY POL'Y 676, 684 (2014).

180. *Id.*

181. At the same time, excessive adjustments in prices in supplies or prices could adversely impact investor confidence. Ying Fang et al., *What Policy Adjustments in the EU ETS Truly Affected the Carbon Prices?*, 103 ENERGY POL'Y 145, 157 (2017).

182. EGENHOFER ET AL., *supra* note 176, at 24; GROSJEAN ET AL., *supra* note 17, at 28.

183. Edenhofer, *supra* note 178, at 664.

184. Sartor, *supra* note 144, at 4.

price guarantees. The establishment of political measures to send precise and credible long-term price signals could help create an "investment grade" framework to drive decarbonization of the European economy.[185] This could include, for example, precise definition of long-term oriented climate and energy objectives, and perhaps a multi-year rolling emissions cap.[186] The European Commission has suggested potentially expanding the purview of the EU-ETS to encompass other energy-related sectors.[187] The Commission suggests that this approach might be salutary given increased use of electricity, gas, and biomass in other energy-related sectors.[188] Moreover, expansion into transport, household, and other fuel consumption sectors could help stabilize EU-ETS prices, as well as reduce dependency of carbon leakage-prone sectors.[189] Finally, expansion of the regulatory scope of the EU-ETS might reduce the political power of emissions-intensive industries as burden shifting becomes more explicit.[190]

On the other hand, these sectors face high average abatement costs and are prone to market failure, which could imperil EU-ETS price signals.[191] There also might be substantial political resistance to this proposal in many Member States given the implications for household incomes and energy poverty.[192]

The European Investment Bank, which provides finance and expertise to support sustainable investment projects,[193] could engage in the auctioning of guarantees on future emission allowance prices.[194] This

185. Spencer & Guérin, *supra* note 153.

186. *Id.*

187. European Comm'n, *supra* note 161, at 9.

188. *Id.* at 9.

189. Berghmans, *supra* note 27, at 6. Moreover, one recent study indicates that regulating transportation emissions in the EU through the EU-ETS would be a much more economically efficient approach compared to performance standards. Sergey Paltsev et al., *Reducing CO2 from Cars in the European Union*, TRANSP. 18 (Oct. 20, 2016), https://link.springer.com/content/pdf/10.1007%2Fs11116-016-9741-3.pdf. *But see* LARS ZETTERBERG ET AL., MISTRA INDIGO, EUROPE'S CHOICE—FACTS AND FUNCTION OF THE EU EMISSIONS TRADING SYSTEM 27 (May 2014), http://www.ivl.se/download/18.343dc99d14e8bb0f58b52a1/1443177288965/EU+ETS+rapport.pdf (including transport in EU-ETS "would increase the allowance price in an uncontrolled way").

190. Yue-June Zhang & Yi-Ming Wei, *An Overview of Current Research on EU ETS: Evidence from Its Operating Mechanism and Economic Effect*, 87 APPLIED ENERGY 1804, 1807 (2010).

191. Berghmans, *supra* note 27, at 6.

192. *Id.*

193. *The EU Bank*, EUR. INV. BANK, http://www.eib.org/about/index.htm (last visited Oct. 14, 2017).

194. Zachmann, *supra* note 3, at 1.

could reduce risks for developers of low-carbon investments and stabilize prices until broader reforms are effectuated in the system.[195]

Alternatively, some policymakers and commentators have suggested scrapping the EU-ETS entirely and opting for a carbon tax.[196] Supporters of this approach contend, *inter alia*, that a carbon tax could more efficiently drive diffusion of low-carbon technologies, lower administrative costs of climate regulatory systems, provide revenue for Member States, and enhance harmonization of prices between different sectors.[197] While it is beyond the scope of this Article to discuss the potential benefits and risks associated with this approach, it should be emphasized, as above, that the Commission was unable to persuade its Member States to accept this approach in the 1990s, and it is unclear why the political landscape has changed radically since then.

VII. CONCLUSIONS

The EU-ETS remains the foundation of Europe's efforts to address climate change. Unfortunately, its operation to date has been characterized by a frustrating lack of effectiveness in meeting key objectives. Moreover, this situation may worsen in the longer term as "low hanging fruit" for reducing emissions give way to the need for more costly and expansive solutions. If the EU is to fulfill its obligations to the world community to meet its reasonable obligations to reduce emissions and derive the benefits of serving as a role model on climate issues,[198] it must fortify the EU-ETS, or choose to take a different route to de-carbonize its economy. The next few years may prove critical in determining the EU's political will to make this happen.

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195. *Id.*

196. CLÓ & VENDRAMIN, *supra* note 126, at 1-36; Ben Schiller, *Europe's CO2 Trading Scheme: Is it Time for a Major Overhaul?*, YALE ENV'T 360 (Apr. 28, 2011), http://e360.yale.edu/features/europes_co2_trading_scheme_is_it_time_for_a_major_overhaul.

197. CLÓ & VENDRAMIN, *supra* note 126, at 14-15; FRIENDS OF THE EARTH EUROPE, *supra* note 155, at 12-13; Mark Muro & Jonathan Rothwell, *Cut To Invest: Institute a Modest Carbon Tax To Reduce Carbon Emissions, Finance Clean Energy, Technology Development, Cut Taxes, and Reduce the Deficit*, at 1-9, REMAKING FEDERALISM, RENEWING ECON. (Nov. 2012), https://www.brookings.edu/wp-content/uploads/2016/06/13-carbon-tax.pdf.

198. *Climate Change—Driving Forces*, *supra* note 7, at 8.