

Endnotes

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- ⁶ *Id.*
- ⁷ *Id.*
- ⁸ Will Steffen et al., *Planetary Boundaries: Guiding Human Development on a Changing Planet*, SCIENCE, Feb. 13, 2015, at 1, <https://science.sciencemag.org/content/347/6223/1259855?intcmp=trendmd-sci>.
- ⁹ See *infra* Part I.
- ¹⁰ See *infra* Part II.
- ¹¹ See *infra* Part III.
- ¹² See *infra* Part IV.
- ¹³ See *infra* Part V.
- ¹⁴ Case Concerning the Gabčíkovo-Nagymaros Project (Hung. v. Slov.), Judgment, 1997 I.C.J. Rep. 7, 88, 95 (Sept. 25) (separate opinion by Weeramantry, J.), <https://www.icj-cij.org/files/case-related/92/092-19970925-JUD-01-03-EN.pdf>.
- ¹⁵ In the Arbitration Regarding the Iron Rhine Railway (Belg. v. Neth.), 27 R.I.A.A. 35, 66, ¶ 59 (Perm. Ct. Arb. 2005), https://legal.un.org/riaa/cases/vol_XXVII/35-125.pdf.
- ¹⁶ U.N. Conference on Environment and Development, *Rio Declaration on Environment and Development*, U.N. Doc. A. CONF.151/26/Rev.1 (Vol. I), annex I, Principle 2 (Aug. 12, 1992), https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A_CONF.151_26_Vol.I_Declaration.pdf [hereinafter *Rio Declaration*].
- ¹⁷ See, e.g., *Rio Declaration*, *supra* note 16, Principle 7 (describing states have “common but differentiated responsibilities”); Convention on Biological Diversity, preamble, June 5, 1992, 1760 U.N.T.S. 79, https://treaties.un.org/doc/Treaties/1992/06/19920605%2008-44%20PM/Ch_XXVII_08p.pdf (highlighting the “conservation of biological diversity is a common concern of humankind”).
- ¹⁸ See generally Andreas Føllesdal, *Sustainable Development, State Sovereignty and International Justice*, in TOWARDS SUSTAINABLE DEVELOPMENT 70-83 (1999); Stephen C. McCaffrey, *Keynote: Sustainability and Sovereignty in the 21st Century*, 41 DENV. J. INT’L L. & POL’Y 507 (2012); Stephen Sec, *Humanitarian Limits to Sovereignty: Common Concern and Common Heritage Approaches to Natural Resources and Environment*, 12 INT’L COMMUNITY L. REV. 361 (2010).
- ¹⁹ See *Rio Declaration*, *supra* note 16, at Principle 2.
- ²⁰ Draft Global Pact for the Environment, art. 3, June 24, 2017, <https://globalpactenvironment.org/uploads/White-paper-Global-pact-for-the-environment.pdf>.
- ²¹ See *infra* Part II.
- ²² See Dom Phillips, *Bolsonaro Declares ‘The Amazon is Ours’ and Calls Deforestation Data ‘Lies’*, THE GUARDIAN (July 19, 2019, 5:00 PM), <https://www.theguardian.com/world/2019/jul/19/jair-bolsonaro-brazil-amazon-rainforest-deforestation> (last visited Mar. 21, 2020) (“We understand the importance of the Amazon for the world - but the Amazon is ours.”); Adrianna Rodrigues, *Amazon Rainforest Fire a ‘Crisis’, Macron Says, But Brazil Pushes Back: What We Know*, USA TODAY (Aug. 25, 2019), <https://www.usatoday.com/story/news/world/2019/08/23/amazon-rainforest-fire-international-crisis-emmanuel-macron-says/2093574001/> (last visited Mar. 21, 2020).
- ²³ See DAVID HUNTER, ET AL., INTERNATIONAL ENVIRONMENTAL LAW & POLICY 133-88 (5th ed. 2015) (summarizing the history of the three most recent summits addressing sustainable development).
- ²⁴ Antonio La Viña, et al, *The Outcomes of Johannesburg: Assessing the World Summit on Sustainable Development*, 23 SAIS REV. 53-70 (2003) (analyzing the positive and the negative results of the WSSD).
- ²⁵ *Id.* at 59–60 (including the Sustainable Agriculture and Rural Development Partnership Initiative, which brought together governments and civil organizations to support sustainable agriculture and rural development, and the Water Sanitation and Hygiene for All Initiative, a multilateral commitment between governments, NGOs and corporations to provide safe, affordable water and sanitation access to rural and urban areas).
- ²⁶ See discussion *infra* Part III B.
- ²⁷ U. N. ENV’T PROGRAMME, AGENDA ITEM 5: “STOCKHOLM + 50” – AN OPPORTUNITY TO CONSIDER A NEW LONG-TERM VISION FOR THE GLOBAL ENVIRONMENTAL AGENDA IN THE CONTEXT OF THE 2030 AGENDA (2018), https://papersmart.unon.org/resolution/uploads/5_discussion_paper_stockholm_50_and_vision.pdf.
- ²⁸ *Id.*
- ²⁹ Dominique Vidalon, “France’s Macron to Back Push for Global Environment Rights Pact” REUTERS (June 24, 2017, 12:48 PM), <https://www.reuters.com/article/us-world-climatechange-macron-idUSKBN19F0LG> (last visited Apr. 12, 2020); President Emmanuel Macron, Address at the Summit for the Global Pact for the Environment (Sept. 19, 2017) (transcript available on France’s Ministry for Europe and Foreign Affairs website); see Draft Global Pact for the Environment, *supra* note 20.
- ³⁰ U.N. CONFERENCE ON ENV’T AND DEV., *Agenda 21*, U.N. Doc. A/CONF.151/4 (1992), <https://sustainabledevelopment.un.org/content/documents/Agenda21.pdf>.
- ³¹ *Id.*
- ³² Stakeholder Forum for a Sustainable Future, *Review of Implementation of Agenda 21 and the Rio Principles: Synthesis* (2012), https://sustainabledevelopment.un.org/content/documents/641Synthesis_report_Web.pdf.
- ³³ *Id.* at 13–14 (noting that funding arrangements were not delivered as promised and that developing nations are pursuing developed countries’ unsustainable models of development, increasing pressure on the planet and its resources).
- ³⁴ See discussion *infra* Part III B.
- ³⁵ Writing in anticipation of Rio +5 in 1997, Professor John Dernbach concluded that “[d]espite all the promises and lofty rhetoric, the Earth Summit . . . had little discernible effect on U.S. law and policy.” Although President Clinton appointed a Council on Sustainable Development, few of its recommendations would be implemented. John Dernbach, *U.S. Adherence to its Agenda 21 Commitments: A Five-Year Review*, 27 ENVTL. L. REP. 10504 (1997). Has the situation in the United States changed since the Dernbach analysis in 1997? See also JOHN DERNBACH, ED., STUMBLING TOWARD SUSTAINABILITY (2002) (analyzing U.S. implementation ten years after Rio and concluding that the U.S. has made some progress but has failed to respond to the seriousness of the problem or take advantage of the opportunities presented by sustainable development despite having the legal and policy tools to do so).
- ³⁶ G.A. Res. 55/2, Millennium Declaration (Sept. 18, 2000) [hereinafter *Millennium Declaration*].
- ³⁷ Kofi A. Annan, Secretary-General, *Foreword to THE MILLENNIUM DEV. GOALS REP.* (2005), <https://unstats.un.org/unsd/mi/pdf/MDG%20Book.pdf>.
- ³⁸ *Id.*
- ³⁹ The 2002 World Summit on Sustainable Development would identify additional sustainable goals, including to halve the number of people without access to sanitation and to achieve maximum sustainable yields of fisheries, both by 2015. Similarly, the Parties to the Biodiversity Convention adopted the so-called Aichi Targets on Biodiversity Conservation in 2010, many of which reflected the 2015 target date.
- ⁴⁰ The governments’ commitment to setting new goals was set out in the outcome document of the U.N. Conference on Sustainable Development (Rio +20). G.A. Res. 66/288, ¶ 247, annex, *The Future We Want*, (Sept. 11, 2012) [hereinafter *The Future We Want*].
- ⁴¹ G.A. Res. 70/1, Transforming our World: The 2030 Agenda for Sustainable Development (Sept. 25, 2015) [hereinafter *The 2030 Agenda*].
- ⁴² *Id.* at ¶ 55.
- ⁴³ See Work of the Statistical Commission pertaining to the 2030 Agenda for Sustainable Development, A/Res/71/313, at 10-11 (July 10, 2017); see also United Nations, *E-Handbook for Sustainable Development Goal Indicators* (2019).
- ⁴⁴ Sharmila Murthy, *Translating Legal Norms into Quantitative Indicators: Lessons from the Global Water, Sanitation, and Hygiene Sector*, 42 WM & MARY ENVTL. L. & POL’Y REV. 385 (2012).
- ⁴⁵ See *infra* Part IV.
- ⁴⁶ See *infra* Part III B.
- ⁴⁷ See G.A. Res. 47/191, at 2 (Jan. 29, 1993); see also About the CSD, <https://sustainabledevelopment.un.org/intergovernmental/csd/about> (last visited March 21, 2020).
- ⁴⁸ *The Future We Want*, *supra* note 40, at ¶ 84.
- ⁴⁹ *Id.* at ¶ 84–85.
- ⁵⁰ See Format and Organizational Aspects of the High-Level Political Forum on Sustainable Development, A/Res/67/290 (Aug. 23, 2013); see also

High-Level Political Forum on Sustainable Development, U.N. Sustainable Dev. Goals: Knowledge Platform, <https://sustainabledevelopment.un.org/hlpf> (last visited March 24, 2020).

⁵¹ *The 2030 Agenda*, *supra* note 41, at ¶ 79 (encouraging member states to “conduct regular and inclusive reviews of progress at the national and sub-national levels, which are country-led and country-driven”).

⁵² *Id.* at ¶ 84.

⁵³ Sharmila Murthy, *supra* note 44.

⁵⁴ *Id.*

⁵⁵ See generally WALTER MAATLI & NGAIRE WOODS, *THE POLITICS OF GLOBAL REGULATION* (2009).

⁵⁶ *The Future We Want*, *supra* note 40, at ¶ 283.

⁵⁷ See generally <https://sustainabledevelopment.un.org/rio20> (last visited March 22, 2020).

⁵⁸ See <https://sustainabledevelopment.un.org/partnerships> (last visited March 22, 2020).

⁵⁹ *Id.*

⁶⁰ For more on contextual accountability, see David B. Hunter, *Contextual Accountability, the World Bank Inspection Panel, and the Transformation of International Law* in Edith Brown Weiss’s *Kaleidoscopic World*, forthcoming 32 GEO. ENVTL. L. REV. (Spring 2020).

⁶¹ *The Future We Want*, *supra* note 40, at ¶ 283.

ENDNOTES: TRANSBOUNDARY AIR POLLUTION IN NORTHEAST ASIA: TWO PATHWAYS FORWARD FOR CHINA AND SOUTH KOREA *continued from page 12*

³ Social activism and public pressure can create strong incentives for governments to show that they are working to combat air pollution, but they might also have existing binding and nonbinding legal obligations to do so. Since the 1972 Stockholm Declaration, governments around the world have adopted international instruments that arguably reflect a human right to a clean environment although public international law has not yet recognized this right. See DAVID HUNTER ET AL., *INTERNATIONAL ENVIRONMENTAL LAW AND POLICY* 141, 434 (5th ed. 2015). The Stockholm Declaration emphasized “the importance of integrating environment and development, *reducing or eliminating pollution*, and controlling the use of renewable and non-renewable resources.” (emphasis added). *Id.* at 141. Many countries have also written a human right to a clean environment into their own constitutions (e.g., South Africa, Portugal, Brazil, and Turkey). *Id.* at 1345.

⁴ *Ultrafine Dust Rising to ‘Very Bad’ Levels in Seoul*, YONHAP NEWS (Dec. 10, 2019), <https://en.yna.co.kr/view/AEN20191210002100315>; Kai Schultz & Suhasini Raj, *New Delhi, Choking on Toxic Air, Declares a Health Emergency*, N.Y. TIMES (Nov. 1, 2019), <https://www.nytimes.com/2019/11/01/world/asia/delhi-pollution-health-emergency.html>; Hannah Beech, *Bangkok Is Choking on Air Pollution. The Response? Water Cannons*, N.Y. TIMES (Jan. 31, 2019), <https://www.nytimes.com/2019/01/30/world/asia/pollution-thailand-bangkok.html>.

⁵ See Hunter, *supra* note 3, at 102 (describing how the current global economic system is biased against environmental protection).

⁶ 3 R.I.A.A. 1905 (Apr. 15, 1935).

⁷ See Henry Fountain, *Calculating Air Pollution’s Death Toll, Across State Lines*, N.Y. TIMES (Feb. 12, 2020), <https://www.nytimes.com/2020/02/12/climate/air-pollution-health.html> (demonstrating that nearly half of the premature deaths caused by air pollution between 2005 and 2018 were from pollutants from sources in other states).

⁸ *Trail Smelter Case* (United States v. Canada), 3 R.I.A.A. 1905, 1916, 1964 (Apr. 15, 1935), https://legal.un.org/riaa/cases/vol_III/1905-1982.pdf (highlighting the importance of preventing the mill from causing future environmental damage to Washington State).

⁹ See *id.* at 1917 (noting that the apple growers whose trees had been damaged asked the United States government to seek damages on their behalf); see also Hunter, *supra* note 3, at 511.

¹⁰ In 1927, the U.S. and Canada referred the transboundary pollution dispute to the International Joint Commission (IJC), which was created by the Boundary Waters Treaty of 1909. See Hunter, *supra* note 3, at 511; Treaty Between the United States and Great Britain Relating to the Boundary Waters and Questions Arising Along the Boundary between the United States and Canada, U.S.-U.K., Jan. 11, 1909, 36 Stat. 2448, https://legacyfiles.ijc.org/tiny_mce/uploaded/Boundary%20Waters%20Treaty%20of%201909_3.pdf.

¹¹ See Hunter, *supra* note 3, at 473 (describing how the *Trail Smelter* Tribunal’s decision eventually led to Principle 21 of the 1972 Stockholm Declaration, a principle widely viewed to reflect customary international law: “States have . . . the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.”) (quoting U.N. Conference on the Human Environment, *Declaration of the United Nations Conference on the Human Environment*, U.N. Doc.A/CONF.48/14 (June 16, 1972)).

¹² See S. KOR. METEOROLOGICAL ADMIN., KOREA METEOROLOGICAL ADMINISTRATION, 21, (2018), http://www.kma.go.kr/download_01/2018english.

pdf (increasing desertification in northern China creates “yellow dust,” or dust and fine sand particles which are carried by the wind, and is affecting South Korea more frequently and at higher concentrations than ever before); see also Laura S. Henry et al., *From Smelter Fumes to Silk Road Winds: Exploring Responses to Transboundary Air Pollution over South Korea*, 11 WASH. U. GLOBAL STUD. L. REV. 565, 567 (2012), https://openscholarship.wustl.edu/cgi/viewcontent.cgi?article=1413&context=law_globalstudies (discussing types of transboundary pollutants that affect South Korea).

¹³ S. KOR. METEOROLOGICAL ADMIN., KOREA METEOROLOGICAL ADMINISTRATION, 21, 25, (2018), http://www.kma.go.kr/download_01/2018english.pdf (recommending carrying a mask when Asian Dust forecasts are high).

¹⁴ Henry, *supra* note 12, at 568.

¹⁵ Matthew A. Shapiro & Toby Bolsen, *Transboundary Air Pollution in South Korea: An Analysis of Media Frames and Public Attitudes and Behavior*, E. ASIAN COMMUNITY REV. 107, 110 (2018) (citing a 2016 study).

¹⁶ See Minbeob [Civil Act], Act. No. 471, Feb. 22, 1958, art. 750 (S. Kor.) (Definition of Torts); Henry, *supra* note 12, at 606 (showing a sufficient probability that the tort created the harm is enough to recover).

¹⁷ See *Trail Smelter Case* (United States v. Canada), 3 R.I.A.A. 1948, 1960 (1941), https://legal.un.org/riaa/cases/vol_III/1905-1982.pdf (ruling that damages should be held in a trust for affected persons to claim).

¹⁸ Seoul Central District Court [Dist. Ct.], 2007Ga-Hap16309, Feb. 3, 2010 (S. Kor.), <http://www.law.go.kr/precSc.do?tabMenuId=tab67§ion=&eventGubun=060101&query=16309#licPrec192339>; see also Supreme Court, 2011Da7437, Sept. 4, 2014 (S. Kor.), http://library.scourt.go.kr/SCLIB_data/decision/2011Da7437.htm (affirmed).

¹⁹ Seoul Central District Court [Dist. Ct.], 2007Ga-Hap16309, Feb. 3, 2010 (S. Kor.); Henry, *supra* note 12, at 606; see also, Sinseob Kang et al., *Victory for local automakers in vehicle emissions lawsuit*, SHIN&KIM (2010), http://www.shinkim.com/newsletter/201003/eng_214.html (outlining the automakers’ litigation strategy and legal arguments).

²⁰ Seoul Central District Court [Dist. Ct.], 2007Ga-Hap16309, Feb. 3, 2010 (1, 66) (S. Kor.).

²¹ See Henry, *supra* note 12, at 60 (requiring reciprocity discourages foreign plaintiffs from bringing suit). https://openscholarship.wustl.edu/cgi/viewcontent.cgi?article=1413&context=law_globalstudies.

²² Zhonghua Renmin Gongheguo Minshi Susong Fa (中华人民共和国民事诉讼法) [Civil Procedure Law] (promulgated by the Standing Comm. Nat’l People’s Cong., March 8, 1982, effective Oct. 1, 1982), art. 282 (China) (providing that a Chinese court may refuse to execute a judgment when doing so would contradict Chinese law or violate state sovereignty, security, or public interest); Minsa sosong beob [Civil Procedure Act], Act No. 217, Feb. 22, 1958, *amended by* Act No. 14193, Mar. 29, 2016, art. 217, ¶ 1 (S. Kor.) (requiring recognition of the rendering court, proper service of process, consistency with Korean law, and reciprocity for the judgment of a foreign court to be executed by a Korean court).

²³ See *Hilton v. Guyot*, 159 U.S. 113, 163–64, 210 (1895) (explaining a lack of reciprocity is a “distinct and independent ground” to not grant “comity,” or “the recognition which one nation allows within its territory to the legislative, executive or judicial acts or another nation.”); see also Antonio F. Perez, *The International Recognition of Judgments: The Debate Between Private and Public Law Solutions*, 19 BERKELEY J. INT’L L. 44, 58–59 (2001) (explaining that a reciprocity agreement does not automatically give effect to either the rendering country or the enforcing country’s judgments).

²⁴ Henry et al., *supra* note 12, at 607 (noting Korea and China's preference for diplomatic preference to address transboundary pollution issues and avoidance of utilizing each other's judicial systems because of the strict reciprocity requirements).

²⁵ Zhonghua Renmin Gongheguo Minshi Susong Fa (中华人民共和国行政诉讼法) [Civil Procedure Law] (promulgated by the Standing Comm. Nat'l People's Cong., March 8, 1982, effective Oct. 1, 1982), art. 282 (China).

²⁶ The *Trail Smelter* Tribunal was successful because both parties consented to the Convention of Ottawa and the Tribunal's ultimate findings and the U.S. was able to present the Tribunal with enough scientific evidence to conclusively prove causation. See *Trail Smelter* (United States v. Canada), 3 R.I.A.A. 1905, 1923–24 (Ottawa Con. 1941) (utilizing meteorological data on air currents to determine concentrations of Sulphur dioxide emitted from the smelter); Convention for Damages Resulting from Operation of Smelter at Trail, British Columbia, U.K.-U.S., art. 12, Apr. 15, 1935, T.S. No. 893.

²⁷ Seoul Central District Court [Dist. Ct.], 2007Ga-Hap16309, Feb. 3, 2010, 43–44 (S. Kor.), [http://www.law.go.kr/%ED%8C%90%EB%A1%80/\(2007%EA%B0%80%ED%95%A916309](http://www.law.go.kr/%ED%8C%90%EB%A1%80/(2007%EA%B0%80%ED%95%A916309) (examining epidemiological studies to determine the extent to which external air pollution can lead to increased incidences of asthma and finding through these studies that such evidence is relatively weak, and that indoor air quality is a more accurate indicator of asthma risk); *Trail Smelter*, 3 R.I.A.A. at 1923–24 (relying on scientific data and monitoring of Sulphur dioxide emissions from the smelter in order to determine causation and damages).

²⁸ See Chung Min-Jung, *International Law-Related Resolutions of the 20th National Assembly with a Focus on Territorial Sovereignty and International Environmental Law*, 6 S. KOR. Y.B. INT'L L. 313, 317 (2018) (recommending the South Korean parliament shift its non-confrontational approach towards China and transboundary air pollution).

²⁹ See, e.g., Henry et al., *supra* note 12, at 569 (finding that while China and South Korea participate in multilateral environmental frameworks, both are reluctant to adhere to binding emissions limits).

³⁰ See Chung, *supra* note 28.

³¹ See Jonathan Iversen, *Transboundary Air Pollution: Moving Toward International Consensus*, 13 COLO. J. INT'L ENVTL. L. & POL'Y 161, 169 (2002) (noting recognition by the United States that Canadian coal-fired plants are responsible for transboundary air pollution, and that these plants need to switch to natural gas in order to reduce emissions in a manner consistent with the Ozone Annex).

³² See JOINT RESEARCH PROJECT FOR LONG-RANGE TRANSBOUNDARY AIR POLLUTANTS IN NORTHEAST ASIA, *Summary Report of the 4th stage (2013–2017) LTP Project* 8 (2019), <http://www.craes.cn/xxgk/zxwx/201911/W020191120811776781324.pdf> (concluding that China accounts for 32% of South Korea's ultrafine dust and 25% of Japan's ultrafine dust, whereas Japan and South Korea's contribution to pollution in China is 1% and 2% respectively).

³³ See Kim Yeon-Joo & Lee Eun-Joo, *More Than 30% of Ultra Fine Dust in S. Korea Came From China: Tripartite Study*, PULSE BY MAEIL BUS. NEWS KOREA (Nov. 20, 2019), at 1–2 <https://pulseneews.co.kr/view.php?year=2019&no=965314> (explaining the research by the Joint Research Project for Long-range Transboundary Pollutants in Northeast Asia).

³⁴ The Convention on Environmental Impact Assessment in a Transboundary Context (“Espoo Convention”), Sept. 10, 1997, 1989 U.N.T.S. 309, 309–11 (noting EIA procedures of Espoo Convention apply to certain activities that are likely to cause a significant adverse transboundary impact).

³⁵ See, e.g., CORMAC CULLINAN, *INTEGRATED COASTAL MANAGEMENT LAW: ESTABLISHING AND STRENGTHENING NATIONAL LEGAL FRAMEWORKS FOR INTEGRATED COASTAL MANAGEMENT* 50 (2006) (The duty to prevent, reduce, and control transboundary harm appears in various treaties and state parties may be required to fulfill this obligation by “employing best practical means at disposal, and in accordance with their capabilities, or best practicable means at their disposal or best environmental practice and best available technology.”).

³⁶ John H. Knox, *The Myth and Reality of Transboundary Environmental Impact Assessment*, 96 AM. J. INT'L L. 291, 293 (2002) (highlighting the difficulties and drawbacks of Principle 21).

³⁷ Neil Craik & Timo Koivurova, *Subsidiary Decision Making under the Espoo Convention: Legal Status and Legitimacy*, 20 REV. EUR. COMP. & INT'L ENVTL. L. 258, 260 (2011) (explaining the Espoo Regime Structure).

³⁸ See Jason Morrison & Naomi Roht-Arriaza, *Private and Quasi-Private Standard Setting*, in THE OXFORD HANDBOOK OF INTERNATIONAL ENVIRONMENTAL LAW 1 (David Bodansky et al. eds., 2008) (“This article examines who creates private and quasi-private standards and why”); see also Michael P. Vandenbergh, *Private Environmental Governance*, 99 CORNELL L. REV. 129, 147–60 (2013) (explaining that examples of private standard-setting include green building standards, Marine Stewardship Council, equator principles, and forest certification schemes).

³⁹ See *Ultrafine Dust in Seoul, Beijing Has Similar Ingredients: Report*, YONHAP NEWS (Jan. 22, 2020), at 1, <https://en.yna.co.kr/view/AEN20200122003600315> (“Ultrafine dust in the capitals of South Korea and China is made up of similar components, most coming from automotive emissions and coal power plants.”).

⁴⁰ Yulia Yamineva & Seita Romppanen, *Is Law Failing to Address Air Pollution? Reflections on International and EU Developments*, 26 REV. EUR. COMP. & INT'L ENVTL. L. 189, 198 (2017) (citing the various alternatives to addressing air pollution).

⁴¹ Min-Jung Chung, *International Law-Related Resolutions of the 20th National Assembly with a Focus on Territorial Sovereignty and International Environmental Law*, in 6 S. KOR. Y.B. OF INT'L L. 313, 317 (2018).

ENDNOTES: SPLITTING CANADA'S NORTHERN STRATEGY: IS IT POLAR POLICY MANIA? *continued from page 16*

³³ See Lloyd Axworthy, *Address at the Inauguration of the Arctic Council*, HOUSE OF COMMONS (Sept. 19, 1996), https://www.ourcommons.ca/Content/archives/committee/352/fore/reports/07_1997-04/chap3-e.html (discussing various entities with a stake in the Arctic).

³⁴ See, e.g., Adam Stepień & Timo Koivurova, *Arctic Europe: Bringing together the EU Arctic Policy and Nordic cooperation*, ARCTIC CTR. OF THE U. OF LAPLAND (2017), <https://lauda.ulapland.fi/bitstream/handle/10024/62766/Koivurova.Timo.pdf?sequence=2&isAllowed=y> (discussing the EU's interest in the Arctic).

³⁵ See André Gattolin & Damien Degeorges, *High geopolitics in the High North: A call for a deeper EU engagement*, EURACTIV (Dec. 17, 2019), <https://www.euractiv.com/section/arctic-agenda/opinion/high-geopolitics-in-the-high-north-a-call-for-a-deeper-eu-engagement/> (demonstrating the EU referencing the Arctic).

³⁶ See RONALD O'ROURKE ET AL., CONG. RESEARCH SERV., R41153, CHANGES IN THE ARCTIC: BACKGROUND AND ISSUES FOR CONGRESS 55 (2018).

³⁷ See SECRETARIAT OF THE ANTARCTIC TREATY, <https://www.ats.aq/e/antarctic.html> (last visited Feb. 28, 2020) (noting that there are now fifty-four parties to the Antarctic Treaty); ANTARCTIC AND SOUTHERN ARCTIC COALITION, <https://www.asoc.org/advocacy/antarctic-governance/overview-of-antarctic-governance>. (last visited Feb. 28, 2020).

³⁸ Thomas Omestad, *Global Warming Triggers an International Race for the Arctic*, U.S. NEWS & WORLD REPORTS (Oct. 9, 2008),

<http://www.usnews.com/articles/news/world/2008/10/09/global-warming-triggers-an-international-race-for-the-arctic/photos/#1>.

³⁹ See GOVERNMENTS OF YUKON, NORTHWEST TERRITORIES AND NUUNAVUT, *DEVELOPING A NEW FRAMEWORK FOR SOVEREIGNTY AND SECURITY IN THE NORTH*, 8–9 (Apr. 2005), http://www.gov.yk.ca/news/pdf/sovereignty_and_security_in_the_north.pdf.

⁴⁰ See *id.*

⁴¹ See University of Helsinki, *Research gaps in environmental science disciplines across the Arctic*, SCIENCE DAILY (Jan. 2, 2020), <https://www.sciencedaily.com/releases/2020/01/200102143437.htm> (“To understand these changes, field measurements that adequately represent environmental variation across the Arctic as a whole are crucial.”).

⁴² See Elisabeth Rosenthal, *Race Is On as Ice Melt Reveals Arctic Treasures*, N.Y. TIMES (Sept. 18, 2012), <https://www.nytimes.com/2012/09/19/science/earth/arctic-resources-exposed-by-warming-set-off-competition.html>.

⁴³ See Greer, *supra* note 11.

⁴⁴ See Jim Bell, *supra* note 12.

⁴⁵ See *id.*; see also Greer, *supra* note 11.

⁴⁶ See Michael Levitt, *Nation-Building At Home, Vigilance Abroad: Preparing For The Coming Decades In The Arctic: Report of the Standing Committee on Foreign Affairs and International Development*, HOUSE OF COMMONS, 42nd Parliament, 1st Session (Apr. 2019) at 21, <https://www.ourcommons.ca/Content/Committee/421/FAAE/Reports/RP10411277/faaerp24/faaerp24-e.pdf>.

- ⁷ See generally Nunavut Land Claims Agreement, Tunngavik Fed'n of Nunavut-Can., May 25, 1993, <https://gov.nu.ca/sites/default/files/files/013%20-%20Nunavut-Land-Claims-Agreement-English.pdf> (giving the Inuit control over the Nunavut territory).
- ⁸ See Thomas R. Berger, *Conciliator's Final Report: Nunavut Land Claims Agreement Implementation Planning Contract Negotiations for the Second Planning Period*, CROWN-INDIGENOUS RELATIONS AND N. AFFAIRS CAN. (Mar. 1, 2016), <https://www.rcaanc-cirnac.gc.ca/eng/1100100030982/1542915160660?wbdisable=true>.
- ⁹ Nick Murray, *As Nunavut turns 20, where is it on Inuit hiring goals?*, CBC (Apr. 9, 2019), <https://www.cbc.ca/news/canada/north/article-23-nunavut-inuit-employment-1.5084889>.
- ¹⁰ DEPARTMENT OF EXECUTIVE AND INTERGOVERNMENTAL AFFAIRS - NUNAVUT BUREAU OF STATISTICS: CANADA'S POPULATION ESTIMATES, THIRD QUARTER 2019 (PRELIMINARY) (Jan. 8, 2020), https://www.gov.nu.ca/sites/default/files/nunavut_and_canada_population_estimates_statsupdate_third_quarter_2019.pdf (showing the official population estimates for Nunavut).
- ¹¹ NUNAVUT DEP'T OF EXEC. & INTERGOVERNMENTAL AFFAIRS, NUNAVUT INFRASTRUCTURE: BUILDING OUR INFRASTRUCTURE, <https://gov.nu.ca/eia/documents/nunavut-infrastructure> (last visited Jan. 24, 2020).
- ¹² NUNAVUT WILDLIFE MANAGEMENT BOARD, NUNAVUT MAPS, <https://www.nwmb.com/en/139-english/sidebars/environment/110-nunavut-maps>.
- ¹³ WIKIPEDIA (last visited Jan. 24, 2020) https://upload.wikimedia.org/wikipedia/commons/a/aa/SSI_Micro_Nunavut.jpg.
- ¹⁴ William B. Henderson, *Indigenous Self-Government in Canada* (Feb. 7, 2006), <https://www.thecanadianencyclopedia.ca/en/article/aboriginal-self-government>.
- ¹⁵ Constitution Act, 1982, *being* Schedule B to the Canada Act, 1982 (U.K.) at § 35; *see also* Section 35 of the Constitution Act 1982, Indigenous Corp. Training Inc. (Sept. 21, 2014), <https://www.ictinc.ca/blog/section-35-of-the-constitution-act-1982>.
- ¹⁶ Hayden King & Shiri Pasternak, *Canada's Emerging Indigenous Rights Framework: A Critical Analysis*, YELLOWHEAD INST. (June 5, 2018), <https://yellowheadinstitute.org/rightsframework/>.
- ¹⁷ *Nunavut Economic Development Strategy: Building a Foundation for the Future*, THE SIVUMMUT ECON. DEV. STRATEGY GRP. (June 2003), <https://nni.gov.nu.ca/sites/nni.gov.nu.ca/files/09nedsE.pdf>.
- ¹⁸ *Study on Addressing the Infrastructure Needs of Northern Aboriginal Communities*, CTR. FOR THE N. AT THE CONFERENCE BD. OF CAN. (2014), <http://www.naadb-cndea.com/reports/northern-infrastructure-report.pdf>.
- ¹⁹ See *Departmental Plan 2019-20* CROWN-INDIGENOUS REL. AND N. AFFAIRS CANADA, <https://www.rcaanc-cirnac.gc.ca/eng/1553021710453/1553021765428> (stating how CIRNA will support First Nations).
- ²⁰ See generally, *Nunavut Region*, INDIGENOUS AND N. AFFAIRS, GOV'T CAN., <https://www.aadnc-aandc.gc.ca/eng/1100100027774/1100100027775> (explaining the NRO).
- ²¹ See generally, *Backgrounder – Nunavut Land Claims Agreement & Settlement Agreement*, GOV'T CAN. (May 4, 2015), <https://www.canada.ca/en/news/archive/2015/05/backgrounder-nunavut-land-claims-agreement-settlement-agreement.html> (describing the Nunavut Land Claims Agreement).
- ²² John Higginbotham, *Nunavut and the New Arctic*, 27 CIGI POLICY BRIEF, July 2013, at 1, <https://www.cigionline.org/sites/default/files/no27.pdf> (exploring the Nunavut's unique social and economic situation).
- ²³ *The North*, NAT. RES. CAN., <https://www.nrcan.gc.ca/earth-sciences/geography/atlas-canada/selected-thematic-maps/16886> ("Canada's north is a vast area, the three territories alone, Nunavut, Yukon and Northwest Territories, encompass approximately 40% of the total area of Canada. . . The presence of permafrost is just one of many ways of demarcating the northern region of Canada, as it provides a natural boundary between northern and southern Canada.")
- ²⁴ See generally *Departmental Plan 2019-20*, *supra* note 19 (expounding that the mission of the Crown-Indigenous Relations and Northern Affairs is to assist the government of Northern First Peoples).
- ²⁵ See generally Michael Levitt, *Nation-Building At Home, Vigilance Abroad: Preparing For The Coming Decades In The Arctic: Report of the Standing Committee on Foreign Affairs and International Development*, HOUSE OF COMMONS, 42nd Parliament, 1st Session (Apr. 2019), <https://www.ourcommons.ca/Content/Committee/421/FAAE/Reports/RP10411277/faaerp24/faaerp24-e.pdf>.
- ²⁶ See *Departments and Agencies*, GOV'T CAN., <https://www.canada.ca/en/government/dept.html> (listing all of the Canadian agencies).
- ²⁷ See *Arctic and Northern Policy Framework*, *supra* note 2.
- ²⁸ See *Arctic and Northern Policy Framework*, *supra* note 2.
- ²⁹ See *Government of Canada Launches Co-Developed Arctic and Northern Policy Framework*, CROWN-INDIGENOUS REL. AND N. AFFAIRS CANADA (Sept. 10, 2019), <https://www.canada.ca/en/crown-indigenous-relations-northern-affairs/news/2019/09/the-government-of-canada-launches-co-developed-arctic-and-northern-policy-framework.html>.
- ³⁰ See *Inuit-Crown Partnership Committee Advances Agenda*, INUIT TAPIRIIT KANATAMI (May 18, 2017), <https://www.itk.ca/inuit-crown-partnership-committee-advances-agenda/> ("The Inuit Nunangat Declaration was signed by ministers of the Government of Canada and the leadership of Inuit Tapiriit Kanatami, the Inuvialuit Regional Corporation, Makivik Corporation, the Nunatsiavut Government, and Nunavut Tunngavik Incorporated as partners in the creation of prosperity for Inuit which benefits all Canadians.").
- ³¹ See Constitution Act, 1982, *being* Schedule B to the Canada Act, 1982 (U.K.) at §§ 91, 92, 30, 31.
- ³² See Levitt, *supra* note 25 at 34.
- ³³ See *Self-Government*, CROWN-INDIGENOUS RELATIONS AND N. AFFAIRS CAN., <https://www.rcaanc-cirnac.gc.ca/eng/1100100032275/1529354547314>.
- ³⁴ See *4 Economic Challenges Facing the Government of Nunavut*, OTUS GRP. (June 1, 2017), <https://www.otusgroup.com/nunavut-economic-challenges/>.
- ³⁵ See John Talberth, *Sustainable Development Opportunities in Nunavut*, SUSTAINABLE ECON. (Feb. 20, 2018), <https://sustainable-economy.org/sustainable-development-opportunities-nunavut/>.
- ³⁶ See *Circumpolar Affairs*, DEP'T OF EXECUTIVE AND INTERGOVERNMENTAL AFF., <https://www.gov.nu.ca/eia/information/circumpolar-affairs> (last visited Jan. 24, 2020).
- ³⁷ See Mary Simon, *A New Shared Arctic Leadership Model*, CROWN-INDIGENOUS RELATIONS AND N. AFFAIRS CAN. (Mar. 2017), <https://www.rcaanc-cirnac.gc.ca/eng/1492708558500/1537886544718>.

ENDNOTES: CLIMATE GENTRIFICATION: AN IMMINENT THREAT TO OCEANFRONT CITIES *continued from page 21*

- ²⁰ Harris, *supra* note 6.
- ²¹ Myungshik Choi et al., *Can Community Land Trusts Slow Gentrification?*, HOUS. ALL. OF PA. (Sept. 27, 2017), <https://www.tandfonline.com/doi/abs/10.1080/07352166.2017.1362318?journalCode=uja20&> (describing how CLT's build assets in neighborhoods and lead to increased diversity).
- ²² Derek Hyra, *Commentary: Causes and Consequences of Gentrification and the Future of Equitable Development Policy*, 18 CITYSCAPE: J. POL'Y DEV. & RES. 171, 171 (2016) (contemplating the reasons that millennials are moving into previously low-income areas).
- ²³ *Id.* at 173 (linking displacement of low-income residents to a lack of representation in their neighborhoods after gentrification).
- ²⁴ Natalie Delgadillo, *D.C. is Being Sued for Gentrifying. Here's What to Know about the Case*, DCIST (Jun. 15, 2018, 10:18 AM), <https://dcist.com/story/18/06/15/dc-is-being-sued-for-gentrifying-he/> (describing a 2018 class action lawsuit filed against Washington, D.C. alleging that the city implemented discriminatory policies favoring millennials and disadvantaging residents of the city's historically African American community).
- ²⁵ 947 F.3d 1159, 1175 (9th Cir. 2020) (holding that the political branches, rather than the courts, must be responsible for addressing climate change).
- ²⁶ *Id.* at 1165.
- ²⁷ *Id.* at 1166.
- ²⁸ *Id.* at 1172 (stating that the plaintiffs' requests require the judiciary to pass judgement on policymaking).
- ²⁹ *Id.* (reasoning that the complexity and long-lasting nature of climate change makes it more suitable for legislative branches to confront it).
- ³⁰ *Id.* at 1168.
- ³¹ See *Lujan v. Defenders of Wildlife*, 504 U.S. 555, 560 (1992) (holding that an injury must be concrete, particularized, and actual for a court to address it).
- ³² See Adja Popovich, Livia Albeck-Ripka & Kendra Pierre-Louis, 95 *Environmental Rules Being Rolled Back Under Trump*, N.Y. TIMES (Dec. 21, 2019), <https://www.nytimes.com/interactive/2019/climate/trump-environment-rollbacks.html> (demonstrating the various ways that the government has been choosing policies that harm the environment).

ENDNOTES: A SILVER BULLET: COULD DATA LINKING URBAN HEAT ISLANDS TO HOUSING DISCRIMINATION CURTAIL ENVIRONMENTAL RACISM? *continued from page 23*

evidence test solely on the plaintiff in order to show possible disparate impact and proceed to discovery).

²⁷ Albert Huang, *Environmental Justice and Title VI of the Civil Rights Act: A Critical Crossroads*, A.B.A. (March 1, 2012), https://www.americanbar.org/groups/environment_energy_resources/publications/trends/2011_12/march_april/environmental_justice_title_vi_civil_rights_act/.

²⁸ *Evaluation of the EPA Office of Civil Rights*, DELOITTE CONSULTING LLP 1, 19 (2011), <https://www.documentcloud.org/documents/723416-epa-ocr-audit.html>.

²⁹ See Vann R. Newkirk, II, *Fighting Environmental Racism in North Carolina*, NEW YORKER (Jan. 16, 2016), <https://www.newyorker.com/news/news-desk/fighting-environmental-racism-in-north-carolina> (discussing how a historically Black community outside of Chapel Hill, NC has struggled since the 1970's to limit pollution from a nearby landfill).

³⁰ See Moshman, *supra* note 14, at 16; see also Press Release, Senator Kamala Harris, Harris, Ocasio-Cortez Announce Landmark Legislation to

Ensure Green New Deal Lifts Up Every Community (July 29, 2019), <https://www.harris.senate.gov/news/press-releases/harris-ocasio-cortez-announce-landmark-legislation-to-ensure-green-new-deal-lifts-up-every-community>.

³¹ See e.g., Affirmatively Furthering Fair Housing, 80 Fed. Reg. 42272 (2015) (to be codified at 24 C.F.R. pts. 5, 91, 92, 570, 574, 576, 903) (requiring grantees to conduct impact assessments that examine whether there are any housing patterns or practices that promote bias based on any protected class under the Fair Housing Act and to create a plan for rectifying fair housing barriers); Affirmatively Furthering Fair Housing, 85 Fed. Reg. 2041 (Jan. 14, 2020) (to be codified in 24 C.F.R. 5, 91, 92, 570, 574, 576, 903, and 905) (requiring grantees to continue to conduct an impact analysis but removing barriers considered burdensome to some grantees such as public housing agencies as well as HUD to measure segregation levels or to fully account for impact on FHA protected classes).

ENDNOTES: A SILVER BULLET: COULD DATA LINKING URBAN HEAT ISLANDS TO HOUSING DISCRIMINATION CURTAIL ENVIRONMENTAL RACISM? *continued from page 30*

(2002) [hereinafter Customer Choice Hearing] (statement of Dale Feste, President, Dale Feste Automotive).

¹⁷ See 42 U.S.C. § 7522(a)(3) (1998).

¹⁸ 371 F. Supp. 381 (M.D. Fla. 1974).

¹⁹ See *id.* at 384–85 (holding that an act done knowingly is done both voluntarily and intentionally and not by “mistake or accident” pursuant to the statutory language).

²⁰ 762 F. Supp. 1242 (E.D. Va. 1991).

²¹ See *id.* at 1245 (concluding that the House Committee on Interstate and Foreign Commerce endorsed the term “knowingly” given by the court in *Haney Chevrolet*).

²² See *id.* at 1243 (stating that Economy Muffler employees installed two-way converters instead of three-way converters, which are not in compliance with EPA emission control standards).

²³ See *id.* (concluding that Economy Muffler regularly received Clean Air Act compliance notifications containing the details related to converter installation). See generally *Haney Chevrolet*, 371 F. Supp. at 384–85 (holding that the dealer was liable for “knowingly” rendering the vehicle noncompliant and then releasing it from his custody).

²⁴ See *Econ. Muffler & Tire Ctr. Inc.*, 762 F. Supp. at 1245.

²⁵ *Id.*

²⁶ See Andrew P. Morriss, Bruce Yandle & Andrew Dorchak, *Regulating by Litigation: The EPA's Regulation of Heavy-Duty Diesel Engines*, 56 ADMIN. L. REV. 403, 407 (2004) (defining regulation by litigation as a “[m]eans of imposing substantive regulatory provisions on regulated entities without the public participation and the checks and balances of the rulemaking process”).

²⁷ See *In re Volkswagen “Clean Diesel” Litigation*, 2017 WL 66281, at *3 (N.D. Cal. Jan. 4, 2017) (holding that Volkswagen is subject to \$18 billion in penalty fines for emissions non-compliance violations).

²⁸ See *EPA Settle with Derive Systems Over Aftermarket Emissions Defeat Devices in Vehicles*, DEP’T OF JUST. (Sept. 24, 2018) [hereinafter EPA Settlement], <https://www.justice.gov/opa/pr/departament-justice-epa-settle-derive-systems-over-aftermarket-emissions-defeat-devices> (stating that the Court held Derive liable for \$6.25 million after selling engine software and parts under the names “Bully Dog” and “SCT” to defeat emissions control systems in vehicles and trucks).

²⁹ See generally Costas Paris, *JPMorgan Says Shipping Loans Will Go Only to Clean Vessels*, WALL STREET J. (Sept. 10, 2019 2:11 PM), <https://www.wsj.com/articles/j-p-morgan-says-shipping-loans-will-go-only-to-clean-vessels-11568139086> (stating that shipping capital for marine vessels will be granted based on compliance with new U.N.-directed International Marine Organization global emissions regulations extending to 2050).

³⁰ See *In re Jackson v. Gen. Motors Corp.*, 770 F. Supp. 2d 570, 576 (S.D.N.Y. 2011) (holding that plaintiff’s state negligence and products liability claims regarding failure to warn of dangers associated with diesel exhaust fumes were dismissed because the Clean Air Act preempts claims related to the control of emissions).

³¹ See *Counts v. Gen. Motors, LLC*, 237 F. Supp. 3d 572, 600–01 (E.D. Mich. 2017) (holding that GM actively concealed and was in a superior position to know of the defeat device).

³² *Id.*

³³ *Id.* at 588.

³⁴ See *id.* (emphasizing that plaintiffs’ suit does not attempt to enforce emissions standards and the court will not allow federal legislation to encroach on established state law).

³⁵ See *Engine Mfrs. Ass’n v. EPA*, 88 F.3d 1075, 1080 (D.C. Cir. 1996) (stating that Congress extended federal regulation under Title II to include nonroad pollution sources and changed the definition of manufacturer to include the assembling of nonroad engines and nonroad vehicles).

³⁶ See S. Rep. No. 105-190, at 8 (1998) (stating that “[c]opyright owners will hesitate to make their works readily available on the Internet without reasonable assurance that they will be protected against massive piracy”).

³⁷ See Karyn Temple Claggett, U.S. Copyright Office, Report of the Register of Copyrights: Section 1201 of Title 17, at 45 (2017) (explaining that the point of the provision was to provide a federal prohibition against descrambling or decrypting which is not technically an infringement of a copyright owner’s exclusive rights under § 106, but harms the value of the work).

³⁸ See *id.* at 8 (“[A] technological measure effectively controls access to a work. . . [i]n the ordinary course of operation.”). See generally 17 U.S.C. § 1201(a)(3)(A) (1998) (“[T]o ‘circumvent a technological measure’ means to descramble a scrambled work, to decrypt an encrypted work, or otherwise to avoid, bypass, remove, deactivate, or impair . . . to gain access to the work.”).

³⁹ See S. Rep. No. 105-190, at 1–2, 32–33 (1998) (defining the DMCA’s purpose as facilitating the development of electronic commerce in the digital age).

⁴⁰ See Claggett, *supra* note 37, at 22 (explaining that the House Commerce Committee recognized that the public’s ability to access and use copyrighted materials is crucial to economic, social, and educational vitality).

⁴¹ Claggett, *supra* note 37, at 23.

⁴² See Claggett, *supra* note 37, at 23 (providing that “The [House] Manager’s Amendment, among other things, changed the biennial proceeding to a triennial one”).

⁴³ 101 U.S. 99 (1879).

⁴⁴ See *id.* at 100–01 (the system of book-keeping cannot be within the scope of copyright protection because it is not Selden’s exclusive right).

⁴⁵ See *id.* at 103 (“[T]he copyright of a book on perspective, no matter how many drawings and illustrations it may contain, gives no exclusive right to the modes of drawing described . . . [t]hose illustrations are mere language employed by the author to convey his ideas more clearly.”).

⁴⁶ See *id.* at 105 (noting the use of an art is different from a book explaining it and cannot be secured by copyright).

⁴⁷ See 17 U.S.C. § 102(b) (2002) (“[I]n no case does copyright protection for an original work of authorship extend to any idea, procedure, process, system, or method of operation . . .”). See generally H.R. Rep. No. 94-1476

at 57 reprinted in 1976 U.S.C.C.A.N 5659, 5670 (stating that the scope of copyright protections under § 102(b) as applied to software does not include the methodology or processes used by the programming in writing the code).

⁴⁸ See *Oracle Am., Inc. v. Google Inc.*, 750 F.3d 1339, 1347 (Fed. Cir. 2014) (holding that the lower court erred in finding certain parts of code outside of copyright protection as a method of operation under § 102(b)); see also *Comp. Assocs. Int'l, Inc. v. Altai, Inc.*, 982 F.2d 693, 704–05 (2d Cir. 1992) (finding that elements of a computer program that are incidental to its function are not protected).

⁴⁹ See Claggett, *supra* note 8, at 3–4 (explaining that the scope of copyright protections for software has changed radically in a short period of time and the reach is indeterminate); see also Transcript of Public Hearing at 249:4–7, Exemptions to the Prohibition on Circumvention of Copyright Protection Systems for Access Control Technologies (May 19, 2015) (Kyle Wiens, iFixit and Repair.org), <https://www.copyright.gov/1201/2015/hearing-transcripts/> (describing how the § 1201 rulemaking process is more difficult because of the movement into “the realm where the distinction between physical and digital product is blurred”).

⁵⁰ See Claggett, *supra* note 8, at 15 (providing that in the context of computer software merger principles apply when there is only one way to write a particular code, then the expression merges with the method of the code and is not afforded copyright protection).

⁵¹ See *Lotus Dev. Corp. v. Borland Int'l, Inc.*, 49 F.3d 807, 815 (1st Cir. 1995) (methods of operation are means by which a user operates something and are unprotected expression). But see *Mitel, Inc. v. Iqtel, Inc.*, 124 F.3d 1366, 1372 (10th Cir. 1997) (rejecting the *Lotus* test and holding that an expressive work could be located within a functional component).

⁵² See Claggett, *supra* note 8, at 3–4 (explaining that the spread of software in recent years has led lawmakers to question the current state of copyright law and whether it is sufficient to handle the complex copyright issues that arise).

⁵³ Cooper, *supra* note 13.

⁵⁴ 750 F.3d 1339 (Fed. Cir. 2014).

⁵⁵ *Id.* at 1347.

⁵⁶ *Id.*

⁵⁷ See *id.* at 1357–58 (explaining that the Second Circuit defined the test in three steps: the abstraction step which “breaks down the allegedly infringed program into its constituent structural parts;” the filtration step, which “sifts out all non-protectable material,” including ideas and “expression that is necessarily incidental to those ideas, and the final step, which requires the court to “compare the remaining creative expression with the allegedly infringing program”). But see *Sony Comput. Entm't, Inc. v. Connectix Corp.*, 203 F.3d 596, 602–03 (9th Cir. 1999) (holding that the fair use doctrine protected the intermediate copies made and used by Connectix during the course of its reverse engineering of Sony's system, even if those copies were infringing).

⁵⁸ See *Oracle*, 750 F.3d at 1367 (explaining that if the Ninth Circuit were “to accept the district court's suggestion that a computer program is uncopyrightable simply because it carries out pre-assigned functions, [then] no computer program is protectable”).

⁵⁹ 37 C.F.R. § 201.40.

⁶⁰ *Id.*; Exemption to Prohibition on Circumvention of Copyright Protection Systems for Access Control Technologies, 80 Fed. Reg. 65,944, 65,954 (proposed Oct. 28, 2015) (to be codified at 37 C.F.R. pt. 201).

⁶¹ See Air Resources Board, Opinion Letter on Proposed Exemptions for Vehicle Software (July 21, 2015) (arguing that proposed exemptions would allow modifications to be made that would undermine the ARB's emission regulatory system); see also U.S. Dep't of Transp., Opinion Letter on Proposed Exemptions for Vehicle Software (Sept. 9, 2015) (arguing that proposed exemptions would allow modifications to be made that would create safety and cybersecurity risks). See generally EPA, Opinion Letter on Proposed Exemptions for Vehicle Software (July 17, 2015) (arguing that proposed exemptions would enable actions that could slow or reverse gains made under the Clean Air Act), [available at https://www.copyright.gov/1201/2015/](https://www.copyright.gov/1201/2015/).

⁶² 80 Fed. Reg. at 65,944.

⁶³ 83 Fed. Reg. at 54,014; see Exemption to Prohibition on Circumvention of Copyright Protection Systems for Access Control Technologies, 83 Fed. Reg. 54,010, 54,021–54,022 (proposed Oct. 26, 2018) (to be codified at 37 C.F.R. pt. 201) (allowing third-party assistance to assist owners in carrying out the authorized services, which were also expanded to include vehicle telematics

and entertainment systems, and to allow acquisition, use and dissemination of circumvention tools).

⁶⁴ See Tr. at 1041:15–22 (Apr. 10, 2018) (J. Matthew Williams, Association of American Publishers) (disputing that third-party servicers, who would be authorized under the proposed exemptions, could be distinguished by ‘good faith’ in order to prevent trafficking); see also Interview with Tom Lorenzen & Scott Winkelman, Partner, Crowell & Moring, in Washington, D.C. (June 27, 2019) (explaining that expanding the scope of third-party access to diagnostic software allows for more untrained individuals to either unintentionally or intentionally modify or tamper with machines and rendering them noncompliant with the Clean Air Act).

⁶⁵ See *Tracking and Reporting on Legal Issues in Various Courts*, REPAIR.ORG (July 9, 2019), [available at https://repair.org/legal-corner](https://repair.org/legal-corner) (explaining that states need Right to Repair laws because copyright law cannot require a manufacturer to sell parts and tools).

⁶⁶ Cody Ellis, *Is Right to Repair Finally Having a National Moment?*, WASTEDIVE (Apr. 1, 2019), [available at https://www.wastedive.com/news/is-right-to-repair-finally-having-a-national-moment/551706/](https://www.wastedive.com/news/is-right-to-repair-finally-having-a-national-moment/551706/).

⁶⁷ Lauren Good, *Could Feds Force Companies to Support Your Right to Repair?*, WIRED (July 23, 2019, 7:00 AM), <https://www.wired.com/story/right-to-repair-ftc-workshop/>.

⁶⁸ See Lorenzen & Winkelman, *supra* note 64 (explaining that third-parties are not required to report modifications to the DOT); see also Letter from Kathryn B. Thompson, Gen. Counsel, U.S. Dep't Transp., to Jacqueline C. Charlesworth, Gen. Counsel & Assoc. Register Copyrights, U.S. Copyright Office, Lib. Cong., DOT, Comment Letter on Proposed Exemptions for Vehicle Software (Sept. 9, 2015) (stating that the Motor Vehicle Safety Act was enacted 50 years ago and does not regulate third-party users or software that control several functions in vehicles that could be tampered with or modified by such users).

⁶⁹ See S. 107, 191st Commw. Ct. Leg., Reg. Sess. (Mass. 2019) (stating that a “[A] digital electronic product is a part or machine containing a microprocessor”); see also H.B. 2688, 80th Legis. Assemb., Reg. Sess. (Or. 2019) (stating that “[d]igital electronic equipment” means is a “product that functions on the basis of digital electronics that are embedded in . . . the product”).

⁷⁰ See R2R Solutions *supra* note 4.

⁷¹ See Natalie Higgins, Vice President, Equipment Dealers Assoc., *Right to Repair Legislation: What Dealers Need to Know*, Equip. Dealers Assoc. (Dec. 6, 2018, 12:00 PM), <https://static1.squarespace.com/static/53821f30e4b07bcdac103594/t/581ca9c8be6594d1fe224494/1478273482364/EDA+R2R+Webinar+October+2016.pdf> (explaining that industrial equipment contains several controls, and operating systems that require trained professionals to make complicated repairs to meet both safety, and emissions standards).

⁷² *Id.*

⁷³ See S. 315, 2019 Gen. Assemb., Reg. Comm. Substitute Sess. (N.C. 2019) (defining embedded software on firmware to include “a basic internal operating system, an internal opportunity system, a machine code, an assembly code, a root code and a microcode, and other similar components”). See generally *Comp. Assocs. Int'l, Inc. v. Altai, Inc.*, 982 F.2d 683, 698, 702 (2d Cir. 1992) (finding that object code and source code contain binary language from which the computer receives its instructions and are protected from copyright under § 102(b)).

⁷⁴ See, e.g., H.R. 1138, 91st Leg., Reg. Sess. (Minn. 2020) (requiring manufacturing companies to “make available, on fair and reasonable terms, documentation, parts, and tools, inclusive of any updates to information or embedded software, to any independent repair provider or to the owner of digital electronic equipment manufactured by or on behalf of, or sold by, the original equipment manufacturer for purposes of diagnosis, maintenance, or repair”).

⁷⁵ See *id.* (requiring manufacturers of products to provide all diagnostic repair capabilities to third-party users that it makes available to its own repair or engineering staff).

⁷⁶ See H.R. 1413, 121st Gen. Assemb., Reg. Sess. (Ind. 2019) (stating that service documentation includes information to unlock a security related function).

⁷⁷ See Mark Schaffer, *Electronic Standards Are In Need of Repair*, REPAIR.ORG (Aug. 3, 2017), <https://repair.org/standards> (arguing that technology has outpaced outdated copyright laws, and third-party access for repairs on electronic equipment is necessary); see also Wiens, *supra* note 3 (describing

how the DMCA protects manufacturing companies, but does not allow owners the legal right to break digital locks required to repair modern farming equipment).

⁷⁸ See Interview with Congressman Bill Shuster, Senior Policy Advisor, Squire Patton Boggs, in Washington, D.C. (June 25, 2019) (explaining that third-party access to the type of software code that Right to Repair bills are demanding would allow for tampering and modifications that would likely render machines noncompliant with federally mandated environmental and safety regulations and manufacturing companies would have to spend burdensome costs in trying to track these machines in every state).

⁷⁹ See *United States v. Haney Chevrolet, Inc.*, 371 F. Supp. 381, 384 (M.D. Fla. 1974) (holding that when the dealer “knowingly” removes or replaces a device regulating emissions in a vehicle and subsequently sells the vehicle, the dealer has relinquished custody or control of the vehicle, and rendered emission control or devices inoperable).

⁸⁰ See *United States v. Econ. Muffler & Tire Ctr., Inc.*, 762 F. Supp. 1242, 1243 (E.D. Va. 1991) (explaining that the owner of Economy Muffler regularly signed EPA-issued notices for professional installers about the tampering provision policy); see also Shuster, *supra* note 78 (explaining that third-party access to proprietary software in the context of industrial and construction equipment inevitably leads to third-party modifications performed ‘by mistake’ during repairs, which unjustifiably forces liability on the manufacturer or dealer with deep pockets).

⁸¹ See *An Act relative to the digital right to repair*, S. 107, 191st Leg., Reg. Sess. (Mass. 2019) [hereinafter Right to Repair Report] (requiring the manufacturer to “make available to independent repair facilities or owners of products manufactured by the manufacturer the same diagnostic and repair information, including repair technical updates, diagnostic software, service access passwords, updates and corrections to firmware, and related documentation, free of charge and in the same manner the manufacturer makes available to its authorized repair providers”).

⁸² See HB 2026, 101st Gen. Assemb., Reg. Sess. (Ill. 2019) (requiring “an original equipment manufacturer to make available . . . the same diagnostic, repair, and remote communications capabilities that the [manufacturer] makes available to its own repair or engineering staff or an authorized provider”).

⁸³ See 42 U.S.C. § 7521(m)(1)(5) (1990) (mandating that the manufacturer provides any person engaged in repair with necessary emissions regulations in order to maintain compliance).

⁸⁴ See Alberto Ayala, California Air Resources Board, Comment Letter on Proposed Exemptions for Vehicle Software (July 21, 2015), <https://www.copyright.gov/1201/2015/USCO-letters/>, at 3-5 (explaining that the Clean Air Act mandates emissions performance of vehicles and engines that requires complex testing that can only be properly conducted in “multi-million dollar test facilities. . . companies that currently offer products that modify emissions-controlled vehicles must invest thousands of dollars to purchase necessary testing” in order to prove compliance pursuant to the anti-tampering statute).

⁸⁵ See Harry M. Lightsey & Jeffrey M. Stefan, General Motors, LLC, Comment Letter on Proposed Exemptions for Vehicle Software “Comments of General Motors LLC” (Mar. 27, 2015), https://www.copyright.gov/1201/2015/comments032715/class%2021/General_Motors_Class21_1201_2014.pdf (explaining that motor vehicles should not be subjected to the broad exemptions on TPMs because third-party access to seed/key control mechanisms would lead to modifications in violation of federal regulations).

⁸⁶ See Tr. at 58:16-23 (May 19, 2015) (Steven Metalitz, Alliance of Automobile Manufacturers) (contrasting the intense regulatory standards that the manufacturing industry complies with in developing equipment to the lack of federal regulation in the software industry); see also *Technology Quarterly: The Internet of Things*, THE ECONOMIST (Sept. 14, 2019) [Hereinafter *The Internet of Things*], at 9 (explaining that the courts have broadly enforced disclaimers to liability for the software industry based on the software industry’s argument that holding them accountable for third-party mishaps would stifle innovation).

⁸⁷ See Right to Repair Report, *supra* note 81 (stating that the failure to cure provision grants independent repair facilities and owners a remedy if a manufacturer fails to provide necessary diagnostic software or fails to respond to a request for such software by filing a complaint for damages in district court, which is enforced by the state’s Attorney General).

⁸⁸ See Right to Repair Report, *supra* note 81 (noting that companies are increasingly unwilling to allow their customers to repair products with

third-party fixers, and customers arguing they that are no longer buying products, but rather, a license to that product).

⁸⁹ 42 U.S.C. § 7522(a) (1990).

⁹⁰ Compare *United States v. Haney Chevrolet, Inc.*, 371 F.Supp. 381, 385 (M.D. Fla. 1974) (holding that the employee voluntarily allowed the vehicle to leave his custody after removing the idle speed solenoid), and *United States v. Econ. Muffler & Tire Ctr. Inc.*, 762 F.Supp. 1242, 1245 (E.D. Va. 1991) (holding that the employee knew the converter replacement violated Clean Air Act enforcement policy), with *In re Volkswagen “Clean Diesel” Litigation*, No. 3:15-md-02672-CRB, 2017 WL 66281, at *3 (N.D. Cal. Jan. 4, 2017) (stating that the software algorithm created the appearance of low emissions in vehicles sold), and EPA Settlement, *supra* note 28 (stating that Derive Systems is liable for selling software that overwrote the original equipment manufacturer’s emissions controls systems).

⁹¹ See Shuster, *supra* note 78 (stating that repair diagnostics for agricultural and industrial equipment are extremely complex in nature and it would become nearly impossible for the EPA or the state to track and identify modifications to emissions controls made by third-party owners during a repair).

⁹² See Shuster, *supra* note 78 (stating that “because manufacturers would have no way of identifying products that might require service in (state), they would have to include service information on all products – the vast majority of which would never be needed in (state)”).

⁹³ See *The Internet of Things*, *supra* note 86, at 10 (providing that Ford’s F-150 pickup truck has “150 million lines of code [and] good programmers working under careful supervision average about one bug per 2,000 lines of code”).

⁹⁴ See *Volkswagen*, 2017 WL 66281, at *3 (stating that Volkswagen installed software defeat devices that allowed vehicles to meet emissions standards during official testing); see also Ayala, *supra* note 84, at 3 (stating that due to the highly sensitive and sophisticated nature of emissions control systems, it is very likely that equipment owners will negatively impact emissions by modifications and the process of determining the impact is impractical for regulatory agencies).

⁹⁵ Lorenzen & Winkelman, *supra* note 64.

⁹⁶ 42 U.S.C. § 7522(a)(2) (1990).

⁹⁷ See *United States v. Econ. Muffler & Tire Ctr. Inc.*, 762 F.Supp. 1242, 1245 (E.D. Va. 1991) (concluding that Economy Muffler regularly received Clean Air Act compliance notifications containing the details related to converter installation).

⁹⁸ Lorenzen & Winkelman, *supra* note 64.

⁹⁹ *Id.*

¹⁰⁰ *Id.*

¹⁰¹ Shuster, *supra* note 78.

¹⁰² See 42 U.S.C. § 7543(a) (mandating that states will not “adopt or attempt to enforce any standard relating to the control of emissions” either before or after the sale of equipment or engine).

¹⁰³ Morriss, *supra* note 26.

¹⁰⁴ Lorenzen & Winkelman, *supra* note 64.

¹⁰⁵ See § 7543(a) (providing that the state is not allowed to require certification or inspection or any other approval as a condition that the manufacturer must comply with prior to the sale of equipment or an engine).

¹⁰⁶ See *Counts v. Gen. Motors*, 237 F. Supp. 3d 572, 574 (E.D. Mich. 2017) (holding that the claim is not preempted by the Clean Air Act because it alleged that the manufacturer violated the duty to disclose state consumer law).

¹⁰⁷ See *id.* at 600 (finding that GM was in a “superior position” to know of the defeat device because GM was the original manufacturer of the vehicle).

¹⁰⁸ See *id.* at 593 (explaining that plaintiffs’ consumer protection claims do not attempt to enforce emissions standards and there is no danger of regulatory “inconsistency”).

¹⁰⁹ See *id.* at 600 (holding that if plaintiffs’ claims are true, then GM installing the defeat device is sufficient to establish active concealment under the duty to disclose doctrine).

¹¹⁰ Lorenzen & Winkelman, *supra* note 64.

¹¹¹ See H.R. 1138, 91st Leg., Reg. Sess. (Minn. 2019) (stating that the manufacturer must make all diagnostic software, service codes, and passwords that they provide to the engineering staff available to the third-party repair facility and equipment owner for repairs and other services).

¹¹² See *General Motors*, 237 F. Supp. 3d 572 at 600 (holding that “GM cannot reasonably argue that plaintiffs’ could have discovered the device’s

existence prior to purchasing the vehicle”). *See generally* H.R. 2026, 101st Leg., Reg. Sess. (Ill. 2019) (requiring the manufacturer to provide third-party repair facilities and equipment owners the same diagnostic software as the manufacturer’s engineers).

¹¹³ *Counts*, 237 F. Supp. 3d at 600.

¹¹⁴ *Id.*

¹¹⁵ *See id.* at 599 (holding that GM has not argued sufficient facts against the plaintiffs’ allegation based on GM’s failure to disclose the defeat device before sale).

¹¹⁶ *Oversight of EPA’s Decision to Deny the California Waiver: Hearing Before the S. Comm. on Env’t & Pub. Works*, 110th Cong. 2, 71-83, 110-112 (2008) (statements of David Doniger, Natural Resources Defense Council, Conn. Governor M. Jodi Rell, Md. Governor Martin O’Malley, and Pa. Governor Edward G. Rendell).

¹¹⁷ Claggett, *supra* note 8, at 954.

¹¹⁸ *See* Tr. at 181:23-182:12 (May 19, 2015) (Kit Walsh, Electric Frontier Foundation) (stating that Section 1201 is interrupting years of traditional do-it-yourself repair for automobiles now that computerization has brought DMCA into the legal environment).

¹¹⁹ *See* 17 U.S.C. § 117(c)(1)-(2) (1998) (providing that the owner or lessee of a machine that lawfully obtains a copy of a computer program may make a copy of that computer program if the purpose of the copy is made only for the purposes of maintenance or repair); *see also*

Tr. at 275:10-277:19 (May 19, 2015) (Harry Lightsey, GM LLC) (explaining that automobile dealers have license agreements on telematics, but it would be near impossible to have license agreements covering all the ECUs that are contained in the vehicle). *But see* The Internet of Things, *supra* note 86, at 10 (John Deere has spent four years defending the licensing of farm equipment required to operate because operating systems are completely dependent on sophisticated technology).

¹²⁰ *See* Tr. at 74:4-75:25 (Apr. 10, 2018) (Kevin Amer, U.S. Copyright Office) (stating concern for unlocking or modifying software embedded in all devices would exceed the scope of rulemaking); *see also* Claggett, *supra* note 8, at 48 (stating that the Copyright Office “considered several options in distinguishing software embedded devices based on the fact that definitions based on the current ecosystem would quickly become obsolete”). *But see* Tr. at 28:19-22 (May 24, 2016) (Cathy Gellis, Digital Age Defense) (stating that there is currently no way to delineate which objects would get protection and which objects would get different sorts of protection or none at all pursuant to copyright law).

¹²¹ *See* 17 U.S.C. § 301(a).

¹²² *See* 17 U.S.C. § 106(3).

¹²³ *See* Claggett, *supra* note 8, at 52 (finding that Section 106(3)’s distribution right is implicated when the new software, device, or replacement part is transferred to a third party).

¹²⁴ 17 U.S.C. § 102(a).

¹²⁵ *See* Claggett, *supra* note 8, at 26 (stating that the Copyright Office notes that many copyright owner concerns are related to the Internet of Things that allows software-enabled products to communicate with each other); *see also* Wiens, *supra* note 49 (describing the difference between what is tangible versus intangible is becoming more difficult to ascertain with software-embedded devices).

¹²⁶ *See* *Lotus Dev. Corp. v. Borland Int’l Inc.*, 49 F.3d 807, 815 (1st Cir. 1995) (stating that methods of operation are means by which a user operates something and are unprotected expression); *see also* *Lexmark Int’l v. Static Control Components, Inc.*, 387 F.3d 522, 533 (6th Cir. 2004) (explaining that “to the extent that the code is functional, it is not entitled to copyright protections”). *But see* *Mitel, Inc. v. Iqtel, Inc.*, 124 F.3d 1366, 1372 (10th Cir. 1997) (rejecting the *Lotus* court test and adopting the approach that an expressive work could be located within a functional component).

¹²⁷ 17 U.S.C. § 106(3) (2002).

¹²⁸ *See* Exemption to Prohibit on Circumvention of Copyright Protection Systems for Access Control Technologies, 80 Fed. Reg. 65,944, 65,963 (Oct. 28, 2015) (to be codified at 37 C.F.R. pt. 201) (permitting the circumvention of electronic control units for the purposes of diagnosis, repair, and modification of modern automobiles and agricultural machinery).

¹²⁹ *See* Tr. at 19:12-14 (May 18, 2016) (Jonathan Zuck, ACT) (arguing that allowing circumvention for proprietary software will fundamentally change how people and companies use their technology that stifles innovation in the search for new ways of protection).

¹³⁰ *Id.* at 19:12-14.

¹³¹ 17 U.S.C. § 102(a)(1) (1998).

¹³² *See* *Lexmark Int’l v. Static Control Components, Inc.*, 387 F.3d 522, 533 (6th Cir. 2004) (explaining that “[T]o the extent that the code is functional, it is not entitled to copyright protections”).

¹³³ *See* *Oracle Am., Inc. v. Google Inc.*, 750 F.3d 1339, 1357–58 (Fed. Cir. 2014) (applying the abstraction-filtration-comparison test to Oracle’s software coding to determine whether non-literal elements of a computer program constitute protectable expression).

¹³⁴ *Oracle*, 750 F.3d at 1367.

¹³⁵ *See* The Internet of Things, *supra* note 86, at 13 (predicting that liability protections historically afforded to the software industry for purposes of advancing innovation will soon be challenged in U.S. courts by personal injury and strict liability claims brought by consumers who were hurt or killed from compromised software in physical goods).

¹³⁶ *See* *Sony Comp. Entm’t v. Connectix, Corp.*, 203 F.3d 596, 608 (9th Cir. 2000) (holding that Sony’s software program contained unprotected functional elements and that the defendant’s only means to access the functional elements were through reverse engineering).

¹³⁷ Lorenzen & Winkelman, *supra* note 64.

¹³⁸ *See* 37 C.F.R. § 201 (2018) (explaining that the Register must consider “(i) the availability for use of copyrighted works; (ii) the availability for use of works for nonprofit archival preservation, and educational purposes; (iii) the impact that the prohibition on the circumvention of technological measures applied to copyrighted works has on criticism, comment, news reporting, teaching, scholarship or research; (iv) the effect of circumvention of technological measures on the market for or value of copyrighted works”).

¹³⁹ *Oracle*, 750 F.3d at 1378–79.

¹⁴⁰ 37 C.F.R. § 201 (2018).

¹⁴¹ *Id.*

¹⁴² *See* Claggett, *supra* note 8, at 18–20 (explaining that the fair use doctrine applies to § 177(b)-(d) of the Copyright Act which lawfully authorizes a machine owner or lessee the right to make a lawful copy or to allow a third-party to make a copy of the machine’s computer program for maintenance or repair purposes).

¹⁴³ *See* Claggett, *supra* note 8, at 63 (observing that questions around copyright protections stemming from the sale of software-enabled consumer devices related to licensee contracts or other forms of contracts are governed by state law).

¹⁴⁴ *See* *Counts v. Gen. Motors, LLC*, 237 F. Supp. 3d 572, 588 (E.D. Mich. 2017) (holding plaintiffs’ suit does not attempt to enforce emissions standards and the court will not allow federal legislation to encroach on established state law).

¹⁴⁵ *See infra* note 149.

¹⁴⁶ *See* Lorenzen & Winkelman, *supra* note 64 (“Right to Repair model legislation hurts the consumer by grouping electronic devices like iPhones with heavy equipment because if something goes wrong during a repair or if a modified engine is sold by third-party, then these machines can cause lots of harm and even kill you as a result.”).

¹⁴⁷ *See* S. 107, 191st Leg., Reg. Sess. (Mass. 2019) (stating that a “digital electronic product” is a “part or machine containing a microprocessor”); *see also* H.R. 2688, 80th Legis. Assemb., Reg. Sess. (Or. 2019) (stating that digital electronic equipment is a “product that functions on the basis of digital electronics that are embedded in . . . the product”).

¹⁴⁸ Cooper, *supra* note 13, at 2; Ayala, *supra* note 84, at 4.

¹⁴⁹ *See* H.R. 1342, 66th Leg., Reg. Sess. (Wash. 2019) (exempting nonroad engines and vehicles and subjecting them to the standards for performance promulgated under the Clean Air Act). *But see* H.B. 1413, 121st Gen. Assemb., 1st Reg. Sess. (Ind. 2019) (stating that an electronic device does not include a motor vehicle that is designed to transport people or property on a street or highway).

¹⁵⁰ Cooper, *supra* note 13.

¹⁵¹ Customer Choice Hearing, *supra* note 16, at 20.

¹⁵² *See* Lorenzen & Winkelman, *supra* note 64.

¹⁵³ Metalitz, *supra* note 86, at 59:13-19.

¹⁵⁴ *See* In re Volkswagen “Clean Diesel” Litigation, No. 3:15-md-02672-CRB, 2017 WL 66281, at *3 (N.D. Cal. Jan. 4, 2017) (holding that Volkswagen is subject to at least \$18 billion in penalty fines for emissions non-compliance violations of the Clean Air Act); *see also* Ayala, *supra* note 84, at 4 (explaining that manufacturing companies invest millions of dollars in emissions tests to remain compliant with the Clean Air Act).

¹⁵⁵ See Internet of Things, *supra* note 86, at 23 (explaining that maintaining good compliance security costs money and the benefits are not readily visible to end users).

¹⁵⁶ See Internet of Things, *supra* note 86, at 14.

¹⁵⁷ *Id.*

¹⁵⁸ See Internet of Things, *supra* note 86, at 11 (predicting that the Internet of Things will give hackers new objects that will enable attacks on life and property).

¹⁵⁹ S. 5283, 2019 Legis., 242nd Sess. (N.Y. 2019); S. 315, 2019 Gen. Assemb., Reg. Sess. (N.C. 2019).

¹⁶⁰ Claggett, *supra* note 37, at 47.

¹⁶¹ See Claggett, *supra* note 37, at 95 (voicing concerns from commentators regarding the scope of the U.S. Copyright Office in making exemptions on technologies that will outpace statutory language and software repair concerns addressing public safety that are better addressed through other agency regulations); see also Daniel Bartholomew, John Deere, Comment Letter on Proposed Exemptions of Vehicle Software (Sept. 9, 2015) (arguing that the Copyright Office should not use its regulatory authority to encourage unauthorized copying and use of proprietary software that contains trade secrets).

¹⁶² Exemption to Prohibit on Circumvention of Copyright Protection Systems for Access Control Technologies, 80 Fed. Reg. 65,944, 65,953 (Oct. 28, 2015) (to be codified at 37 C.F.R. pt. 201).

¹⁶³ Thompson, *supra* note 68, at 2.

¹⁶⁴ Lorenzen & Winkelman, *supra* note 64.

¹⁶⁵ See Claggett, *supra* note 37, at 96 (recognizing that defining modifications and the limits on exemptions to anticircumvention is increasingly difficult as repairs are reliant on complex software).

¹⁶⁶ See Claggett, *supra* note 8, at 27 (predicting that the findings in the report could be underinclusive and do not provide a bright line legislative fix because the technology in the products are evolving at a rapid pace).

¹⁶⁷ Bartholomew, *supra* note 161.

¹⁶⁸ See Claggett, *supra* note 8, at 27 (noting that Chairman Grassley and Ranking Member Leahy of the Committee on the Judiciary requested a report on the “expanding presence of software” in every day products and the Librarian’s role in maintaining sufficient copyright protections to digital works).

¹⁶⁹ *Id.*

ENDNOTES: NOTHING SHELLFISH ABOUT IT: WHY THE FDA NEEDS TO UPDATE *THE SEAFOOD LIST* TO REQUIRE GEOGRAPHIC ORIGIN AND SPECIES-SPECIFIC SHRIMP LABELING *continued from page 32*

²³ See Ganzler, *supra* note 19.

²⁴ See U.S. Seafood Import Monitoring Program, *supra* note 14.

²⁵ See 21 U.S.C. § 341. The Commissioner of Food and Drugs is the head of the FDA and is delegated the authority granted to the Secretary of Health and Human Services under the Food, Drug, and Cosmetic Act. Staff Manual Guide, Vol. II, 1410.10 (Aug. 26, 2016).

²⁶ U.S. Gov’t Accountability Off., GAO-09-258, Seafood Fraud: FDA Program Changes and Better Collaboration among Key Federal Agencies Could Improve Detection and Prevention, (2009) (reporting on the examples of seafood fraud including statements from various government department).

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