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COMMENT

Addressing the Green Patent Global Deadlock Through Bayh-Dole Reform

Without a global commitment to dramatically reduce greenhouse gas emissions, climate change will very likely cause catastrophic damage in this century.[1] Carbon taxes or cap-and-trade systems are insufficient to produce the necessary emissions reduction; increased green technology research is also critical.[2] Intellectual property (IP) rights can provide an incentive for the development of these technologies, but they can also impede technology dissemination – any climate change treaty must balance this controversial tradeoff between innovation and access.[3]

During climate treaty negotiations, developing countries like China have argued that patents limit their access to green technologies.[4] Based on these submissions, the May 2009 United Nations climate treaty negotiating text contained proposals that weaken IP rights for green technologies.[5] In response,

1. *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: SYNTHESIS REPORT 10-12 (Lenny Bernstein et al. eds., 2008), *available at* http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_synthesis_report.htm.

2. *See* NICHOLAS STERN, THE ECONOMICS OF CLIMATE CHANGE: THE STERN REVIEW 393 (2007); Paul Klemperer, *What is the Top Priority on Climate Change?*, VOX, Dec. 13, 2007, http://www.voxeu.org/index.php?q=node/803.

3. *See* STERN, *supra* note 2, at 420.

4. *See, e.g.*, U.N. Framework Convention on Climate Change, Ad Hoc Working Group on Long-Term Coop. Action Under the Convention, Bonn, F.R.G., Mar. 29-Apr. 8, 2009, *China's Views on the Fulfillment of the Bali Action Plan and the Components of the Agreed Outcome To Be Adopted by the Conference of the Parties at Its 15th Session*, at 23, U.N. Doc. FCCC/AWGLCA/2009/MISC.1 (Mar. 13, 2009), *available at* http://unfccc.int/resource/docs/2009/awglca5/eng/misco1.pdf.

5. *See* U.N. Framework Convention on Climate Change, Ad Hoc Working Group on Long-Term Coop. Action Under the Convention, Bonn, F.R.G., June 1-12, 2009, *Negotiating Text*, ¶¶ 187-89, U.N. Doc. FCCC/AWGLCA/2009/8 (May 19, 2009), *available at*

the U.S. House of Representatives passed a bill in June stating that "with respect to the United Nations Framework Convention on Climate Change, the [United States] should prevent any weakening of, and ensure robust compliance with and enforcement of, existing international legal requirements . . . for the protection of intellectual property rights related to [green technologies]."[6] Developing countries, however, continue to propose excluding green technologies from patentability and revoking existing green patents.[7] This divide between rich and poor countries over green IP is contributing to the delay in reaching a meaningful climate change treaty.[8]

This Comment argues that the United States could reduce IP-related market inefficiencies and appease its global critics—without changing international IP laws—by making nonpatenting or nonexclusive licenses the default for federally funded technologies. Part I demonstrates that most basic green energy research in the United States, including much of the research at universities and national laboratories, is funded by the federal government. Part II discusses problems with the current patent regime for government-funded research. Part III offers a normative analysis of why a socially responsible policy for government-funded green technologies ought to favor nonpatenting and nonexclusive licenses. Finally, Part IV analyzes possibilities for reform and suggests that even without congressional action, agencies that distribute federal research money could nudge universities toward responsible licensing practices by including these practices in grant evaluation criteria.

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http://unfccc.int/resource/docs/2009/awglca6/eng/08.pdf (proposing "remov[ing] barriers to development and transfer of technologies from developed to developing countr[ies] arising from . . . intellectual property rights" or exempting least-developed countries "from patent protection of climate-related technologies").

6. Foreign Relations Authorization Act, Fiscal Years 2010 and 2011, H.R. 2410, 111th Cong. § 1120A (2009). The amendment adding the quoted language passed 432-0. Vote on House Amendment 187, GovTrack, http://www.govtrack.us/congress/vote.xpd?vote=h2009-323 (last visited Oct. 18, 2009).

7. *See* Tove Iren S. Gerhardsen, *IP Issues May Go to 'Higher Political Level' in Copenhagen amid Difficulties*, INTELL. PROP. WATCH, Dec. 9, 2009, http://www.ip-watch.org/weblog/2009/12/09/ip-issues-may-go-to-'higher-political-level'-in-copenhagen-amid-difficulties/ (noting that the G77 countries have stood together in asking for green patent exemptions).

8. *See* Tessa J. Schwartz & Sarah Tierney Niyogi, *Technology Transfer and Intellectual Property Issues Take Center Stage in UNFCCC Negotiations*, INTELL. PROP. TODAY, Dec. 16, 2009, http://www.iptoday.com/news-article.asp?id=4743.

I. THE CRITICAL ROLE OF FEDERAL FUNDING IN BASIC GREEN TECHNOLOGY RESEARCH

Government funding will lead to new green technologies to combat climate change. In 2006, sixty percent of basic research in the United States was funded by the federal government, twenty-one percent was funded directly by universities and other nonprofits, and only fifteen percent was funded by industry.[9] The relative importance of government-funded basic research will increase with rising funding levels. The 2009 stimulus package provided $2 billion for basic science research within the Department of Energy (DOE) and $3 billion for the National Science Foundation (NSF),[10] a significant addition to their respective 2009 budgets of $4.77 billion and $5.18 billion.[11] President Obama noted that the Act "represents the biggest increase in basic research funding" in American history, commenting that "we are taking big steps down the road to energy independence, laying the groundwork for new green energy economies."[12]

Researchers are using this federal funding for basic research projects that might lead to game-changing green technologies,[13] but IP policy could limit the

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9. *See* MARK BOROUSH, NAT'L SCI. FOUND., NATIONAL PATTERNS OF R&D RESOURCES: 2007 DATA UPDATE 28 tbl.6 (2008), *available at* http://www.nsf.gov/statistics/nsf08318/pdf/nsf08318.pdf. The federal government also funds applied research, and the proposals in this Comment apply to *all* federally funded research, but unnecessary patenting poses particular problems for basic research. *See infra* note 19.

10. American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, 123 Stat. 115, 131, 139-40.

11. Omnibus Appropriations Act, 2009, Pub. L. No. 111-8, 123 Stat. 524, 590, 618 (codified as amended in scattered sections of 42 U.S.C.).

12. Press Release, White House, Remarks by the President and the Vice President at Signing of the American Recovery and Reinvestment Act (Feb. 17, 2009), http://www.whitehouse.gov/the_press_office/Remarks-by-the-President-and-Vice-President-at-Signing-of-the-American-Recovery-an/ (last visited Oct. 23, 2009); *see also* Eli Kintisch, *DOE Gives $151 Million to 'Out-of-Box' Research*, 326 SCIENCE 651, 651 (2009) ("Three days after President Barack Obama [said] . . . that he would lead the country into a 'new frontier' of clean energy research, a fledgling federal agency . . . . gave grants to 37 teams at companies, universities, and national labs . . . .").

13. *See, e.g.*, Nathaniel M. Gabor et al., *Extremely Efficient Multiple Electron-Hole Pair Generation in Carbon Nanotube Photodiodes*, 325 SCIENCE 1367, 1368 (2009) (noting that their research results might "improve the efficiency of photovoltaic solar cells beyond standard thermodynamic limits"); Matthew W. Kanan & Daniel G. Nocera, *In Situ Formation of an Oxygen-Evolving Catalyst in Neutral Water Containing Phosphate and Co^{2+}*, 321 SCIENCE 1072, 1072 (2008) (noting that "[s]unlight is the only renewable and carbon-neutral energy source of sufficient scale to replace fossil fuels" and reporting the discovery of a catalyst that can use solar energy to convert water into hydrogen and oxygen for energy storage).

dissemination of these inventions. In 1980, the Bayh-Dole Act clarified that recipients of federal research grants can patent these new technologies "to promote the utilization of inventions arising from federally supported research,"[14] and universities and other federally funded entities have begun patenting many of their researchers' discoveries.[15] Many new green technologies will thus be protected by public-sector patents,[16] which can hinder public access to these results, both in the United States and worldwide.

II. PUBLIC SECTOR PATENTS AS IMPEDIMENTS TO GREEN TECHNOLOGIES

The Bayh-Dole Act has been highly controversial over its nearly thirty-year history. Proponents argue that it has led to economic growth, particularly in the biotechnology industry.[17] Critics counter that Bayh-Dole has negatively affected the practice and norms of science,[18] created "anticommons" problems and contributed to patent hold-ups,[19] and led to unnecessary increases in consumer prices.[20]

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14. 35 U.S.C. § 200 (2006).

15. Mark A. Lemley, *Are Universities Patent Trolls?*, 18 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 611, 614 (2008). This surge in patenting is being accomplished by the universities, not by individual researchers, who generally must assign away their patent rights. *Id.* at 621.

16. For example, as of November 24, 2009, MIT had over thirty green energy technologies available for licensing in fields including batteries, biofuels, carbon capture, energy efficiency, fuel cells, and photovoltaics. MIT Technology Licensing Office, Selection of Energy and Material Technologies Available for Licensing, http://web.mit.edu/tlo/www/EMLetter1/index.html (last visited Jan. 4, 2010).

17. *See* Chester G. Moore, *Killing the Bayh-Dole Act's Golden Goose*, 8 TUL. J. TECH. & INTELL. PROP. 151, 155-57 (2006).

18. *See* Arti Kaur Rai, *Regulating Scientific Research: Intellectual Property Rights and the Norms of Science*, 94 NW. U. L. REV. 77, 109 (1999).

19. *See* Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 SCIENCE 698 (1998); Lemley, *supra* note 15, at 615-19; Arti K. Rai & Rebecca S. Eisenberg, *Bayh-Dole Reform and the Progress of Biomedicine*, LAW & CONTEMP. PROBS., Winter/Spring 2003, at 289, 295-303 ; Anthony D. So et al., *Is Bayh-Dole Good for Developing Countries? Lessons from the US Experience*, 6 PLOS BIOLOGY 2078, 2080 (2008). These are both problems of transaction costs: an anticommons occurs when too many IP rights in basic research create obstacles for future research, and hold-ups occur when a patent holder impedes a product's development by demanding royalties.

20. *See* Clifton Leaf, *The Law of Unintended Consequences*, FORTUNE, Sept. 19, 2005, at 250, *available at* http://money.cnn.com/magazines/fortune/fortune_archive/2005/09/19/8272884/index.htm.

Patents are not needed to motivate university researchers to innovate; instead, the justification for Bayh-Dole patents is that they provide the incentive to commercialize.[21] Under this commercialization theory, corporations need exclusive rights to attract the capital required to turn university inventions into commercial products. As Mark Lemley has noted, however, "the validity of commercialization theory depends a great deal on the industry in question."[22] Patents are certainly not always a prerequisite for commercialization, as many technologies arising from federal research funding were commercialized without patents prior to Bayh-Dole.[23] Exclusive patent rights might be needed in the pharmaceutical and biotechnology industries, given the high cost of gaining FDA approval for a new drug and the low cost of imitation. In engineering fields like green energy, however, although significant capital may be necessary to bring new technologies to market,[24] patents are typically unnecessary for commercialization due to a lower ratio of regulatory barriers to imitation costs,[25] the cumulative nature of innovation,[26] and other methods of obtaining competitive advantage.[27]

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21. *See* Lemley, *supra* note 15, at 621; Rai, *supra* note 18, at 97-99. Patent incentives are important for spurring *private-sector* innovation, but university scientists were innovating long before the Bayh-Dole Act, primarily out of desire for prestige (and the resulting tenure and prizes), and they receive comparatively little financial gain from the patents. *See* Lemley, *supra* note 15, at 621; Rai, *supra* note 18, at 92; Jason R. Wiener, *Sharing Potential and the Potential for Sharing: Open Source Licensing as a Legal and Economic Modality for the Dissemination of Renewable Energy Technology*, 18 GEO. INT'L ENVTL. L. REV. 277, 294 (2006).

22. Lemley, *supra* note 15, at 622.

23. *See id.* at 624; So et al., *supra* note 19, at 2079.

24. *See* Wiener, *supra* note 21, at 294. Wiener does not conclude that these costs require more exclusive patent rights; rather, he argues that governments should encourage "open source" licensing of green energy technologies. *Id.* at 294-302.

25. *See* Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575, 1589 & n.37 (2003) (describing evidence that patents are only important in a few industries like pharmaceuticals); *id.* at 1615-30 (arguing that commercialization theory—also known as prospect theory—is appropriate for pharmaceuticals because of their high regulatory barriers and relatively low imitation cost, but not for other technologies).

26. *See* Jay P. Kesan, *Transferring Innovation*, 77 FORDHAM L. REV. 2169, 2195-96 & nn.134-37 (2009) (noting that the comparative value of each individual patent is lower in engineering fields than in pharmaceuticals because of the large number of innovations involved in each product, and describing empirical findings that patents are not important for technology transfer in engineering fields).

27. *See* Burk & Lemley, *supra* note 25, at 1584-85 (describing why the "first-mover advantage" and trade secret protection often have more practical importance than patents); Lemley, *supra* note 15, at 624 (arguing that there is no reason to think patents are needed for commercialization outside the pharmaceutical and biotechnology industries).

Indeed, even pro-IP reports present no evidence that green patents are necessary for commercialization or for public-sector innovation. A European study argued that green patents provide needed private-sector innovation incentives and that "[patented] technologies are not necessarily more expensive," but it did not argue that patents help commercialization (as opposed to innovation).[28] The U.S. Chamber of Commerce's congressional testimony on IP and global warming similarly focused on the private-sector innovation justification for green patents.[29] Commercialization theory thus fails to justify exclusive patent rights on most government-funded green technologies.

There is concern, however, that patents actually hinder the spread of these new technologies. Benjamin Sovacool's interviews with energy experts indicated that patents can "prevent, complicate, or delay commercialization" for a wide range of reasons, including anticommons problems.[30] The Eco-Patent Commons—a pool of free green patents contributed by companies like IBM, DuPont, and Sony—demonstrates that some companies believe that putting green patents in the public domain can help disseminate these technologies.[31] Most significantly, as noted above, developing countries express great concern about intellectual property barriers impeding their access to green technologies, and these concerns have threatened to derail climate treaty negotiations.[32] In summary, patenting federally funded green technologies under the Bayh-Dole Act is not necessary for either innovation or commercialization. On the contrary, there is evidence that patents limit access to these technologies, both in the United States and around the world. Part III

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28. COPENHAGEN ECON. A/S & THE IPR CO. APS, ARE IPR A BARRIER TO THE TRANSFER OF CLIMATE CHANGE TECHNOLOGY? 4 (2009), *available at* http://trade.ec.europa.eu/doclib/docs/2009/february/tradoc_142371.pdf.

29. *Climate for Innovation: Technology and Intellectual Property in Global Climate Solutions: Hearing Before the H. Select Comm. on Energy Independence and Global Warming*, 111th Cong. 3-4 (2009) (statement of Mark T. Esper, Executive Vice President, Global Intellectual Property Center, U.S. Chamber of Commerce), *available at* http://globalwarming.house.gov/files/HRG/072909IP/Esper.pdf.

30. Benjamin K. Sovacool, *Placing a Glove on the Invisible Hand: How Intellectual Property Rights May Impede Innovation in Energy Research and Development (R&D)*, 18 ALB. L.J. SCI. & TECH. 381, 385, 399, 422, 439 (2008); *cf.* Daniel R. Cahoy & Leland Glenna, *Private Ordering and Public Energy Innovation Policy*, 36 FLA. ST. U. L. REV. 415, 433-35 (2009) (noting that the biofuel patent landscape seems ripe to become a patent thicket, but arguing that "private forces" will "reshape ownership trends and realign innovation").

31. *See* Mary Tripsas, *Everybody in the Pool of Green Innovation*, N.Y. TIMES, Nov. 1, 2009, at BU5, *available at* http://www.nytimes.com/2009/11/01/business/01proto.html.

32. *See supra* notes 4-8 and accompanying text.

discusses how to bring patenting and licensing practices under the Bayh-Dole Act more in line with its public-spirited goals.

III. SOCIALLY RESPONSIBLE LICENSING FOR GREEN ENERGY RESEARCH

The first-listed goal of the Bayh-Dole Act—"the *utilization* of inventions arising from federally supported research"[33]—would be served best if universities and other federally funded research entities only sought exclusive patent licenses when required for commercialization. Unfortunately, the interests of university technology transfer offices are not aligned with this goal. Instead, "university technology transfer activities continue to be predominantly patent-centric and revenue-driven with a single-minded focus on generating licensing income and obtaining reimbursement for legal expenses."[34]

This disconnect between the ideals of the Bayh-Dole Act and its real-world application has been recognized in the field of biomedical research. Scholars and advocates have pushed agencies and universities to adopt more socially responsible licensing practices.[35] National Institutes of Health (NIH) guidelines state that biomedical research tools and genomic inventions should be patented and exclusively licensed only when required for

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33. 35 U.S.C. § 200 (2006) (emphasis added). Other goals, which also counsel against exclusive licenses, include "promot[ing] free competition and enterprise without unduly encumbering future research" and "promot[ing] the commercialization and *public availability* of inventions made in the United States." *Id.* (emphasis added). I use "socially responsible licensing" to refer to practices that meet these goals of increasing the use and availability of federally funded technologies, as opposed to increasing the profit of the patentee.

34. Kesan, *supra* note 26, at 2169. Note that it is the university technology transfer offices that are revenue driven, not the individual researchers, and that university administrators have very little control over how much federal money professors receive or how they spend it. Further, few universities actually succeed in their goal of raising significant revenue through their patents, with most universities failing to generate even enough licensing revenue to offset the cost of running a technology transfer office. *Id.* at 2180 & n.64. Changing the licensing practices would therefore have minimal effect on innovation.

35. *See* Amy Kapczynski et al., *Addressing Global Health Inequities: An Open Licensing Approach for University Innovations*, 20 BERKELEY TECH. L.J. 1031 (2005); Beirne Roose-Snyder & Megan K. Doyle, *The Global Health Licensing Program: A New Model for Humanitarian Licensing at the University Level*, 35 AM. J.L. & MED. 281 (2009). I use "socially responsible" to refer to licensing practices that focus on the public interest, not the private gain of the licensor. Whether universities should maximize the U.S. public interest or the global public interest need not be resolved here, as the practices recommended in this Comment would benefit both.

commercialization.[36] Although the NIH's guidance was initially criticized by members of the Association of University Technology Managers (AUTM),[37] AUTM and many universities later endorsed a more general principle that universities "should strive to grant just those rights necessary to encourage development of the technology."[38]

AUTM has also recently endorsed "strategies that promote the availability of health-related technologies in developing countries for essential medical care."[39] Under this market-segmentation strategy, pharmaceutical companies can use patent protection in high-income countries to recoup their development costs, while generic competition drives down the prices of medicines in low- and middle-income countries.[40]

While these proposals focus on pharmaceuticals, the argument for promoting access by weakening university IP protections is even stronger in other industries where patent incentives are less important.[41] Socially responsible licensing policies for green technologies should make nonpatenting or nonexclusive licenses the default, unless there are exceptional circumstances under which an exclusive patent license is necessary for commercialization.[42] Additionally, even when exceptional circumstances warrant an exclusive

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36. Best Practices for the Licensing of Genomic Inventions, 70 Fed. Reg. 18,413 (Apr. 11, 2005); Principles and Guidelines for Recipients of NIH Research Grants and Contracts on Obtaining and Disseminating Biomedical Research Resources, 64 Fed. Reg. 72,090 (Dec. 23, 1999).

37. *See* David Malakoff, *NIH Roils Academe with Advice on Licensing DNA Patents*, 303 SCIENCE 1757 (2004).

38. CAL. INST. OF TECH. ET AL., IN THE PUBLIC INTEREST: NINE POINTS TO CONSIDER IN LICENSING UNIVERSITY TECHNOLOGY 2 (2007), http://www.autm.net/Nine_Points_to_Consider.htm.

39. ASS'N OF UNIV. TECH. MANAGERS ET AL., STATEMENT OF PRINCIPLES AND STRATEGIES FOR THE EQUITABLE DISSEMINATION OF MEDICAL TECHNOLOGIES 1-2 (2009), http://www.autm.net/Content/NavigationMenu/TechTransfer/GlobalHealth/Statementofprincliples.pdf [sic] (footnote omitted).

40. *See* Kapczynski et al., *supra* note 35, at 1088-89; Roose-Snyder & Doyle, *supra* note 35, at 285-98.

41. *See supra* note 27 and accompanying text.

42. This would reverse the current burden, where "exceptional circumstances" are needed to declare an area off-limits to patenting. Bayh-Dole Act, 35 U.S.C. § 202(a)(ii) (2006). Also note that while socially responsible licensing practices are particularly important for green technologies, the goals of the Bayh-Dole Act would be served best if *all* federally funded research were patented and licensed in a way to expand public access to this research.

license, these policies should eliminate IP-related barriers to access in developing countries.[43]

IV. TYING SOCIALLY RESPONSIBLE LICENSING PRACTICES TO FEDERAL RESEARCH GRANTS

Mandating that federally funded green technologies be available in developing countries could help narrow the policy differences that obstruct a global climate change treaty. A congressional amendment to the Bayh-Dole Act would be a straightforward reform and would send a clear international signal. Congress could add a goal of global dissemination of federally funded research for humanitarian needs, and could give agencies the discretion necessary to create technology transfer policies consistent with these goals.[44] In the absence of congressional action, however, there is room for change within the current Bayh-Dole regime to make university practices more consistent with the purposes of the Act.

A number of scholars and advocates have pushed for changes to licensing practices at the university level, particularly as part of the access to medicines movement.[45] While these efforts have resulted in some success,[46] universities' financial interests are aligned against these changes,[47] and universities also face a significant collective action problem.[48] When these difficulties are combined with the collective action problem that faces climate change itself,[49] it seems

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43. "Developing countries" should be defined in a way that includes middle-income countries like China and India that are concerned about U.S. patents and that have the manufacturing capacity to produce low-cost, off-patent green technologies for use in low-income countries. The World Bank provides classifications based on per capita gross national income. World Bank, Data & Statistics: Country Classification, http://go.worldbank.org/K2CKM78CCo (last visited Nov. 22, 2009).

44. *Cf.* Rai & Eisenberg, *supra* note 19, at 310 (arguing that Bayh-Dole should be amended to give agencies more discretion in declaring areas off limits to patenting). Many scholars have also suggested amending Bayh-Dole to provide an "academic research exemption," *see, e.g.*, Sovacool, *supra* note 30, at 434, but this would have limited effect and would not address the real problems with university patents. *See* Lisa Larrimore Ouellette, Note, *Access to Bio-Knowledge: From Gene Patents to Biomedical Materials*, 2010 STAN. TECH. L. REV. N1, ¶¶ 28-41, http://stlr.stanford.edu/pdf/ouellette-access-to-bio-knowledge.pdf.

45. *See, e.g.*, Kapczynski et al., *supra* note 35, at 1078-90; Lemley, *supra* note 15, at 625-28.

46. *See supra* notes 38-39 and accompanying text.

47. *See* Kesan, *supra* note 26, at 2169.

48. *See* Rai & Eisenberg, *supra* note 19, at 305-06.

49. *See* STERN, *supra* note 2, at 510 (describing the international collective action problem).

unlikely that universities will independently adopt socially responsible licensing policies for green technologies.

Federal agencies that provide funding for green energy research, such as the NSF and DOE, can initiate more immediate change. Nonmandatory licensing guidelines for green technologies, like the NIH guidelines for biomedical research,[50] may have hortatory value in shaping university licensing norms.[51] In order to actually limit a grant recipient's patent rights, however, agencies must find "exceptional circumstances" such that the limitation "will better promote the policy and objectives" of the Bayh-Dole Act.[52] Even though such intervention may be warranted, the "elaborate administrative procedure for challenging such determinations" has caused these declarations to be "extremely rare."[53] The Bayh-Dole Act also allows agencies to exercise "march-in rights" after a patent is granted, but this procedure has proved equally toothless.[54]

Previous analyses of the role of agencies in Bayh-Dole reform have focused on this ability to set broad guidelines and influence patenting decisions for technologies that are already developed,[55] but agencies could have more success through their ex ante control over which research projects get funded. If funding decisions depended in part on how the resulting technology would be licensed, university researchers would be more invested in ensuring that their institutions had socially responsible licensing policies. Criteria for grant selection vary by agency,[56] but a change by just one agency could lead to new university policies that affect many licensing decisions.

The NSF has at least two options for influencing technology transfer policies within its broad mandate to award grants "on the basis of merit."[57]

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50. *See supra* note 36 and accompanying text. The agencies could also consider Department of Commerce regulations for government-owned inventions, which only allow exclusive licenses if "[t]he public will be served by the granting of the license" and "[t]he proposed scope of exclusivity is not greater than reasonably necessary to provide the incentive for bringing the invention to practical application." 37 C.F.R. § 404.7(a)(1)(ii) (2008).

51. *See* Rai & Eisenberg, *supra* note 19, at 306-08.

52. 35 U.S.C. § 202(a)(ii) (2006).

53. Rai & Eisenberg, *supra* note 19, at 293-94.

54. *Id.* at 294.

55. *See* Lemley, *supra* note 15, at 628; Rai, *supra* note 18, at 147-48; Rai & Eisenberg, *supra* note 19, at 303-10; So et al., *supra* note 19, at 2080.

56. The rulemaking requirements of the Administrative Procedure Act do not apply to matters related to grants, 5 U.S.C. § 553(a)(2) (2006), but there are requirements in the agencies' substantive statutes.

57. 42 U.S.C. § 1862c(a)(2)(A).

First, the NSF could require institutions receiving grants to have socially responsible licensing policies.[58] The NSF could only recommend policy content, but forcing universities to publicly address these issues would likely bring their practices more in line with the goals of the Bayh-Dole Act. Second, the NSF could include licensing considerations in individual project reviews. NSF proposals are peer reviewed not only for "intellectual merit," but also for "broader impacts," including whether the results will be disseminated broadly and how the results will benefit society.[59] The NSF could simply add examples related to licensing—such as a statement that the researcher's university had adopted a socially responsible licensing policy—to its current examples of how to satisfy the broader impacts criterion.[60] This option would bring licensing concerns to the attention of the scientists, rather than just to the university administrators who prepare the bulk of grant applications, and it is easier to implement within the current review process.

Similarly, the DOE could influence university licensing practices by imposing a blanket requirement that institutions receiving grants have socially responsible licensing policies, or it could exercise more subtle influence by including a researcher's plans for commercialization in the merit-based review process. Licensing considerations could enter the definition of "merit," the "[o]ther appropriate factors" set forth in the grant announcement, or the "other available advice or information as well as program policy factors" that are considered during basic research proposal reviews.[61]

CONCLUSION

The U.S. government is investing in basic green energy research to address global climate change, but the current practices for patenting and licensing these new technologies will likely impede their dissemination, both within the United States and throughout the world. The refusal of the United States to

58. The NSF already requires institutions to have conflict-of-interest policies. NAT'L SCI. FOUND., PROPOSAL AND AWARD POLICIES AND PROCEDURES GUIDE pt. II, at IV-1 (2009), *available at* http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf101. This requirement became effective in 1995 after a notice-and-comment period. 59 Fed. Reg. 33,308 (June 28, 1994).

59. NAT'L SCI. FOUND., *supra* note 58, pt. I, at III-1.

60. NAT'L SCI. FOUND., MERIT REVIEW BROADER IMPACTS CRITERION: REPRESENTATIVE ACTIVITIES (2007), *available at* http://www.nsf.gov/pubs/gpg/broaderimpacts.pdf. The NSF has little power to enforce promises made in grant applications, but the threat of future grants being rejected should compel researchers to follow through on their commitments.

61. 10 C.F.R. § 605.10 (2009).

negotiate over IP thus harms its own economic interests in addition to contributing to the climate change treaty deadlock. By changing licensing practices for these inventions, the United States could help satisfy its global critics while still maintaining strong IP laws to encourage private-sector innovation.

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