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Exploring the Role of Patent Offices in Climate Change Mitigation

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Abstract

Patent offices are developing new programs to help in climate change mitigation. What can they deliver? This Article provides a contemporary overview of the different green technology initiatives promoted by patent offices: fast-tracking of patent applications, search platforms, applicant resources, and publicity and awareness programs. The Article concludes that special treatment of green technology is fair and administrable when programs are openly accessible but narrowly tailored. The most tangible effect of these initiatives is the increased control by the patentee over the patenting and commercialization process, which is valuable even when effects of these programs on technology dissemination are difficult to quantify.

TABLE OF CONTENTS

INTRODUCTION

One of these days, someone will invent a technology that will be the perfect solution for one of the several pressing problems humanity faces due to climate change. What will happen next? Optimally, the inventor would deploy the invention as quickly and widely as possible, but the inventor might not have the resources to accomplish that. They would need investors and partners. To secure those, they would often need a patent – which may take years to obtain.[1] Patenting is costly and requires expertise the inventor does not necessarily have.[2] Even after overcoming these challenges, the invention is not automatically guaranteed public distribution.

What can we do to lower these hurdles and advance the dissemination of green technologies?[3] Among various initiatives, programs administered by patent offices worldwide are gaining new wind, and many patent offices are willing to play an active role. But what exactly can patent offices deliver? There have been several developments in the patent office space over the past few years. In June 2022, the United States Patent and Trademark Office (USPTO) announced it would provide accelerated review for patent applications that reduce greenhouse gas (GHG) emissions under a Climate Change Mitigation Pilot Program.[4] Under the pilot program, GHG reduction technologies may be eligible for fast-tracked examination.[5] In July 2022, the USPTO also announced that it is joining World Intellectual Property Organization's (WIPO) WIPO GREEN, an online knowledge-sharing platform for

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1. *See Patents Pendency Data*, USPTO (Oct. 2022), https://www.uspto.gov/dashboard/patents/pendency.html (showing that the traditional total pendency of a regular patent application in the USA is 25.5 months) [https://perma.cc/YWC4-QXZ4]; *Patent Index 2021: Quality Indicators*, EPO (Dec. 31, 2021), https://www.epo.org/about-us/annual-reports-statistics/statistics/2021/statistics/quality-indicators.html (showing that the average examination time at the European Patent Office is 23.0 months) [https://perma.cc/6JAC-JWNF].

2. The cost of patenting in the US typically ranges between $5,000–$20,000 depending on the complexity of the invention. Gene Quinn, *The Cost of Obtaining a Patent in the US*, IPWATCHDOG (Apr. 4, 2015), https://ipwatchdog.com/2015/04/04/the-cost-of-obtaining-a-patent-in-the-us/id=56485/ [https://perma.cc/66FJ-P2GS]; *see also* Bruno van Pottelsberghe & Didier François, *The Cost Factor in Patent Systems.* 9 J. INDUS. COMPETITION & TRADE 329, 329–355 (2009) (outlining the costs of patent maintenance in USA, Europe and Japan).

3. *See generally* Jayne Piana, *Diffusion of Green Technology: Patents, Licenses, and Incentives*, 52 TEX. ENV'T L.J. 37 (2022) (discussing how there is a need for reform in incentivizing green technology dissemination). Green technology can be understood broadly. This paper is mainly focused on greenhouse gas emission reduction technologies and clean energy forms that are the highlight of most patent office initiatives, but many arguments also apply to climate change adaptation measures and sustainability generally. *See generally, e.g., What is Technology Development and Transfer?*, UNFCCC, https://unfccc.int/topics/what-is-technology-development-and-transfer (on the different aspects of green technology and climate change) (hereinafter UNFCCC) [https://perma.cc/JGW3-T4LK]; Anne Saab, *Climate-Resilient Crops and International Climate Change Adaptation Law*, 29 LEIDEN J.INT'L L. 503 (2016) (on the concept of climate change adaptation law).

4. *USPTO Announces Launch of Climate Change Mitigation Pilot Program*, USPTO (June 3, 2022), https://www.uspto.gov/about-us/news-updates/uspto-announces-launch-climate-change-mitigation-pilot-program (hereinafter *USPTO Announces Launch*) [https://perma.cc/G4FW-2G2T].

5. *Climate Change Mitigation Pilot Program*, USPTO, (accessed Nov. 18, 2023), https://www.uspto.gov/patents/laws/patent-related-notices/climate-change-mitigation-pilot-program [https://perma.cc/X7ZS-YM5H].

green technologies.[6] In March 2022, WIPO GREEN launched a new initiative, IPO GREEN, that shares information and provides support for green innovation programs of patent offices.[7] In March 2023, the USPTO also announced a new green technology award that provides the winners with an acceleration certificate that can be used to speed up USPTO processing.[8]

The USPTO fast-tracking program is the second of its kind in the United States. The first green tech pilot program ran from 2009–2012.[9] Programs of this kind were launched between 2009–2012 also in the United Kingdom, Australia, Korea, Japan, Israel, Canada, Brazil and China.[10] Many of these international programs are still running,[11]and they provide accelerated examination for eligible applications. Singapore has also recently launched a fast-track program.[12] Each office has slightly different requirements for eligibility, procedure, and evidence needed to qualify.[13] The new USPTO program, for example, is specifically targeted to technologies that reduce GHG emissions.[14]

In November 2022, the European Patent Office (EPO) launched its clean energy platform.[15] The new clean tech platform includes smart patent information searches that "will help accelerate the transformation of patent information into patent knowledge by supporting researchers, entrepreneurs, and decision-makers."[16] The smart searches include pre-programmed patent searches on different aspects of wind and solar energy, CO_2 reduction in the cement and steel industries, and energy storage and other enabling

6. *USPTO Becomes a Partner in International Green-technology Platform, WIPO GREEN*, USPTO (July 22, 2022), https://www.uspto.gov/about-us/news-updates/uspto-becomes-partner-international-green-technology-platform-wipo-green-0 [https://perma.cc/NPB6-K8GU] (hereinafter *USPTO Becomes Partner*); *WIPO GREEN – The Marketplace for Sustainable Technology*, WIPO, (accessed Nov. 18, 2023), https://www3.wipo.int/wipogreen/en/ [https://perma.cc/TF26-L67E].

7. *IPO GREEN*, WIPO, (accessed Nov. 18, 2023), https://www3.wipo.int/wipogreen/en/ipo-green/ [https://perma.cc/6UB5-T722].

8. *USPTO Announces New Patents for Humanity Green Energy Category*, USPTO (Mar. 23, 2023), https://www.uspto.gov/about-us/news-updates/uspto-announces-new-patents-humanity-green-energy-category [https://perma.cc/C6CS-DV5H].

9. *Green Technology Pilot Program – CLOSED*, USPTO, https://www.uspto.gov/patents/initiatives/green-technology-pilot-program-closed [https://perma.cc/D9SK-P8SX].

10. Antoine Dechezleprêtre, *Fast-Tracking 'Green' Patent Applications: An Empirical Analysis* 3-5 (Feb. 27, 2013) (ICTSD Programme on Innovation, Technology and Intellectual Property; Issue Paper No. 37), https://ssrn.com/abstract=2228617 [https://perma.cc/36WT-WYA8].

11. Except that Brazil's program was on a break between 2014-2016. Pedro Moreira, *Updated Landscape on Expedited Protection of "Green" Inventions in Brazil*, WIPO GREEN (May 18, 2021), https://www3.wipo.int/wipogreen/en/news/2021/news_0016.html [https://perma.cc/P63T-BMQ8].

12. *Launch of the SG Patent Fast Track Programme on 4 May 2020 (Circular No. 2/2020)*, IPOS (Apr. 27, 2020), https://www.ipos.gov.sg/docs/default-source/resources-library/patents/circulars/(2020)-circular-no-2-launch-of-sg-patent-fast-track-programme-on-4-may-2020-(final).pdf [https://perma.cc/SQ74-JGHB].

13. IPO GREEN, *supra* note 7.

14. *USPTO Announces Launch, supra* note 4.

15. *Clean Tech in Focus*, EPO, (accessed Nov. 18, 2023), https://www.epo.org/news-events/in-focus/green-tech.html [https://perma.cc/UU8A-F8BY].

16. *Key Resources for Clean Energy*, EPO (Nov. 3, 2022), https://www.epo.org/en/news-events/news/key-resources-clean-energy [https://perma.cc/Z857-XY35].

technologies.[17] The EPO does not have a green tech fast-track but offers a general fast-tracking option available for all, including green tech applicants.[18] In addition to patenting aid, the clean energy platform helps those wishing to develop and use clean energy technologies.

In some ways, EPO's clean energy platform is a narrower version of the WIPO GREEN platform, launched in 2013, which the USPTO recently joined along with Brazil, Canada, Chile, Denmark, France, Japan, Lebanon, Morocco, Portugal, and Switzerland.[19] Compared to the EPO platform, WIPO GREEN covers a broader range of technologies, and works as a collaboration and licensing marketplace rather than just an information platform. WIPO GREEN is known for its successful combining of different stakeholders' interests.[20] In 2022, IPO GREEN reinforced the platform by providing patent office resources "to stimulate the development and deployment of new green technology solutions."[21] With fast-tracking and other initiatives, these platforms, referred to in this paper as "search platforms" provide an additional layer to the role of patent offices in climate change mitigation.

The launch of the fast-tracking programs in 2009 coincided with a steep rise in the patenting of climate change mitigation and clean energy technologies.[22] After 2012, the trajectory of new applications for climate change mitigation technologies has turned downwards.[23] The growth of the filing rate for low-carbon energy technologies has slowed down from more than 12% to about 3%.[24] Policymakers and researchers alike have been worried about this declining trend, with explanations proposed from the maturation of climate change mitigation technologies and the role of digitalization across technology fields.[25] However, there seems to be little support for the

17. *Clean Energy Technologies*, EPO (accessed Nov. 18, 2023), https://www.epo.org/en/news-events/in-focus/clean-energy [https://perma.cc/9U6G-ALMN].

18. *Key Resources for Clean Energy*, *supra* note 16. The fast-track program has been available in its current form since 2016.

19. *USPTO Becomes Partner*, *supra* note 5.

20. For extensive discussion of the WIPO GREEN model, see Piana, *supra* note 3, at 50-57 and Ahmed Abdel-Latif, *The Rise of Public–Private Partnerships in Green Technologies and the Role of Intellectual Property Rights*, in THE CAMBRIDGE HANDBOOK OF PUBLIC-PRIVATE PARTNERSHIPS, INTELL. PROPERTY GOVERNANCE, AND SUSTAINABLE DEV. (Margaret Chon, et al., eds., 2018).

21. IPO GREEN, *supra* note 7.

22. Miguel Cárdenas Rodríguez, Ivan Haščič & Nick Johnstone, *Global Patent Applications for Climate Change Mitigation Technologies – a Key Measure of Innovation – Are Trending Down*, IEA (July 11, 2019), https://www.iea.org/commentaries/global-patent-applications-for-climate-change-mitigation-technologies-a-key-measure-of-innovation-are-trending-down [https://perma.cc/9J4F-H42A].

23. *Id*. With no similar trend in patenting generally.

24. Apart from certain subcategories. *EPO-IEA Study Highlights Need to Accelerate Innovation in Clean Energy Technologies to Meet Climate Goals*, EPO (Apr. 27, 2021), https://www.epo.org/news-events/news/2021/20210427.html [https://perma.cc/PVE7-8T3X] (hereinafter *EPO-IEA Study*).

25. Cárdenas Rodríguez, *supra* note 22.

maturation hypothesis.[26] It appears more likely that the decline has been due to various policy and market reasons, including the difficulty of competing with the well-established and stably funded fossil fuel industry as well as the fact that key markets, such as the USA and China, have focused on endeavors other than green technology and climate change mitigation.[27]

Today, there is a new wave of interest in fast-tracking and other patent office programs, along with generally more ambitious domestic and international climate change objectives compared to the early 2010s. What else is different now from ten years ago? Collaboration between patent offices has increased.[28] There is more climate change awareness and an increased willingness to address these issues. Most crucially, we have even less time to wait for convenient solutions to pop up. Amidst this, there is a pressing need to answer how society gets the advanced technology needed to keep the planet habitable for future generations.

Patent offices want to do their part in answering this question, evidenced by the inclusion of fast-tracking and other green technology-related programs. In view of the recent activities, it is appropriate to revisit the logic behind these initiatives and to discuss how the current programs fit into the bigger picture of fighting climate change with patent law. This Article approaches these themes from the perspective of the recent patent office initiatives and contemplates the significance of this kind of activity, asking what reasons there may be to promote it – or not.

Part I addresses the question on the abstract level and discusses why patent law generally matters and is a justified field of action in the fight against climate change. It also systematizes different patent office initiatives and contemplates why they may be lucrative. Part II discusses the effects of patent office initiatives, drawing ideas from the fast-tracking discussion and applying them to the more recent programs. These effects include, among other things, facilitating green technology dissemination and increasing patentee choice. The paper concludes that patent offices should adopt these policy tools in the global struggle against climate change despite their potentially limited reach. For some patentees, the benefits of information and control may be essential, and there are few downsides to providing these tools as long as the patent offices design the programs to observe practical considerations.

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26. David Roberts, *Many Technologies Needed to Solve the Climate Crisis are Nowhere Near Ready*, VOX (July 14, 2020), https://www.vox.com/energy-and-environment/2020/7/14/21319678/climate-change-renewable-energy-technology-innovation-net-zero-emissions [https://perma.cc/2SPD-EJQZ].

27. Melissa Hurtado, *The Green Tech Patent Boom and Bust: Getting it Back on the Fast-Track*, JTIP BLOG (Mar. 27, 2021), https://jtip.law.northwestern.edu/2021/03/27/green_tech_patent_boom_or_bust/ [https://perma.cc/65FN-N8DP].

28. *See, e.g., International Worksharing and Collaborative Activities for Search and Examination of Patent Applications*, WIPO (accessed Nov. 18, 2023), https://www.wipo.int/patents/en/topics/worksharing/ [https://perma.cc/4WDQ-AZV5]. *See also* IPO GREEN, *supra* note 7.

I. HARNESSING PATENT LAW FOR CLIMATE CHANGE MITIGATION

A. Relationship of Patents and Climate Change

Patents impact what kind of technologies are available to the public.[29] Patents affect incentives, promote disclosure, and inspire follow-up innovation; they can also restrict or enable the use of specific technologies.[30] The question of why patent law matters for climate change mitigation divides into two issues: 1) how are patents relevant to climate change, and 2) can patent law be used for climate change mitigation purposes?

From an economic perspective, climate change is the result of the use of various technologies for profit, free of their external costs to the planet.[31] Patent law protects technologies with intellectual property rights. Thus, it is not farfetched to assume that patent law might contribute to the problems at the heart of climate change. Any tangible links are difficult to verify empirically, but the connection has been extensively explored in literature.[32] In brief, property theory supports the argument that patent law should play a role in climate change mitigation because patent-protected technologies have contributed to climate change in the past and may have the power to mitigate future effects of climate change.[33] Climate change is an example of a tragedy of the commons caused by the external effects of natural resource utilization.[34] Regulation and different policy tools incentivize and enforce

29. *See generally* Zachary Liscow & Quentin Karpilow, *Innovation Snowballing and Climate Law*, 95 WASH. U. L. REV. 387 (2017) (discussing the way innovations build on top of existing solutions, whereby the disclosure function of patents can be important); Chen Zhou, *Can Intellectual Property Rights within Climate Technology Transfer Work for the UNFCCC and the Paris Agreement?*, 19 INT'L ENV'T AGREEMENTS 109 (2019) (citing IP as the major reason for difficulties in green technology transfer).

30. *See generally* Stephen Yelderman, *Coordination-Focused Patent Policy*, 96 B.U. L. REV. 1565 (2016) (discussing patent policy and the rewarding functions of the patent system); Colleen V. Chien, *Opening the Patent System: Diffusionary Levers in Patent Law*, 89 S. CAL. L. REV. 793, 825-34 (2016) (discussing the disclosure function of the patent system). *But cf.* Joshua D. Sarnoff, *The Patent System and Climate Change*, 16 VA. J.L. & TECH. 301 (2011) (pointing out several ways the traditional patent incentives are not realized in the current systems in particular with respect to climate change).

31. Liscow & Karpilow, *supra* note 29, at 379-399.

32. *See generally, e.g.,* Stephanie Plamondon Bair, *Innovation's Hidden Externalities*, 47 BYU L. REV. 1385 (2022) (discussing how innovations cause externalities that are not factored into the cost of their use).

33. *See generally* Estelle Derclaye, *Patent Law's Role in the Protection of the Environment: Re-Assessing Patent Law and its Justifications in the 21st Century*, 4 INT'L REV. INTELL. PROP. & COMP. L. 249, 249 (2009) (concluding that patent law is an appropriate and justified field to involve in climate change mitigation).

34. *See generally* ELINOR OSTROM, GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION 2 (Canto Classics ed., 2015). A large part of the problems can be framed as there having been insufficient incentives to internalize the externalities related to consumption of natural resources and spoiling the environment. *See also generally* Harold Demsetz, *Toward a Theory of Property Rights*, 57 AM. ECON. REV. 347, 351-52 (1967).

reductions in GHG emissions.[35] Eventually, this will require the adoption of new technologies. It is necessary to factor in and actively consider innovation policy and the patent system to achieve GHG reductions by new technologies.[36]

From this perspective, one criticism of the patent system is that it provides patent owners with the ability to internalize the benefits of their invention but does not impose any mechanism that would force the patent owner, or anyone else, to consider the negative effects of the invention.[37] Another feature of how the patent system handles externalities is by inherently encouraging rapid exploitation of the invention rather than careful contemplation of the invention's effects by, e.g., searching for sustainable and efficient alternatives or embodiments.[38] This feature is deeply rooted in the foundations of the patent system. The patentee needs to be quick to commercialize the invention, because there is a limited timeline for patentees to recoup their investments before the invention enters the public domain. Where we require significant additional steps in the name of public policy—to ensure the safety of pharmaceutical products, for example—we provide extra periods of protection.[39] The problem with prolonged protection is that the public has to wait an increased amount of time before the patented technology is more freely available.[40] Thus, questions of the availability of technology to the public intertwine with patent protection.

Another question relates to the *ability* of the patent system to deal with external concerns like climate change, pollution, natural resource depletion and biodiversity and habitat losses. The World Trade Organization's (WTO) framework and particularly the Agreement on the Trade-Related Aspects of

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35. Rafael Leal-Arcas et al., *Green Bills for Green Earth: How the International Trade and Climate Regimes Work Together to Save the Planet*, 31 EUR. ENERGY & ENV'T L. REV. 19, 31-32 (2022). *See generally* Qi Liu & Bin Dong, *How Does China's Green Credit Policy Affect the Green Innovation of Heavily Polluting Enterprises? The Perspective of Substantive and Strategic Innovations*, 27 ENV'T SCI. & POLLUTION RSCH, 77113, 77113-14 (2022).

36. *See generally* Matthew Rimmer, *A Proposal for a Clean Technology Directive: European Patent Law and Climate Change*, 3 RENEWABLE ENERGY L. & POL'Y REV. 195, 195 (2011) (calling for developing comprehensive climate policy by involving patent law).

37. Peter Lee, *Patent Law's Externality Asymmetry*, 43 CARDOZO L. REV. 1923, 1927 (2022). It has been noted that not all positive externalities of green tech inventions are converted into property rights and profits, which may lead to too little incentives for development and commercialization of such technologies. Caoimhe Ring, *Patent Law and Climate Change: Innovation Policy for a Climate in Crisis*, 35 HARV. J. L. & TECH. 373, 383-84 (2021). On the other hand, this can be viewed as more efficient, socially, than centralizing all benefits to one party. *See generally* Mark A. Lemley, *Property, Intellectual Property, and Free Riding*, 83 TEX L. REV. 1031, 1031 (2005).

38. *Lee, supra* note 37*,* at 1967-68.

39. *See, e.g.,* U.S. Drug Price Competition and Patent Term Restoration Act of 1984, Pub. L. No. 98-417, 98 Stat. 1585; Regulation 469/2009 of the European Parliament and of the Council of 6 May 2009 concerning the Supplementary Protection Certificate for Medicinal Products, 2009 O.J. (L 152) 1-10.

40. These dynamics and consequences of additional protection have been extensively discussed in literature on pharmaceutical patents. *See generally, e.g.,* Aaron S. Kesselheim, Michael S, Sinha, & Jerry Avorn, *Determinants of Market Exclusivity for Prescription Drugs in the United States*, 177 JAMA INTERN. MED. 1658, 1658-64 (2017) (describing the kinds of exclusivities available for pharmaceutical products and their effects).

Intellectual Property Rights (TRIPS) can potentially block initiatives that seek to limit intellectual property (IP) rights to further environmental causes,[41] but international trade-related initiatives are especially relevant due to the global nature of the climate change problem.[42]

Environmental and trade regulations serve different purposes, but there is also a lot to accomplish within the trade sphere that can help humanity fight climate change.[43] As part of the WTO framework, IP is a potential target for programs that harness the power of trade regulation to pursue climate goals. Prospective areas include "green technology dissemination" and "enhancement of market access for green goods."[44] Articles of the TRIPS Agreement—e.g., Article 7—also recognize the subservient role of patents in the pursuit of "dissemination of technology" and "social and economic welfare."[45]

The WTO framework is not fundamentally in conflict with mitigating climate change.[46] Yet, the reality is that international trade is a substantial contributor to the climate crisis, and there is no effective mechanism that would place environmental causes above commercial interests.[47] Commercial interests are usually more concrete and enforceable,[48] which makes them easy to prioritize over the more vague and overarching environmental policies that might lack enforcement mechanisms.[49] The limitations that international free trade regulation places on climate change measures have been extensively discussed in legal scholarship,[50] but the same tensions still exist.

Consequently, applying any public interest-based exceptions to IP rights has been difficult.[51] Scholars have called for more practical implementation of sustainability principles that would reflect current societal priorities but not change the underlying logic of the IP system.[52] Furthermore, there

41. This issue with WTO and externalities has been discussed extensively with respect to access to medicine and the international trade regime's ability to observe human rights. *See generally* Gregory Shaffer & Susan K. Sell, *Transnational Legal Ordering and Access to Medicines*, in PATENT LAW IN GLOBAL PERSPECTIVE 1, 1-10 (Ruth L. Okediji & Margo A. Bagley, eds., 2014).

42. *See generally* Bradly J. Condon, *Climate Change and Unresolved Issues in WTO Law*, 12 J. INT'L ECON. L. 895, 895 (2009) (discussing how interpretations of WTO law limit climate change policy implementation).

43. Leal-Arcas, *supra* note 35, at 20 (describing the programs put in place by the EU to reduce GHG emissions and assessing their chances of success; calling for a global Green Deal and closer cooperation between trade and environment policies).

44. *Id.*

45. 1869 U.N.T.S. 299, art. 7.

46. In theory, as long as the measures are not discriminatory, the WTO does not limit the measures countries can adopt to protect the environment. Even the United Nations' instruments addressing climate change reject discriminatory measures. Leal-Arcas, *supra* note 35, at 22, 35-36.

47. *Id.*at 22-23, 39.

48. *See id.* at 35-39 (commenting on the difficulty of advancing climate goals due to, e.g., the strict non-discrimination rules of international trade).

49. Taina Pihlajarinne & Rosa Maria Ballardini, *Paving the way for the Environment: Channeling 'Strong' Sustainability into the European IP System*, 42 EUR. INTELL. PROP. REV. 239, 239-50 (2020).

50. *See generally* Condon, *supra* note 42.

51. *Id.*

52. *See* Pihlajarinne & Ballardini, *supra* note 49, at 18.

are also social justice issues and the effects on developing countries to consider.[53] According to some metrics, the Paris Agreement is profitable to the participating countries, and it actively recognizes the importance of innovation and new technologies[54]—contrasting the assumption that business interests and environmental protection would necessarily conflict at all. Thus, despite the practical issue of how to avoid triggering any WTO provisions, there is no reason why the patent system could not or should not be affected by the climate crisis.

From these theoretical starting points, I arrive at the appropriateness of the patent office initiatives in mitigating climate change. This paper highlights relevant arguments in favor of climate change and green technologies receiving special treatment within the patent system. I also describe and systematize existing patent office activities and their main features. Overall, patent office initiatives tend to be the least problematic and invasive in terms of the WTO framework, which can be a significant practical advantage.

B. How the Patent System Can Make a Difference

Various ideas have been discussed to increase green tech accessibility to the public via the patent system. Many authors suggested changes to substantive patent law, with both positive and negative effects on existing patent rights, either from the perspective of green technology or a conventional technology patent holder.[55] These suggestions include (1) compulsory

53. *See generally* Mahatab Uddin, *Intellectual Property Rights and Competition Law for Transfer of Environmentally Sound Technologies*, 34 PACE INT'L L. REV. 63, 63 (2022) (discussing how patented information may be well accessible and freely usable in the least developed countries, but innovation activities and the technologies themselves are located out of reach—all while the effects of climate change may be felt more severely in these locations); Michael Blakeney, *Climate Change and Gene Patents*, 2 QUEEN MARY J. INTELL. PROP. 2, 2 (2012) (discussing the effects of patents on food security in light of climate change); Anne Saab, *Climate-Ready Seeds and Patent Rights: A Question of Climate (in) Justice*, 15 GLOBAL JURIST 219, 219 (2015) (discussing social justice argumentation regarding patents and climate change).

54. Leal-Arcas, *supra* note 35, at 25. *See generally* Matthew Rimmer, *Beyond the Paris Agreement: Intellectual Property, Innovation Policy, and Climate Justice*, 8 L. 7, 7 (2019) (discussing how the Paris Agreement plays together with intellectual property systems).

55. *See generally, e.g.,* Estelle Derclaye, *Can and Should Patent Law Help Cool the Planet? An Inquiry from the Point of View of Environmental Law*, 5-6 INT'L ENERGY L. REV., 26-34 (2009) (hereinafter Derclaye 2009) (introducing the divide between positive and negative measures); Estelle Derclaye, *Not Only Innovation but also Collaboration, Funding, Goodwill and Commitment: Which Role for Patent Laws in Post-Copenhagen Climate Change Action*, 9 J. MARSHALL REV. INTELL. PROP. L. 657, 657-73 (2010) (calling for a combination of positive and negative measures); Wenting Cheng, *Intellectual Property and International Clean Technology Diffusion: Pathways and Prospects*, 12 ASIAN J. INT'L L. 370 (2022) (assessing potential ways to strike a balance between IP and climate change); Ye Wang, *Has China Established a Green Patent System? Implementation of Green Principles in Patent Law*, 14 SUSTAINABILITY 11152 (2022) (discussing comprehensive ways to implement greenness into the patent system).

licensing,[56] (2) a climate IP waiver,[57] (3) a duty to practice,[58] (4) patent ineligibility,[59] (5) a morality exception,[60] (6) using a prize system,[61] (7) unavailability of injunctions,[62] (8) environmental compensation fees,[63] (9) licensing pools/obligations and non-exclusive licenses,[64] (10) stronger and longer patent protection,[65] (11) price controls,[66] (12) broader experimental use exceptions and exhaustion principles,[67] (13) and alternative damages systems.[68]

The main issue in tampering with substantive patent rights is the conflict it creates with the WTO framework and the TRIPS Agreement and, hence, the legal and political difficulty of adopting such measures.[69] Additionally, due to the severe and potentially discriminatory nature of many of the proposed measures, their scope and reach would have to be very specific. This raises difficult questions regarding technology maturity and definitions.[70] These issues make many proposed tools difficult to administer and

56. Leal-Arcas, *supra* note 35, at 20, 23, 35-39; Rimmer, *supra* note 54, at 2, 9. *See also generally* Robert Fair, *Does Climate Change Justify Compulsory Licensing of Green Technology?*, 6 BYU INT'L L. & MGMT. R. 21, 29-41 (2010).

57. Leal-Arcas, *supra* note 35, at 23-24.

58. *See generally* Oskar Liivak & Eduardo M. Penalver, *The Right Not to Use in Property and Patent Law*,
98 CORNELL L. REV. 1437, at 1437, 1443, 1455, 1460 (2013) (arguing that a patentee's right not to use their proprietary invention should be limited when such non-use harms others or the public).

59. Rimmer, *supra* note 36, at 199-200; Sarnoff, *supra* note 30, at 336-44.

60. Rimmer, *supra* note 36, at 199-200; Sarnoff, *supra* note 30, at 336-44.

61. *See generally* Michael Abramowicz, *Perfecting Patent Prizes*, 56 VAND. L. REV. 115-16 (2003) (discussing the possibility of utilizing a prize system to place socially valuable innovations into the public domain).

62. *See generally* Samuel Cayton, *The "Green Patent Paradox" and Fair Use: The Intellectual Property Solution to Fight Climate Change*, 11 SEATTLE J. TECH., ENV'T & INNOVATION L. 214, at 216-19, 232-45 (2020) (discussing the possibility of fair use type of exemptions for green tech patent infringement).

63. *See generally* Itaru Nitta, *Proposal for a Green Patent System: Implications for Sustainable Development and Climate Change*, 5 SUSTAINABLE DEV. L. & POL'Y 61, 61-63 (2005) (suggesting patent applicants and holders pay a climate compensation into a trust fund based on the environmental effects of the invention).

64. Enrico Bonadio, *Climate Change and Intellectual Property*, 1 EUR. J. RISK REG. 72, 75-76 (2010); Piana, *supra* note 3, at 48; Sarnoff, *supra* note 30, at 349, 353-54; *see generally also* Andrea Nocito, *Innovators Beat the Climate Change Heat with Humanitarian Licensing Patent Tools*, 17 CHI.-KENT J. INTELL. PROP. 164, 165, 168, 171, 177, 179-85, 187-88 (2017).

65. Pihlajarinne & Ballardini, *supra* note 49, at 18-19; Derclaye 2009, *supra* note 55, at 31-32.

66. Fair, *supra* note 56, at 40.

67. Sarnoff, *supra* note 30, at 344-48, 356-60; Rimmer, *supra* note 36, at 202.

68. Wang, *supra* note 55, at 16-17 (discussing punitive damages for patent infringement that was environmentally harmful).

69. *See* Bonadio, *supra* note 64, at 75 (discussing the difficulty of adopting IP waivers). *Cf.* also the difficulties in adopting the COVID-19 IP waiver. *See, e.g., TRIPS Council Welcomes MC12 TRIPS Waiver Decision, Discusses Possible Extension*, WIPO (July 6, 2022), https://www.wto.org/english/news_e/news22_e/trip_08jul22_e.htm [https://perma.cc/K6GP-5C4L].

70. *See* Derclaye 2009, *supra* note 55, at 35-38 (on potential ways to define green innovation); Sarah Tran, *Expediting Innovation*, 36 HARV. ENV'T L. REV. 123, 154-58 (2012) (on the difficulties of defining green innovation and the risk of free-riding by innovations with little social worth); Marinella Favot et al., *Green Patents and Green Codes: How Different Methodologies Lead to Different Results*, 18 RESOURCES, CONSERVATION & RECYCLING ADVANCES 200132 (2023) (showing that it is difficult to even identify the amount of existing green patents and how different institutions apply different methods

may lead to increased legal uncertainty. They may also make the tool ineffective or obsolete due to its applicability in rare circumstances only.[71] Still, adopting more extreme policies should not be prematurely ruled out because we likely cannot obtain sufficient results with more benign measures.

Additionally, patent offices can host different kinds of initiatives, which can theoretically be either positive (providing benefits and tools) or negative (setting additional requirements or denying benefits) in how they treat the applicant.[72] These initiatives affect the innovation and patenting process and subsequent commercialization rather than substantive patent rights. Patent office action on this front is both an established and evolving landscape. The current initiatives are roughly divided into four categories: accelerated examination, search platforms, applicant resources, and publicity and awareness.

The best-known and most discussed of the currently adopted tools is accelerated examination, i.e., fast-tracking of green patent applications. As noted above, these programs have existed for some time now in several countries, but new programs have also started and existing programs are updated.[73] The IPO GREEN also highlights the option of setting up green patent prosecution highways that allow different patent offices to share the workload and accelerate the examination.[74] These highways are considered harmonized, international fast tracks.[75]Additionally, many Asian countries have established a regional green patent acceleration program.[76]

The second group of existing initiatives falls under the term search platforms. Search platforms make it easier for applicants to find up-to-date information on their field of endeavor and more commercialization and alternative development options. These initiatives include the WIPO GREEN and the EPO clean tech platforms. Specifically, these platforms have data and

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to accomplish this). This also relates to how novel green tech is presumed to be both incremental in nature and an alternative to existing solutions. *See generally* J.M. Allwood et al., ABSOLUTE ZERO: DELIVERING THE UK'S CLIMATE CHANGE COMMITMENT WITH INCREMENTAL CHANGES TO TODAY'S TECHNOLOGIES (Nov. 29, 2019), http://www.ukfires.org/wp-content/uploads/2019/11/Absolute-Zero-online.pdf [https://perma.cc/LR7L-XTEV]; Ring, *supra* note 37, at 1972. *See also* Ofer Tur-Sinai, *Cumulative Innovation in Patent Law: Making Sense of Incentives*, 50 IDEA 723 (2015) (discussing ways to reconcile cumulative innovation with exclusive rights).

71. *Cf.* How compulsory licensing of pharmaceutical patents has not been practicable under the existing frameworks. *See* Uddin, *supra* note 53, at 55-75.

72. *See* Derclaye 2009, *supra* note 55, at 26-34.

73. *See, e.g.,* Moreira, *supra* note 11; WIPO, IPO GREEN POLICY NOTE 1: ACCELERATED PATENT PROSECUTION (accessed Nov. 18, 2023), https://www3.wipo.int/wipogreen/en/docs/ipo-green-policy-note-1.pdf [https://perma.cc/T4M9-K2CQ].

74. WIPO, IPO GREEN POLICY NOTE 8: GREEN PATENT PROSECUTION HIGHWAYS (accessed Nov. 18, 2023), https://www3.wipo.int/wipogreen/en/docs/ipo-green-policy-note-8.pdf [https://perma.cc/2PFE-KSSJ].

75. *See generally* Eric L. Lane, *Building the Global Green Patent Highway: A Proposal for International Harmonization of Green Technology Fast Track Programs*, 27 BERKELEY TECH. L.J. 1119 (2012).

76. WIPO, IPO GREEN POLICY NOTE 4: REGIONAL COOPERATION ON GREEN IP MATTERS (accessed Nov. 18, 2023), https://www3.wipo.int/wipogreen/en/docs/ipo-green-policy-note-4.pdf [https://perma.cc/6ACH-NFSL]; POLICY NOTE 8, *supra* note 74.

analysis tools,[77] new classification systems that facilitate access to information,[78] and business contact matchmaking platforms.[79] WIPO GREEN hosts one business contact matchmaking platform, but generally social platforms can be more cumbersome to operate than purely technology-based platforms, and their outcomes are generally outside the control of patent offices.[80] However, to the extent that these platforms are database-driven, they contribute to the access function.

A third initiative is applicant resources. It is helpful to consider matchmaking platforms in this context since they can involve active consultations and workshops.[81] Applicant resources would also include financial support for applicants and entrepreneur services.[82] Financial support includes reduced or removed issuance and maintenance fees or patent prosecution financial aid.[83] Entrepreneur services can include various resources regarding IP strategy and further development and commercialization of green technologies, such as mentorship, advisory, and training services.[84] Several countries offer some versions of these services, and they should increase these efforts even more—especially financial support, where one roadblock is the self-funding model of many patent offices.[85] This funding model requires patent offices to cover most of their operative costs by various processing fees,[86] which discourages offering extensive price reductions and, to the extent they are available, requires strict definitions regarding who is eligible to obtain them.[87]

The fourth group is called publicity and awareness. These initiatives include (1) different green technology campaigns and awareness-raising

77. WIPO, IPO GREEN POLICY NOTE 2: PROVISION OF GREEN DATA AND ANALYSIS BY THE IP OFFICE (accessed Nov. 18, 2023), https://www3.wipo.int/wipogreen/en/docs/ipo-green-policy-note-2.pdf [https://perma.cc/48JJ-LF3F].

78. WIPO, CLASSIFICATION SYSTEMS FOR GREEN TECHNOLOGY SOLUTIONS, (accessed Nov. 18, 2023) https://www3.wipo.int/wipogreen/en/docs/ipo-green-policy-note-6.pdf [https://perma.cc/WVC2-ZZ48].

79. WIPO, IPO GREEN POLICY NOTE 3: MATCHMAKING AND BUSINESS ROUNDS (accessed Nov. 18, 2023), https://www3.wipo.int/wipogreen/en/docs/ipo-green-policy-note-3.pdf [https://perma.cc/U2HQ-X29N].

80. *See id.*

81. *Id.*

82. WIPO, IPO GREEN POLICY NOTE 11: FINANCIAL SUPPORT FOR GREEN PATENT APPLICATIONS (accessed Nov. 18, 2023), https://www3.wipo.int/wipogreen/en/docs/ipo-green-policy-note-11.pdf [https://perma.cc/3EKJ-WTFZ]; WIPO, IPO GREEN POLICY NOTE 12: IP SERVICES FOR ENTREPRENEURS (accessed Nov. 18, 2023), https://www3.wipo.int/wipogreen/en/docs/ipo-green-policy-note-12.pdf [https://perma.cc/H7F9-UVPJ].

83. IPO GREEN POLICY NOTE 11, *supra* note 82. *See also* Derclaye 2009, *supra* note 55, at 31.

84. IPO GREEN POLICY NOTE 12, *supra* note 82; WIPO, IPO GREEN POLICY NOTE 13: AWARDS FOR GREEN TECHNOLOGY INNOVATION (accessed Nov. 18, 2023), https://www3.wipo.int/wipogreen/en/docs/ipo-green-policy-note-13.pdf [https://perma.cc/4P65-2GPJ].

85. IPO GREEN POLICY NOTE 11, *supra* note 82; IPO GREEN POLICY NOTE 12, *supra* note 82.

86. Joshua S. Gans et al*., Patent Renewal Fees and Self-Funding Patent Offices*, U. MELBOURNE LEGAL STUDIES RSCH. PAPER NO. 64 (Feb. 24, 2004) 1–2, https://ssrn.com/abstract=515162 [https://perma.cc/W6FB-5F7E].

87. IPO GREEN POLICY NOTE 11, *supra* note 82. *Cf.* Chien, *supra* note 30, at 859 (discussing fee reductions for purely defensive patents to facilitate technology diffusion).

activities,[88] competitions, and award programs that raise visibility,[89] collaboration, and training with other government agencies and officials,[90] and (2) general international cooperation with other patent offices and their green technology initiatives.[91] These programs target policy and public perceptions.

In addition to the programs highlighted by IPO GREEN,[92] patent offices could potentially require climate disclosures from applicants.[93] Patent offices could theoretically provide less favorable treatment to environmentally harmful inventions.[94] However, this starts to approach substantive law measures or at least activates several such concerns. Overall, it seems that the positive tools described above are favorable as patent office initiatives. Before discussing the specific effects of these initiatives, I briefly discuss the more general features of operating at the patent office level.

C. Why Look to Patent Offices

In their basic form, green technology-related patent office initiatives provide certain benefits to inventions that are perceived desirable due to their environmental effects. The main weakness of patent office initiatives is their limited reach—patent offices are only part of the patenting process and steps shortly preceding or following it. WIPO GREEN, for example, has been able to extend its reach to the development and commercialization phase, but it can only act as a facilitator. Patent office initiatives are a lucrative option to adopt, at the very least, to complement other more rigid measures, because they lack some of the biggest issues encountered with substantive patent law, as described next.

Firstly, implementing patent office initiatives is less burdensome than adopting substantive law tools because initiatives require no exceptions to existing rights and are thus less problematic from the perspective of international law. Implementing initiatives works from within the patent system and

88. WIPO, IPO GREEN POLICY NOTE 10: IP AWARENESS-RAISING ACTIVITIES (accessed Nov. 18, 2023), https://www3.wipo.int/wipogreen/en/docs/ipo-green-policy-note-10.pdf [https://perma.cc/XQG5-A9FH].

89. IPO GREEN POLICY NOTE 13, *supra* note 84. *See also, e.g., USPTO Announces New Patents for Humanity Green Energy Category*, *supra* note 8.

90. WIPO, IPO GREEN POLICY NOTE 7: TRAINING GOVERNMENT OFFICIALS ABOUT GREEN INNOVATION (accessed Nov. 18, 2023), https://www3.wipo.int/wipogreen/en/docs/ipo-green-policy-note-7.pdf [https://perma.cc/VKA8-ABVM].

91. IPO GREEN POLICY NOTE 4, *supra* note 76; WIPO, IPO GREEN POLICY NOTE 5: JOINT INITIATIVES WITH WIPO GREEN (accessed Nov. 18, 2023), https://www3.wipo.int/wipogreen/en/docs/ipo-green-policy-note-5.pdf [https://perma.cc/GMV4-UDGX].

92. Yet another IPO GREEN initiative concerns the upcycling of confiscated infringing goods, but that is not included in the discussion of this paper. WIPO, IPO GREEN POLICY NOTE 9: UPCYCLING PROGRAM FOR COUNTERFEIT GOODS (accessed Nov. 18, 2023), https://www3.wipo.int/wipogreen/en/docs/ipo-green-policy-note-9.pdf [https://perma.cc/WDQ9-MLF9].

93. *See, e.g.,* Lee, *supra* note 37, at 1988-1992 (contemplating a requirement to disclose external societal effects of inventions).

94. *See* Derclaye 2009, *supra* note 55, at 31-32.

is adopted on the existing mandate of the patent office without legislative changes. This makes solution finding quicker, more flexible, and suitable for experimentation. These initiatives give patent offices helpful tools and the freedom to explore what works best while waiting for more rigid measures.

Patent office initiatives are also interesting because they do not prolong the patent term—and thus do not "cost" anything to the public[95]—but they may speed up the dissemination of green technology.[96] The potential speeding effect is significant because technology is key in reducing GHG emissions and levels as well as resolving many of the related issues regarding habitability, health, and security.[97] Patent office initiatives may also have international effects despite being formally administered by one country or region, as resource-based tools are not bound to one patent office, and international collaboration, as well as cross-agency collaboration, is generally increasing.[98]

To the extent a program includes tangible discrimination based on the content of the invention—by way of fees, low-priority treatment, or similar—the patent office would probably have to have clear rules regarding which applications are granted or rejected benefits. This line-drawing activates the fundamental yet unresolved dilemma of regulating use versus regulating grant of rights: Is it appropriate to judge the sustainability or moral desirability of a technology at the patenting stage, or should that only be considered once the technology is in use?[99] Morality standards in patent law tend to be fuzzy: Who should decide what is bad enough to justify a restriction of patent rights? Most inventions are not inherently polluting or unsustainable; the outcome depends on how they are implemented and coupled with other solutions.[100] For example, an industrial process may be harmful on paper, but its combination with other technologies mitigates the polluting effects. Patenting should not be precluded for inventions that appear harmful in isolation. Rather, we should require invention embodiment and implementation so that the net effect on the environment is sustainable. This logic leads to the conclusion that sustainability is an issue for regulation, not for the scope of property rights. Thus, negative interference with the patenting

95. *See, e.g.,* Lucas S. Osborn, *A Case for Weakening Patent Rights*, 89 ST. JOHN'S L. REV. 1185 (2015) (for discussion of the costs of patent systems).

96. *See generally* Dechezleprêtre, *supra* note 10.

97. *See, e.g.,* Tania Sebastian, *A 'Chennai' in Every City of the World: The Lethal Mix of the Water Crisis, Climate Change, and Governance Indifference*, 4 LAW, TECH. & HUM. 79, at 86, 91-93 (2022); UNFCCC, *supra* note 3.

98. *See* IPO GREEN, *supra* note 7.

99. *See generally* Julien Crockett, *Morality: An Important Consideration at the Patent Office*, 108 CALIF. L. REV. 267 (2020) (summarizing this debate from the recent decades).

100. *See* Lee, *supra* note 37, at 1988-90. Even with respect to fossil fuel inventions, sustainability and "greenness" is a matter of degree. Yasmin Lambert, *Green Patents Slow as Net Zero Deadlines Edge Closer*, FINANCIAL TIMES (June 15, 2022), https://www.ft.com/content/dcff4b52-bb21-4596-a66b-24753635df0c [https://perma.cc/LM6B-UFLN].

process is suspect because conclusions regarding the desirability of the technology are likely to lack accuracy and usefulness.

In essence, similar questions on definitions arise concerning patent offices providing positive treatment for environmentally beneficial technologies:[101] What is the appropriate moment to judge whether an invention is environmentally sustainable? We can look at the patent claims: Do they directly address GHG levels in any way? If impacting the environment is the main objective of the invention, then it probably qualifies as "green technology." To the extent that the invention is an incremental improvement and merely "better" than (some) prior art from the perspective of sustainability, we run into the issue of what counts as good enough.[102] Is it sufficient if one embodiment is better on some metric? Or must the patented invention be explicitly related to climate change? What if the claims also cover less effective and less green embodiments? Does it matter how the patentee intends to embody the invention? Based on these open-ended questions, it does not make sense to be overly critical of the invention's potential effects before public dissemination or before the characteristics of a commercial embodiment have crystallized.[103] Climate disclosures, for instance, could easily become an administrative burden that causes patentees to overreport or underreport environmental impacts; alternatively, forcing the patentees to consider these aspects may be enough to make the invention and its implementation more environmentally friendly.[104]

Definitions and eligibility may become significant barriers to the effective administration of patent office programs.[105] However, it seems that most existing programs circumvent these issues by two mechanisms: First, making the respective patent office program openly accessible without complex pre-election of eligible patent applications increases the likelihood of capturing all desirable inventions that want the benefit.[106] Easy access can also direct patent applicants to think of their claims and invention implementations in a way that considers environmental aspects—thus better internalizing the invention's external effects. Second, targeting the program's core relatively concisely should naturally rule out technologies that do not fit the

101. *See* Derclaye 2009, *supra* note 55, at 35-38; Tran, *supra* note 70, at 154-58.

102. *See* Lambert, *supra* note 100 (discussing the difficulty of drawing the line between green and "other" technology: Does diesel count? Does AI count?).

103. *But see* Lee, *supra* note 37, at 1941-49 (arguing that, e.g., social media, autonomous vehicles, and big data patents should discuss how to mitigate the social harms caused by the use of the claimed inventions).

104. *Id.* at 1991-92.

105. *See* Tran, *supra* note 70, at 148-51 (for discussion on how the initial model of the first USPTO fast-tracking pilot had major problems with definitions, eligibility criteria and poor pay-off for applicants).

106. *See* Lane, *supra* note 75, at 1143. For example, the UK program, which is generally considered a success, only requires self-qualification by applicants. *See also* Diana Bentley, *How Patent Law Supports the Fight Against Climate Change*, RACONTEUR (Dec. 2, 2021), https://www.raconteur.net/legal/patent-law-climate-change/ [https://perma.cc/7MVR-4JAY].

description of "sustainable" or "green."[107] Within the fast-tracking, fee reductions, and other resource-consuming programs, exclusionary effects are enhanced by having the information on the benefited applications publicly available (or possibly combining the benefit with other programs) to reduce misuse. These measures increase ease for applicants and patent office program management. Most importantly, focus on self-qualification dodges the critical questions of definitions and administrability that other proposed patent law solutions face.

Of course, all proposed patent law measures come with their downfalls, and none alone can fully achieve the goals of facilitating green innovation and its dissemination to the public. Ultimately, we will need an effective combination of measures—a significant portion of which should come from outside patent law. Nonetheless, patent offices are interesting to explore because they have a few straightforward ways to contribute. With these more abstract justifications and arguments in mind, I next discuss the more tangible effects of these patent office initiatives.

II. A CONTEMPORARY VIEW OF PATENT OFFICE INITIATIVES

This part discusses the benefits and issues of patent offices' green technology initiatives. The focus is on the overarching themes and effects identified and traditionally discussed in the context of green technology fast-tracking programs. I assess recent initiatives considering the arguments arising from the fast-tracking context. The evaluated factors include fairness of special treatment, facilitation of technology diffusion, strategical nonuse of the benefits, and signaling effects.

A. Is Special Treatment of Green Tech Fair?

Fast-tracking allows green technology applications to skip the line, which leads to faster patent grants.[108] The "time-to-grant period" is reduced up to 75% through fast-tracking.[109] Faster grants provide certainty and secure benefits to the applicants, such as better access to funding and faster commercialization.[110] The other tools provided for green tech applicants have similar ideas behind them: search platforms and applicant resources help make the commercialization of green technologies cheaper and smoother, as elaborated below.

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107. Concise scope would be, *e.g.*, in the case of the US pilot "GHG emission reduction" and in the EPO search platform the different subcategories of "clean tech." As a weakness, these scopes might still rule out, *e.g.*, infrastructure technology that is crucially needed for green tech dissemination but might not strictly qualify as green tech itself. Roberts, *supra* note 26.

108. Bingbin Lu, *Expedited Patent Examination for Green Inventions: Developing Countries' Policy Choices*, 61 ENERGY POL'Y 1529, 1531 (2013).

109. Dechezleprêtre, *supra* note 10, at 10.

110. Lane, *supra* note 75, at 1126-27; Moreira, *supra* note 11; IPO GREEN POLICY NOTE 1, *supra* note 73.

The low-hanging counterargument to these systems is fairness: patent offices should grant patents on a first-come-first-served basis, and it is unfair that some applications are stuck in the backlog while others skip the line.[111] This is problematic in systems where the fast-track program selects only specific types of innovation.[112] In the EPO, for example, fast-tracking can be requested by anyone,[113] and some patent offices are content with the applicant's statement that there are environmental benefits to the invention.[114] Additionally, data shows that corporate innovators with established revenue streams may not be interested in fast-tracking because they prefer to keep the claims secret or open to amendments for a longer time to gain competitive advantages.[115]

The fairness argument against fast-tracking is not strong considering the data. The fairness argument is easily rebuttable with Part I's reasoning regarding societal priorities. Important public policy supports climate change mitigation; therefore, some inventions merit special treatment.[116] The biggest challenge regarding fairness relates to questions of definitions and eligibility for programs directed to a subset of applicants.[117] Two ways to resolve exclusive programs issues are (1) implementing the type of open access but narrow tailoring outlined above and (2) carefully observing the reality of who is participating and who is left out. For example, if a program rejects a significant number of applicants willing to participate, it may not be appropriately tailored.[118] Although relevant fairness concerns may arise, specific program design can mitigate these concerns.

B. Facilitating Technology Dissemination

It is critical that climate change mitigation appropriate technology is invented and *used*.[119] Traditionally, the efficiency of technology dissemination tends to be an afterthought when discussing the incentives created by

111. Lu, *supra* note 108, at 1531; Derclaye 2009, *supra* note 55, at 32; Tran, supra note 70, at 159-62. *See* USPTO, *supra* note 1; EPO, *supra* note 1 (current examination times).

112. *See* Antoine Dechezleprêtre & Eric Lane, *Fast-tracking Green Patent Applications*, WIPO MAG. (June 2013), https://www.wipo.int/wipo_magazine/en/2013/03/article_0002.html [https://perma.cc/CD5E-KUZT].

113. EPO, *supra* note 1.

114. Dechezleprêtre & Lane, *supra* note 112.

115. Dechezleprêtre, *supra* note 10, at 16. However, there are also large multinational corporations among fast-tracked applicants. *Id.* at 14.

116. *See, e.g.,* Lu, *supra* note 108, at 1531.

117. In particular financial support programs. *See, e.g.,* IPO GREEN POLICY NOTE 11, *supra* note 82.

118. For example, the first USPTO fast-tracking pilot program initially ruled out many applications due to classification issues and the Korean program, too, rejected around a third of submitted applications in the first years of operation. *See* Dechezleprêtre, *supra* note 10, at 4, 6.

119. Lane, *supra* note 75, at 1121-22; *see generally* Piana, *supra* note 3; Krishna Ravi Srinivas, *Climate Change, Technology Transfer and Intellectual Property Rights*, RIS DISCUSSION PAPER SERIES (July 29, 2009) https://ssrn.com/abstract=1440742 [https://perma.cc/7VQF-B4P8].

the patent system.[120] Focus on green technology dissemination rather than merely on the early innovation phase is now gaining more attention in all fora.[121] This focus is an ultimate goal of patent office initiatives.[122]

Literature suggests that patents are relevant for the creation of inventions and also significantly affect whether innovations end up commercialized and diffused in society.[123] Two policy questions are central to green technology diffusion. The first is how to observe the financial realities of companies and the difficulty of timing patent applications optimally, especially in the case of large-scale technologies.[124] The second issue is whether we should focus more on the emergence of novel, disruptive technologies rather than finetuning existing solutions.[125]

In addressing either issue, fast-tracks for green technology patent applications are the most concrete tools so far available within patent law that specifically promote green technology development and diffusion.[126] So, does fast-tracking work in practice? According to the data from 2013, it does.[127] Based on the data, a typical fast-track user would be a small but fast-growing company with a single, highly valuable patent application filed in numerous patent offices.[128] It is easy to see how such a company might benefit from faster examination and how this may be useful for the public: it may accelerate revenue generation, commercialization, and public access. The effects of fast-tracking are not limited to a faster grant of the individual patent but extend to knowledge diffusion: ideas in fast-tracked patents tend to spread more broadly than those in regular patents.[129] The dissemination-facilitation function of fast-tracking is two-fold: faster patent grants will potentially advance the commercialization of the claimed invention and accelerate the development of follow-up innovation due to earlier publication, market-entry, and potential inclusion to search platforms. Moreover, some speculate that the greater number of citations to fast-tracked patents improves access to green technologies by increasing the public domain and

120. *See, e.g.,* Bonadio, *supra* note 64, at 73-74; Chien, *supra* note 30, at 799-800. *See generally also* Ahmed Abdel-Latif, *Intellectual Property Rights and the Transfer of Climate Change Technologies: Issues, Challenges, and Way Forward*, 15 CLIMATE POL'Y 103 (2015) (summarizing the debate on the tension between incentive to innovate and effective technology dissemination).

121. Ring, *supra* note 37, at 381-82.

122. *See* IPO GREEN, *supra* note 7.

123. *See generally, e.g.,* Ring, *supra* note 37; Zhou, *supra* note 29; Eric E. Johnson, *Intellectual Property and the Inventive Fallacy*, 39 FLA. ST. U. L. REV. 623 (2012). *See also* Piana, *supra* note 3, at 38-41; Tran, *supra* note 70, at 152-53.

124. *See generally* Ring, *supra* note 37; Lane, *supra* note 75.

125. Allwood, *supra* note 70, at 9–10.

126. Bentley, *supra* note 106; Tran, *supra* note 70, at 152-53 (arguing that the first USPTO pilot *only* affected technology dissemination and not incentives to innovate).

127. *See generally* Dechezleprêtre, *supra* note 10 (finding that fast-tracking reduces examination times by 42–75% and results in twice as many citations for the participating patents).

128. *Id.* at 11, 15-17.

129. *Id.* at 12.

limiting subsequent exclusive rights.[130] Many doubt the significance of earlier publications alone, as patents are not necessarily a notable source of information,[131] but combined with the search platform tools, earlier publication can be useful.[132]

Search platforms ultimately contribute to the same ends as fast-tracking. By providing easy access to relevant patent searches and prior art information, two main effects can be presumed for the applicant: Firstly, the platform may improve the quality of the initial patent application if the applicant can better place the invention into the context of the prior art and recognize its value and patentability. Optimally, the value recognition will translate into more efficient and realistic funding and partnering. The patentability assessment, in turn, should lead to fewer issues arising during the examination, contributing to faster grants. This effect can be global because the utilization of the information and the market for green technology is global.[133] Secondly, from a pragmatic perspective, making information more accessible and streamlining the searches may free up resources. As said, the typical beneficiary of these programs would be a startup company with a single, valuable invention.[134] Often, such companies would be on a tight budget with limited assets, and it is helpful to spend fewer hours and dollars on the administrative parts of the patenting process. It is more fruitful for the patentee to focus on further developing and commercializing the technology, raising capital, and securing partnerships—rather than reformulating the patent claims repeatedly while unsure about what comes next. This view is simplified, but it is essential to address the significance of the delays and the patent attorney bill for applicants.[135]

Additionally, search platforms perform a knowledge-sharing function that can inspire new innovation and inform investors and policymakers, thereby increasing overall market efficiency.[136] This further contributes to green technology dissemination.

Initiatives under the category of applicant resources address the issue of resource allocation, both by saving the applicant's funds in the early

130. Prateek Viswanathan, *The United States' Climate Patenting Behavior After the Paris Agreement Withdrawal Announcement: An Empirical Analysis and a Fast-Track Proposal*, 2021 U. ILL. L. REV. 261, 306 (2021). This effect can be presumed due to, e.g., more technologies becoming obvious. *See also generally* Chien, *supra* note 30, at 807, 825-26 (discussing the public domain and defensive publication strategies in technology diffusion).

131. *See* Sarnoff, *supra* note 30, at 316.

132. *See, e.g.,* Chien, *supra* note 30, at 851-52 (highlighting the significance of having accessible information on patents that are available to license; pointing out the issue that providing such information may affect available patent remedies).

133. Lane, *supra* note 75, at 1132.

134. Dechezleprêtre, *supra* note 10, at 11, 15.

135. In reality, it must be noted that startups have varying interests and strategies, which affects the ways they utilize the patent system. *See generally* Stuart J.H. Graham et al., *High Technology Entrepreneurs and the Patent System: Results of the 2008 Berkeley Patent Survey*, 24 BERKELEY TECH. L. J. 255 (2009).

136. *See*, e.g., Chien, *supra* note 30, at 799-800; *Key Resources for Clean Energy, supra* note 16.

phases of commercialization and by helping them to avoid costly problems that might arise later. Applicant resources further empower the patentee to make conscious choices on these topics during and after the patenting process. The combination of fewer legal issues and more patentees aware of their rights should translate into better chances of successful commercialization as well as faster, widespread dissemination to the public of the respective technology.

Thus, search platforms and applicant resources can contribute to faster patenting processes and green technology diffusion on the global level, independent of formal fast-tracking programs. Search platforms and applicant resources also have the potential to target a broader scope of the innovation process and potentially complement some of the shortcomings of fast-tracking.

C. Better off without the Benefit?

One disappointment in the green tech fast-tracking initiatives is limited applicant use. [137] Countries reported objectively low numbers of utilization.[138] Cited causes include the complexity of the different national systems with varying eligibility and procedural requirements.[139] Additionally, a patentee is not always better off with a quick patent grant; there is less time to finetune the claims, patent maintenance costs hit quicker, and the patent may be published earlier.[140] Some suggest that a patentee gains substantial benefits from fast-tracking only if there is a threat of infringement or a need for capital and partnerships.[141] These considerations have not recently changed significantly, but search platforms and applicant resources may alleviate some.

Keeping up with the varying national approaches and programs requires lots of applicant work, which may be a significant burden for small companies.[142] This led to calls for international harmonization of the fast-tracking systems,[143] which has not yet happened but should be a priority to make participation more lucrative.[144] Some offices discuss green patent prosecution highways, which would expand fast-tracking benefits across borders.[145]

137. *See* Dechezleprêtre & Lane, *supra* note 112.

138. E.g., only 43 applications in Australia and 78 in Israel over a period of three years and fewer than 50 in a year in Canada. Dechezleprêtre, *supra* note 10, at 6-7; Brazil's initial pilot had fewer than one hundred applications. Douglas Alves Santos et al., *Assessing Patented Technologies within the Brazilian "Green" Patent Applications Program* 2012-2014 (VPI 2014 Global Tech Mining Conference paper) (available at https://gtmconference.org/abstracts/2014/EXTEND7.pdf [https://perma.cc/UH2M-5GCV]).

139. Dechezleprêtre & Lane, *supra* note 112.

140. Dechezleprêtre, *supra* note 10, at 8.

141. *Id*.

142. *See generally* Lane, *supra* note 75.

143. *Id.*

144. Dechezleprêtre & Lane, *supra* note 112.

145. IPO GREEN POLICY NOTE 8, *supra* note 74.

Search platforms and applicant resources will not directly address the hurdle of many national systems, but they may provide some relief concerning the resources required for patent prosecution. IPO GREEN can generally work to increase international collaboration and compatibility of the various programs.[146]

The main benefit of withholding from a fast-tracking program is securing a priority date while allowing more time to perfect the patent claims to match practical embodiments and to work on the invention's commercialization procedure.[147] For example, in the UK, a green technology patent may be granted in six to nine months.[148] This timeline may be too fast if a patentee seeks a patent in the early stages of discovery without clear commercial plans.

The fact that several applicants may not want to participate does not make patent office initiatives obsolete. Offering programs and tools empowers applicants. Applicant needs vary depending on their revenue, funding, and technology maturity.[149] Ultimately, applicants prefer retaining control by going through the patent system quickly or slowly, based on their needs.[150] Applicants may not want to receive a patent before they know what they want to do with the invention or wait years to know if their invention is patentable. Continued improvement of available tools is valuable, even if only some qualified applicants use them.

D. Signaling Effect

The final argument in favor of patent office initiatives is that in the absence of any harmful effects, these initiatives send a signal about what we, as a society, want and value. Signaling, as well as more tangible policy effects, can be obtained through publicity and awareness tools, but other programs can also contribute by their existence and promotion. If we focus on the signaling effect, we might not care if the programs are effective in their technology dissemination function. They do not hurt, but they send a signal and sometimes they *might* help.

For the signaling effect to be considerable, there should be sufficient promotion of these initiatives. Patent attorneys are likely familiar with available programs, but the public should have more exposure to these programs. The availability and promotion of other unrelated fast-track options and policy goals may blur the landscape and the significance of climate change

146. *See generally id.*

147. Bentley, *supra* note 106.

148. *Id.*

149. *See generally* Dechezleprêtre, *supra* note 10; Graham, *supra* note 135.

150. *See* Chien, *supra* note 30, at 801, 841, 858-59 (arguing for increasing control of patentee and focusing on voluntary tools to promote technology diffusion).

mitigation tools, even if they are important for a subcategory of applicants.[151] Patent offices are not known for their vivid marketing campaigns, but this could be an area of improvement. IPO GREEN provides support and practical tips in this area. For example, IPO GREEN recommends creating green tech-focused content based on existing training and campaign materials.[152]

One may see signaling through a negative lens: Since the launch of green tech fast-tracks, there have been concerns regarding whether they will act as green-washing tools that merely provide a sense of comfort due to the illusion of doing something while the practical effects remain negligible.[153] Regarding green-washing, there is evidence that customers and investors can value the "green patent" label obtained by participation in a fast-tracking program.[154] For the comfort and illusory effect, the concern is that they will distract and take up resources from more efficient programs. This may be a valid concern, but to the extent further tools and initiatives are being developed and not rejected based on the existence of these light first-wave programs, this does not sound like a real danger. Some of the programs promoted by IPO GREEN are more resource-intensive than others;[155] that will probably make patent offices more critical in assessing whether their programs provide sufficient pay-off.

One may question the relevance of the signaling by pointing out that specific green technology fast-tracks are not necessarily needed to get lots of green innovation patents. For example, Germany has been at the top of the list for green tech innovators for a long time despite not having a specific green technology fast-track program.[156] The EPO has the general fast-tracking program without distinction between types of technologies, which may lead to more efficient outcomes due to fewer resources put to eligibility questions.[157] That may be a good argument against the *necessity* of fast-tracking, but it does not negate the general need for effective policy tools—after all, the current innovation figures are also a result of public policies and market developments.[158] Search platforms and applicant resources are further tools

151. For information on other fast-track options, s*ee, e.g., Green Technology Pilot Program – CLOSED, supra* note 9; Ricardo D. Nunes, *Brazil Announces New Fast Track Options for Patent Examination*, MANAGING IP (Oct. 23, 2020), https://www.managingip.com/article/2a5cxnmoiyww9zjesaigw/brazil-announces-new-fast-track-options-for-patent-examination [https://perma.cc/8V47-HSSL].

152. *See* IPO GREEN POLICY NOTE 10, *supra* note 88.

153. *See* Jeffrey Mervis, *Will Fast-Tracking Green Tech Patent Applications Help Transform the Economy?*, SCIENCE (Dec. 8, 2009), https://www.science.org/content/article/will-fast-tracking-green-tech-patent-applications-help-transform-economy [https://perma.cc/85WW-VYNJ].

154. Moreira, *supra* note 11.

155. *See, e.g.,* IPO GREEN POLICY NOTE 3, *supra* note 79.

156. Antoine Dechezleprêtre et al., *Invention and Transfer of Climate Change–Mitigation Technologies: A Global Analysis*, 5 REV. ENV. ECON. & POL. 109, 116 (2011); *Germany is Leading in the Field of Climate-friendly Innovations*, GERMAN PATENT AND TRADEMARK OFFICE (Mar. 29, 2022), https://www.dpma.de/english/services/public_relations/press_releases/29march2022/index.html [https://perma.cc/M8BM-9S73].

157. Dechezleprêtre, *supra* note 10, at 19.

158. For the current innovation figures, s*ee, e.g., EPO-IEA study*, *supra* note 24.

in this palette. If a program is specifically tailored and widely accessible, I would argue that optimizing the signaling effect can be done with minimal administrative cost.

On a more skeptical note, it appears that the direct economic effects of green technology fast-tracking are small and limited to startups that need funding.[159] Moreover, sometimes clean technology innovations equally benefit the fossil fuel industry, so they may not be as disruptive as some policymakers would prefer.[160] Since the empirical economic and technological effects of patent office initiatives remain modest or ambiguous, one can frame the signaling effect of promoting green innovation as a central function of the programs.

Overall, part of the logic around adopting these initiatives relates to society seeing policymakers doing something to mitigate climate change and its effects. This signaling becomes increasingly important as the urgency to act becomes more apparent. It is a strength rather than a weakness.[161]

CONCLUSION

Patent office initiatives are small policy tools among more significant political questions regarding climate change.[162] This does not mean we should not further adopt and develop them. Their appeal lies in the easy administrability and minimal interference with the use of patent rights, which is a significant benefit from the perspective of compatibility with the WTO framework and national legislation. Combined with other measures, patent office initiatives have the potential to bring about positive effects in society for climate change mitigation.

Some may criticize the patent system for its technology neutrality: There are few mechanisms to incentivize or disincentivize specific types of innovation.[163] One counterargument is the view that patents are not effective in incentivizing innovation or its dissemination at all—that incentives come from the market and exist only outside of the patent system.[164] From this

159. Lambert, *supra* note 100. *Cf., e.g.,* Nicoletta Corrocher & Muge Ozman, *Green Technological Diversification of European ICT firms: a Patent-based Analysis*, 29 ECON. INNOVATION & NEW TECH. 559, 571-75 (2020) (finding that medium-diversified companies are more likely to develop green technologies compared to single-technology and overly diversified firms; also noting that green patenting activity correlates with better sales performance).

160. Liscow & Karpilow, *supra* note 29, at 433-35.

161. *See, e.g.,* Bentley, *supra* note 106 ("Fast-track schemes for green patents are good tools to have in the toolbox").

162. *See* Lambert, *supra* note 100; *see* Jun-liang Du, et al., *Assessing Regional Differences in Green Innovation Efficiency of Industrial Enterprises in China*, 16 INT'L J. ENV'T RSCH. PUB. HEALTH 940 (2019) (pointing out that small market demand is a major reason for insufficient green technology dissemination); *see* Piana, *supra* note 3, at 44 (arguing that demand is growing fast).

163. Lee, *supra* note 37, at 1982.

164. *See generally* Ofer Tur-Sinai, *Patents and Climate Change: A Skeptic's View*, 48 ENV'T L. 211 (2018) (arguing that patents have a limited role in climate change mitigation). *Cf.*, *e.g.*, WIPO GREEN and patent office's fast-tracking initiatives mention acceleration of green technology innovation as one of their goals. WIPO GREEN, *supra* note 7.

perspective, it may not matter if the benefits gained from patent office initiatives are not strictly exclusive to green technology and its subcategories,[165] or if all eligible applicants receive benefits. Patent office initiatives can be perceived as effective provided we can otherwise create great enough incentives to engage in green technology research and development.[166]

The main benefit of these programs seems to be increased choice and control for the applicant. Having improved control over the patenting process is the most practical step to be offered by the patent system to facilitate the dissemination of green technology to society. Combined with other, more potent policy tools, this can become increasingly valuable.

165. *Cf.* Liscow & Karpilow, *supra* note 29, at 434 (arguing that clean tech that benefits the fossil fuel industry should be disfavored).

166. *See, e.g.,* Lisa Larrimore Ouellette, *Patentable Subject Matter and Nonpatent Innovation Incentives*, 5 UC IRVINE L. REV. 1115 (2015) (for discussion of nonpatent mechanisms to incentivize innovation).