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Building the Global Green Patent Highway: A Proposal For International Harmonization of Green Technology Fast Track Programs

Eric L. Lane

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BUILDING THE GLOBAL GREEN PATENT HIGHWAY: A PROPOSAL FOR INTERNATIONAL HARMONIZATION OF GREEN TECHNOLOGY FAST TRACK PROGRAMS

Eric L. Lane[†]

ABSTRACT

As governments around the world have recognized the importance of development and implementation of clean technologies in mitigating climate change, they have looked to patenting procedures as a mechanism to promote and accelerate green innovation. In particular, many national intellectual property offices have implemented programs that provide expedited examination of patent applications directed to green technologies. These green patent fast track programs vary widely in their rules, both in eligibility requirements and process parameters. Because of these disparities, it can be costly and time consuming for applicants and their patent attorneys to select which green technology patent fast track programs to utilize, to determine whether and how to utilize such programs, and to prepare separate submissions for different programs. This Article recommends that the disparate fast track programs for green patent applications be harmonized to make eligibility and process requirements uniform across all national intellectual property offices. This article conducts a critical analysis of the eligibility and process requirements of existing programs, and, drawing from the analysis, suggests a balanced approach that maximizes eligibility yet imposes reasonable process restrictions to prevent significant increases in the workload of patent examiners. A standardized and balanced international system of expedited examination would encourage greater participation in green technology fast track programs and reduce the time to grant for a larger number of green patents, thereby fostering development and diffusion of green technologies.

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I. INTRODUCTION

It is widely recognized that innovation in green technologies will be a central component of any solution to the problem of global warming.¹ Of the statutory and regulatory vehicles that promote technological innovation, intellectual property regimes, particularly patent laws and rules, are perhaps the most important.² Historically, governments implemented patent systems to create or heighten incentives for industry to invest financial resources in research and development (“R&D”) of new technologies.³ In many instances, the exclusivity conferred by a patent may provide adequate return on investment to justify the financial risk of research and development.⁴

While R&D is necessary for successful innovation in green technologies, it is not sufficient. R&D is, at most, only half of the equation for green technology innovation. The formulation of an idea for a green technology invention, even a prototype of the invention, cannot begin to alleviate global warming unless and until the invention is implemented.⁵ Green technologies,

1. See Sarah M. Wong, *Environmental Initiatives and the Role of the USPTO’s Green Technology Pilot Program*, 16 MARQ. INTELL. PROP. L. REV. 233, 237–38 (2012) (“There is a general consensus that new eco-efficient, clean, and economically competitive technology is needed to solve the ‘green’ problem.”).

2. See, e.g., ROBERT MERGES, *INTELLECTUAL PROPERTY IN THE NEW TECHNOLOGICAL AGE* 127 (4th ed. 2007) (stating that the grant of patent protection “provides a market-driven incentive to invest in innovation, by allowing the inventor to appropriate the full economic rewards of her invention”).

3. See, e.g., Matthew W. Coryell, *Patent Law as an Incentive to Innovate Not Donate: The Role of the U.S. Patent System in Regulating Ownership of Human Tissue*, 36 J. CORP. L. 449, 451 (2011) (stating the theory that the patent system “provides an incentive for inventors to invest their time and resources necessary for invention”).

4. See Francesca Cornelli & Mark Schankerman, *Patent Renewals and R&D Incentives*, 30 RAND J. ECON. 197, 198 (1999) (discussing the effects of differentiated patent length on the incentive to invest in R&D).

5. See CHRISTOPHER M. ARENA & EDUARDO M. CARRERAS, *THE BUSINESS OF INTELLECTUAL PROPERTY* 59 (Oxford University Press 2008) (stating that innovation is

particularly those that relate to renewable energy generation, need major manufacturers to build them, skilled installers and operators to deploy them, well-funded project developers to finance the facilities that use them—such as wind farms and solar plants—and utilities to purchase and distribute the energy generated from them.

To move green products from factory to field often requires complex business transactions that include a technology transfer component such as an intellectual property license.⁶ Frequently, then, patents covering green technologies are implicated in business deals to implement clean tech products and services.⁷ Generally, too, clean tech startups and established companies use technology transfer and intellectual property licensing in a variety of ways to provide revenue opportunities and operational flexibility.⁸

The complex web of manufacturing, financing, installation, operation, and distribution is sometimes contained within national borders, but increasingly spreads across borders via a global network of stakeholders.⁹ Most, if not all, of the major clean tech industry players today are themselves multinational corporations or have lucrative cross-border partner or

“broader than creativity and invention in that it includes not only the formulation of ideas, but the implementation of those ideas as well”).

6. See, e.g., *Ingenius Engines to Generate Electricity from Waste Oil*, MACHINERY LUBRICATION, <http://www.machinerylubrication.com/Read/2255/ingenius-engines-to-generate-electricity-from-waste-oil> (last visited Mar. 9, 2012) (“The license [between Cyclone Power Technologies and Phoenix Power Group LLC] provides Phoenix Power with exclusive North American and Australian rights to develop and sell power generator systems utilizing Cyclone’s award-winning external combustion engines, which will run on waste oil fuels such as motor oil from cars, trucks and busses.”); see also Eric Wesoff, *Innovalight: Successful Solar Startup, Troubling Exit*, GREENTECH MEDIA (Jul. 28, 2011), <http://www.greentechmedia.com/articles/read/Innovalight-Successful-Solar-Startup-Troubling-Exit/> (“The platform license business model is novel and seems to be working. Innovalight provides their silicon ink at a nominal cost—that is not the primary source of their revenue. The licensing model is structured so that Innovalight’s customers pay a fee for every wafer produced that uses the Innovalight special sauce.”).

7. See discussion *infra* Section II.C (discussing eSolar master licensing deals with Penglai Electric in China and ACME Group in India).

8. One of the Author’s clients is negotiating an agreement with a major power equipment manufacturer to license technology patented in less than two years via the U.S. Patent and Trademark Office Green Technology Pilot Program. In another example, GreenShift Corporation (“GreenShift”), a New York developer of biofuel production technologies, has licensed some of its patented and patent-pending bioreactor technologies to Carbonics Capital Corporation Electric (“Carbonics”) for use with algae. The license limits Carbonics’ use to the algae field and limits use that would conflict with GreenShift’s core business of ethanol production. See ERIC L. LANE, CLEAN TECH INTELLECTUAL PROPERTY: ECO-MARKS, GREEN PATENTS, AND GREEN INNOVATION 79–80 (2011).

9. See discussion *infra* Section II.C.

customer relationships.¹⁰ Therefore, holding green patents in a number of countries and jurisdictions around the world helps clean tech companies to effectively deploy their products globally.

In recognition of the important role patents play in both development and implementation of clean technologies, many national intellectual property offices around the world have initiated accelerated examination programs for green patent applications to reduce the time necessary for clean tech innovators to obtain issued patents.¹¹ While all of these programs share the common goal of expediting green patents, they vary widely in their requirements for eligibility and participation. The disparate program requirements can make it costly and time consuming for applicants and their patent attorneys to take advantage of the green patent fast track programs in multiple jurisdictions.¹²

To be sure, the fast track programs provide a useful mechanism for expediting green innovation. But they could be made more effective if they were standardized. Accordingly, this Article posits that the programs should be harmonized to make participation easier and more efficient. Standardization should be implemented through a balanced approach that maximizes eligibility yet imposes reasonable process restrictions to avoid a significant spike in the workloads of the intellectual property offices.

Part II of this Article discusses the role of green patents in clean tech innovation, with particular attention given to patent licensing in domestic and international business transactions deploying clean technologies. Part III provides an overview of the various programs in place in national intellectual property offices for expedited examination of green patent applications and describes their general benefits. Part IV conducts a critical analysis of the key

10. The General Company, for example, is a leader in several clean technology sectors, particularly in the wind industry. *See, e.g.*, American Wind Energy Association Annual Wind Industry Report, Year Ending 2008 at 10, *available at* http://www.awea.org/_cs_upload/learnabout/publications/5094_1.pdf (“GE Energy continues to dominate the [wind] market, with 43% of the newly installed capacity in 2008 and over 48% of the over 5,000 turbines installed in 2008.”); GE Fact Sheet, *available at* <http://www.ge.com/company/factsheets/corporate.html>; *see also* discussion *infra* Section II.C.

11. Such accelerated examination programs include the UK Intellectual Property Office’s Green Channel, and programs in the Canada Intellectual Property Office, IP Australia, and the Korean Intellectual Property Office.

12. Several of the Author’s clients have elected to forgo participation in the Japan Patent Office accelerated examination program because of the high cost of compliance with the program rules. Some of the Author’s clients have paid increased legal bills because of the additional attorney work needed to draft arguments and conform claims to the U.S. Patent and Trademark Office Green Technology Pilot Program’s initial technology classification requirement.

program features and describes how some of the major drawbacks adversely affect patent practice. This Part also illustrates the distinction between program rules directed to eligibility, in particular subject matter eligibility, and those that relate to process requirements.

Part V proposes harmonization of the disparate green technology fast track programs and argues the programs should be open to a wide array of technology categories yet be limited by certain process restrictions with respect to the patent claims and prosecution. This Part argues that such a balanced approach would increase utilization of the programs without overburdening the intellectual property offices. Finally, this Part concludes with a proposed set of program rules for a standardized international green patent fast track system that would feature broad subject matter eligibility but reasonable process restrictions.

II. THE IMPORTANCE OF GREEN PATENTS IN CLEAN TECH INNOVATION

This Part presents some of the challenges of green innovation, particularly the high cost of developing and implementing green technologies, and discusses some of the ways clean tech companies are using patents to meet those challenges. For instance, a patent licensing business model is proving successful for many clean tech startups, some of which are profiled in this Part. Patents are also acting as vehicles for implementation and international transfer of green technologies in international business transactions, particularly in emerging markets such as India and China. Thus, this Part concludes that green patents are playing a critical role in promoting innovation in the clean tech industry.

A. THE CLEAN TECH CHALLENGE: INNOVATION IN A CAPITAL-INTENSIVE INDUSTRY

There is a general consensus among those who believe in anthropogenic climate change that substantial technological innovation is necessary to slow or stop the warming of our planet.¹³ But that may understate the challenge.

13. See, e.g., Jonathan H. Adler, *Eyes on a Climate Prize: Rewarding Energy Innovation to Achieve Climate Stabilization*, 35 HARV. ENVTL. L. REV. 1, 3 (2011) (stating that if the United States is to come close to achieving reductions in greenhouse gas emissions of eighty percent by the year 2050, “let alone the reductions necessary for atmospheric stabilization, substantial innovation in energy and climate-related technologies is necessary”); Deborah Behles, *The New Race: Speeding Up Climate Change Innovation*, 11 N.C. J.L. & TECH. 1, 2 (2009) (commenting that the United States “needs to encourage the creation and disclosure of climate change innovation to mitigate potentially catastrophic effects”).

Given the scope and complexity of the climate change problem,¹⁴ we will need an unprecedented degree of technological advancement to meet the emissions targets necessary to maintain global temperatures at a safe level.¹⁵ Long-term projections for global carbon emissions in cases where “transformative” new green technologies are deployed are significantly better than those models based on use of older technologies.¹⁶ Similarly, the projected cost of stabilizing environmental carbon dioxide levels is also much lower with expected technological advances than if we were to rely on existing green technologies.¹⁷

The formidable challenge of raising our technological innovation to an unprecedented level has turned policymakers’ attention to mechanisms that can foster development and deployment of green technologies. The patent system, in particular, has been an area of intense focus.¹⁸ This is due to the long-standing belief¹⁹ that patents drive innovation by providing the incentive

14. See Adler, *supra* note 13, at 2 (“Global climate change is a terribly vexing environmental problem. Its scope, complexity, and potential costs are daunting.”).

15. See Adler, *supra* note 13, at 3 (arguing that “[n]othing short of a clean energy revolution will be capable of meeting [the GHG emissions reduction of eighty percent by 2050] target while maintaining or achieving acceptable standards of living throughout the world”).

16. See Jae Edmonds, Selected Key Findings from the Global Energy Technology Strategy Program 8, Presentation to “Seminar on Climate Change & Innovative Technologies” at 8 (Jul. 13, 2007), available at <http://www.uschamber.com/sites/default/files/issues/environment/files/presentationofjaeedmonds.pdf> (showing that projected global carbon emissions using 2005 clean technologies is 40 gigatons by 2080, and projected global carbon emissions using transformative new technologies is 7.5 gigatons by 2080).

17. See Rebecca Henderson & Richard G. Newell, *Accelerating Energy Innovation: Insights from Multiple Sectors*, Harvard Business School Working Paper 10-067, available at <http://www.hbs.edu/research/pdf/10-067.pdf> (“Modeling scenarios of cost-effective global climate change mitigation policy suggest that, for atmospheric stabilization targets in the range of 450–550 parts per million CO₂, the cost of GHG mitigation through 2050 *without significant innovation in the underlying technologies* would require additional trillions or tens of trillions of dollars (Newell 2008)”) (emphasis in original).

18. See, e.g., 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, 659–69 (discussing mechanisms to “green” the patent laws to accelerate international transfer of clean technologies); Bronwyn H. Hall & Christian Helmers, *The Role of Patent Protection in (Clean/Green) Technology Transfer*, 26 SANTA CLARA COMPUTER & HIGH TECH. L.J. 487, 493–507 (surveying the literature on the role of patent protection in facilitating technology transfer); Wong, *supra* note 1, at 242 (“Many solutions to the problems related to patent dissemination have been proposed”).

19. This belief was enshrined in Article I, Section 8, Clause 8 of the U.S. Constitution, which gives Congress the power “to promote the Progress of Science and useful Arts, by securing for limited Times to . . . Inventors the exclusive Right to their . . . Discoveries.”

to invest in R&D of new and improved technologies.²⁰ Patents motivate investors to spend substantial sums on R&D, the theory holds, because the exclusivity of a patent on a resulting invention mitigates risk through its promise of a better return on the investment during the limited monopoly period.²¹

That promise is critical in the clean tech industry, in which commercial scale-up is often very capital intensive.²² Commercialization costs for successful renewable energy facilities, particularly for large-scale projects, are extremely high and require complex equipment and infrastructure.²³ A utility-scale solar thermal plant, for instance, can cost \$2–3 billion, and construction of a wind farm typically costs hundreds of millions of dollars.²⁴ Even large established companies with mature technologies and successful commercial products face challenges when negotiating viable products.²⁵ The approximately twenty-year term of a patent may provide sufficient time for an investor or a company to recoup its investment in a renewable energy facility.

20. See generally Tencille R. Brown, *The Eminence of Imminence and the Myopia of Markets*, 9 J. MARSHALL REV. INTELL. PROP. L. 674, 682–84 (discussing the theory and practice of patent protection and how patents are believed to foster innovation and investment in R&D).

21. See *id.* at 683 (“Without the potential for patenting successful products, many U.S. investors would put their money elsewhere, as a substantial sum of funds given toward basic research never yields fruit”); see also Uma Suthersanen & Graham Dutfield, *Innovation and the Law of Intellectual Property*, in INNOVATION WITHOUT PATENTS: HARNESSING THE CREATIVE SPIRIT IN A DIVERSE WORLD 17 (Uma Suthersanen et al. eds., 2007) (“The traditional justification of the patent systems is that market power is conferred on an inventor for a limited duration for two purposes. First, the inventor is granted a reward for the introduction of technological developments by means of a buffer of protection against other competitors, and this guaranteed term of patent protection will act as a stimulus for further innovation.”).

22. See, e.g., Joel Makower, *Financing Our Cleantech Future*, GREENBIZ.COM (Jan. 28, 2010), <http://www.greenbiz.com/blog/2010/01/18/financing-our-cleantech-future> (“Deploying even one commercial-scale plant can require more capital than most people imagine. Consider BrightSource Energy, which builds and operates large-scale solar thermal plants, in which massive arrays of mirrors beam sunlight to a central tower, boiling water to create steam to run a generator. BrightSource (which happens to be funded by VantagePoint, along with Morgan Stanley, BP, Chevron, Google, and others) has contracts to build several of these plants, at \$2 billion to \$3 billion a pop. And then there are wind farms. Building one will set you back anywhere from \$150 million to \$1 billion or more. So, too, a biofuels refinery. Real money, as they say.”).

23. *Id.*

24. *Id.*

25. See, e.g., *SunPower Sells 250 MW California Valley Solar Ranch PV project to NRG*, SOLAR MAGAZINE (Oct. 4, 2011), available at <http://www.solarserver.com/solar-magazine/solar-news/current/2011/kw40/sunpower-sells-250-mw-california-valley-solar-ranch-pv-project-to-nrg.html>.

In the clean tech industry there are many small companies, and these clean tech start-ups would love to have the problem of funding a large project utilizing its scaled technology. For early-stage companies, especially those that are well before the point of making any sales, it can be very difficult to find the sources of the capital they need to get their businesses off the ground.²⁶ These companies typically have to explore a diverse array of public and private funding sources and solicit a wide variety of investors.²⁷ Thus, clean tech innovators, both large and small, depend upon capital investment for all stages of their business, from initial R&D to proof of concept, commercial scale-up, and bringing their products to market.

When investors consider providing capital in clean tech, or other industries, they want to know they will get a good return on investment (“ROI”) and turn a sufficient profit to justify their capital outlay. While investors trying to gauge ROI will, of course, examine the whole business picture, including a wide array of individual metrics, one important factor is a company’s ability to erect barriers to entry for potential competitors so the company can carve out a greater market share for itself. Patents provide some assurance in this regard by awarding periods of exclusive rights to an invention.²⁸

B. THE IMPORTANCE OF GREEN PATENTS AS VEHICLES FOR IMPLEMENTATION OF CLEAN TECHNOLOGIES

In *The Business of Intellectual Property*, Christopher Arena and Eduardo Carreras stress that innovation is “broader than creativity and invention in that it includes not only the formulation of ideas, but the implementation of

26. See *AVC Smart Startup Guide*, THE SMART STARTUP, <http://www.antiventurecapital.com/avcguide.html> (last visited Feb. 22, 2012) (“What is the Venture Capital Catch-22™? Well, startups need venture capital to start, but venture capitalists and angel investors only fund companies which already have traction (i.e., sales).”).

27. See *More Than Venture Capital Is Needed to Help Cleantech Startups Cross ‘The Valley of Death’*, KNOWLEDGE@WHARTON, <http://knowledge.wharton.upenn.edu/article.cfm?articleid=2842> (“‘You need more than venture capital to get to launch,’ said panelist Bernard David, a serial entrepreneur and fellow at IGEL. ‘To reach the commercial stage, you often need \$100 million or more, so your choices for that level of funding become private equity firms, large companies that have enough cash on their balance sheets, or the public markets.’”).

28. See 35 U.S.C. § 154(a)(1) (2010) (“Every patent shall contain . . . a grant to the patentee, his heirs or assigns, of the right to exclude others from making, using, offering for sale, or selling the invention throughout the United States or importing the invention into the United States, and, if the invention is a process, of the right to exclude others from using, offering for sale or selling throughout the United States, or importing into the United States, products made by that process, referring to the specification for the particulars thereof.”).

those ideas as well.”²⁹ Clean tech products and services may be developed through research and testing, but they cannot be implemented without manufacturing facilities to assemble them, project developers to build them out, and consumers to purchase and use them.

As mentioned in Section II.A, *supra*, barriers to entry in the clean tech industry can be high, particularly with respect to commercializing green technologies. Through green patents, clean tech companies can leverage their proprietary technology in a number of ways to successfully implement and deploy their technologies. A focus on licensing patented technology to others allows companies to skirt certain barriers to market entry such as building factories, purchasing equipment, and hiring employees that would otherwise exist in more traditional business models.

License agreements with large manufacturers can help startups get their products scaled and commercialized. Nanostellar, a Redwood City, California-based company which designs catalysts for reducing motor vehicle tailpipe emissions, used to focus on making the catalysts and shipping them to customers.³⁰ But in 2008, the company shifted its business model from making and supplying chemicals to licensing its intellectual property to others, including large chemical manufacturers.³¹ The company believed this change in strategy was necessary to enter the automotive market and serve its target customers.³² Typically, automakers need large quantities of materials and long-lasting supply contracts.³³ Nanostellar concluded that developing and relying on its own chemical manufacturing capability would have created too much uncertainty in the catalyst supply chain, and the risk would have been too great for its customers.³⁴ So the company made the shift to licensing its technology.³⁵

29. *See* Arena & Carreras, *supra* note 5, at 59.

30. *See* Michael Kanellos, *Will Greentech Startups Shift From Products to Patents*, GREENTECH MEDIA (Jan. 16, 2009), <http://www.greentechmedia.mobi/articles/read/will-greentech-startups-shift-from-products-to-patents-5541/>.

31. *Id.* (“This summer, however, Nanostellar shifted from making chemicals to licensing its intellectual property to large chemical manufacturers, said CEO Pankaj Dhingra.”).

32. *Id.* (“The shift largely came about because of the realities of the automotive market place.”).

33. *Id.* (“Automakers need large quantities of almost all of the materials they consume. They also generally like their supply contracts to last for years.”).

34. *See id.* (“We are a startup. What if we have a fire in the factory? A whole manufacturing line of luxury cars is stopped,” [CEO Pankaj Dhingra] said. “They don’t like that.”).

35. *See id.*

Nanostellar protects its technology through a portfolio of over ten U.S. patents and several pending applications. The patent portfolio covers the company's proprietary catalyst synthesis methods³⁶ as well as certain automotive catalyst products created by those processes.³⁷ Since making the shift to licensing its technology, at least one large automaker has signed a contract to buy catalysts made by a Nanostellar licensee.³⁸

Another successful solar startup, Innovalight,³⁹ shifted its focus from an all-manufacturing plan to a partial licensing business model. Once on a path to become a solar cell and solar panel manufacturer, in 2008 Innovalight changed course to produce photovoltaic ink.⁴⁰ The company revised its plan to sell the ink and generate additional revenue by licensing its materials and production process to solar cell manufacturers.⁴¹ This reduced both the cost of initial market entry, because the company did not have to build and operate a factory, and the cost of staying in business by obviating the need to compete on solar cell or module price.⁴²

According to a company brochure, Innovalight's silicon ink enables production of mono-crystalline solar cells that have efficiencies of more than nineteen percent.⁴³ The "selective emitter" platform essentially comprises

36. *See, e.g.*, U.S. Patent No. 7,482,163 (filed Feb. 18, 2005); U.S. Patent No. 7,430,322 (filed June 27, 2005).

37. *See, e.g.*, U.S. Patent No. 7,517,826 (filed Nov. 20, 2007); U.S. Patent No. 7,709,414 (filed Jan. 17, 2007); U.S. Patent No. 7,521,392 (filed Feb. 18, 2005).

38. *See* Kanellos, *supra* note 30 ("So far, one large European car manufacturer has signed on to adopt Nanostellar-created catalysts made by someone else.").

39. Innovalight is now owned by DuPont. *See* Michael Kanellos, *DuPont Snaps Up Innovalight*, GREENTECH MEDIA (Jul. 25, 2011), <http://www.greentechmedia.com/articles/read/dupont-snaps-up-innovalight/> (noting that Innovalight is "a startup that found success after switching business models").

40. Eric Wesoff, *Innovalight Tops Up With \$18 Million For Solar Inks*, GREENTECH MEDIA (Jan. 6, 2010), <http://www.greentechmedia.com/articles/read/innovalight-tops-up-with-18-million-for-silicon-solar-inks1/> ("At one point in the company's history, Innovalight was on the (expensive) path to be a solar cell and solar panel manufacturer. But in late 2008 they changed their business plan to become a manufacturer of the photovoltaic ink . . .").

41. *Id.* (Innovalight changed its plan to "generating revenue from sales of the ink and licensing income from the incorporation of the process into manufacturing lines").

42. Michael Kanellos, *Innovalight Signs with Yingli for Second Chinese Solar Deal*, GREENTECH MEDIA (Jul. 26, 2010), <http://www.greentechmedia.com/articles/read/innovalight-signs-with-yingli-for-second-chinese-solar-deal/> ("While Innovalight could produce its own solar cells, the company has largely shifted to producing solar inks for others and collaborating on research. The shift obviates the need to raise the capital to build solar factories, and it insulates Innovalight to some degree from the brutal price competition in solar.").

43. *See* DuPont, *DuPont Innovalight Selective Emitter Platform: Raising the Efficiency of Solar Cells*, available at http://www2.dupont.com/Photovoltaics/en_US/assets/downloads/pdf/Innovalight_brochure.pdf ("The DuPont Innovalight selective emitter

adding a silicon ink screen-printing step to conventional solar cell manufacturing process.⁴⁴ The properties of the silicon ink powders are optimized to achieve high conversion efficiency of the resulting solar cells.⁴⁵ Incorporating Innovalight's silicon ink can mean an efficiency boost of one to two percentage points "in a market where a tenth of a percentage point efficiency increase often warrants a press release."⁴⁶

Innovalight's patent portfolio supports the company's licensing business model by providing a tool it can sell to generate a steady revenue stream.⁴⁷ Those licensees are increasing in number and driving implementation of Innovalight's technology. Several major Chinese solar manufacturers have teamed with Innovalight to use its solar ink to boost efficiencies in their products.⁴⁸

Technology transfer and licensing arrangements with the right partners can provide access to established distribution and customer networks. For Cyclone Power Technologies ("Cyclone"), a designer of heat regenerative combustion engines, patent licensing facilitates partnerships for both manufacturing purposes and access to distribution channels.⁴⁹ Awarded

platform is a patented silicon ink based solution for quick transition to >19% efficient monocrystalline solar cells.").

44. *See id.* ("A silicon ink screen printing step is added after texturization in a monocrystalline cell manufacturing line.").

45. *See id.* ("The result of over 100 engineering-years of ink development, DuPont Innovalight has optimized silicon ink powder and formulation properties to maximize the conversion efficiency of the DuPont Innovalight selective emitter platform.").

46. *See* Wesoff, *supra* note 40 ("Innovalight has developed a silicon ink . . . which [CEO Conrad] Burke claims can boost the efficiencies of crystalline silicon wafers by more than 1%. Burke hinted it could be up to 2%. In a market where a tenth of a percentage point efficiency increase often warrants a press release, a 1% increase is significant.").

47. *See Innovalight Awarded Key Patent by U.S. Patent & Trademark Office for Solar Cells Manufactured with Silicon Ink*, GREENTECH MEDIA (Feb. 16, 2010), <http://www.greentechmedia.com/industry/read/innovalight-awarded-key-patent-by-u.s.-patent-trademark-offic-12178/> (quoting Alex Sousa, Innovalight's Intellectual Property Counsel, on the importance of his company's intellectual property, which gives Innovalight "the ability to immediately provide our licensees with a substantial competitive advantage in the marketplace.").

48. *See, e.g.,* Eric Wesoff, *JA Solar Relying on Innovalight to Improve Efficiency to 18.9%*, GREENTECH MEDIA (June 17, 2010), <http://www.greentechmedia.com/articles/read/ja-solar-relying-on-innovalight-to-improve-efficiency-to-18.9/> ("The process that incorporated the Innovalight ink is the sonorusly named SECIUM process and has allowed JA Solar to announce R&D efficiency results of greater than 18.5 percent at the cell level."); *supra* note 42 ("Innovalight has signed a research and production deal with Yingli Green Energy that, ideally, will lead to a marriage of low-cost Chinese manufacturing and U.S. technological expertise.").

49. *See Ingenius Engines to Generate Electricity From Waste Oil*, NOIRA NEWSWIRE, available at <http://www.machinerylubrication.com/Read/2255/ingenius-engines-to-generate>

Popular Science Magazine's Invention of the Year for 2008,⁵⁰ the Cyclone Engine is an external combustion engine that achieves high thermal efficiencies through a heat-regenerative process.⁵¹ The patent portfolio protecting Cyclone's technology covers various aspects of its engine.⁵² According to a company press release, Cyclone's patent portfolio provides protection for the Cyclone Engine and its key systems.⁵³ It also represents a technology package that can be licensed to manufacturers and distributors.

A 2009 license agreement with Phoenix Power Group ("Phoenix") links Cyclone's engines with automotive oil change and service facilities built by a Phoenix affiliate throughout the United States.⁵⁴ Under the terms of the license agreement, Phoenix enjoys exclusive North American and Australian rights to develop and sell power generator systems using Cyclone's

-electricity-from-waste-oil ("The license provides Phoenix Power with exclusive North American and Australian rights to develop and sell power generator systems utilizing Cyclone's award-winning external combustion engines").

50. Press Release, Cyclone Power Technologies, Cyclone Power Technologies' Green Engine Named Popular Science Invention of the Year (May 22, 2008), *available at* <http://www.cyclonepower.com/press/5-22-08.pdf> ("Cyclone Power Technologies, Inc. announced today that *Popular Science* magazine named the clean, green Cyclone Engine as a 2008 Invention of the Year.") (internal citations omitted).

51. *See Cyclone Power Technologies Receives Fourth U.S. Patent for its Green Engine*, BUSINESS WIRE (Apr. 27, 2010), http://www.businesswire.com/portal/site/home/permalink/?ndmViewId=news_view&newsId=20100427006502&newsLang=en ("the patented Cyclone Engine is a modern day steam engine, ingeniously designed to achieve high thermal efficiencies through a compact heat-regenerative process").

52. *See Cyclone Power Technologies Receives Fifth U.S. Patent for Its Green Engine*, BUSINESS WIRE (June 8, 2010), <http://www.businesswire.com/news/home/20100608005450/en/Cyclone-Power-Technologies-Receives-U.S.-Patent-Green> ("The Company now has patents on each of the three major component systems of the engine—one on its combustion chamber, two on its mechanical operations (comprised of pistons, valves, bearings and other sub-components), and now one on the condensing system. The Company has an overall patent on the total Cyclone Engine system in the United States and several other nations throughout the world.").

53. *See id.* ("The Company now has patents on each of the three major component systems of the engine—one on its combustion chamber, two on its mechanical operations (comprised of pistons, valves, bearings and other sub-components), and now one on the condensing system. The Company has an overall patent on the total Cyclone Engine system in the United States and several other nations throughout the world.").

54. *See Phoenix Power Group Commences Project to Generate Clean Electricity from Waste Oil*, BUSINESS WIRE (Sep. 17, 2009), http://www.businesswire.com/portal/site/home/permalink/?ndmViewId=news_view&newsId=20090917006310&newsLang=en ("[Phoenix Power] is an affiliate of Atlantic Systems Group of Harrisonburg, VA, which is in the business of designing and building automotive oil change and service facilities throughout the United States").

combustion engines.⁵⁵ Cyclone will rely on Phoenix's ability to efficiently market and sell engines.⁵⁶ The ability of Cyclone to license its patent portfolio is critical to the company's revenue, and, in the case of the Phoenix deal, is important to get its products developed and commercialized.⁵⁷

C. THE IMPORTANCE OF GREEN PATENTS IN INTERNATIONAL
TRANSFER AND DIFFUSION OF CLEAN TECHNOLOGIES: EMERGING
MARKET SUCCESS STORIES

The market for green technologies is increasingly a global one, and international technology transfer is an area of focus for policymakers⁵⁸ and commentators.⁵⁹ Implementation of an international technology transfer mechanism has been a central tenet of the United Nations Framework Convention on Climate Change, both in the existing treaty and the recent diplomatic meetings to negotiate a new treaty.⁶⁰ Economic and legal scholars have argued for various policies—some involving intellectual property and others non-IP-related—to foster transfer of green technologies from developed countries to developing countries.⁶¹

55. See *supra* note 49 (“The license provides Phoenix Power with exclusive North American and Australian rights to develop and sell power generator systems utilizing Cyclone’s award-winning external combustion engines, which will run on waste oil fuels such as used motor oil from cars, trucks and busses.”).

56. See *id.* (quoting Cyclone’s CEO, Harry Schoell, on Phoenix’s “proven track record of success in building companies and bringing products and services to market”).

57. See Press Release, Cyclone Power Technologies, Cyclone Power Technologies to Design Waste Energy Generator for Phoenix Power Group (Jan. 13, 2010), available at www.cyclonepower.com/press/01-13-10.pdf (“Cyclone Power Technologies Inc. has received a work order from Phoenix Power Group LLC (PPG) to develop a prototype electric generator system that will be powered by Cyclone’s heat-regenerative, external combustion engine running on waste oil. The new agreement expands Cyclone’s responsibilities with respect to the development of PPG’s waste energy generator systems and provides additional revenue to Cyclone over the next few months.”).

58. See United Nations Framework Convention on Climate Change Treaty art. 4.5, May 9, 1992, S. Treaty Doc No. 102-38, 1771 U.N.T.S. 107, available at <http://unfccc.int/resource/docs/convkp/conveng.pdf> [hereinafter UNFCCC Treaty] (“Parties . . . shall take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how to other Parties, particularly developing country Parties . . .”).

59. See, e.g., Derclaye, *supra* note 18; Hall & Helmers, *supra* note 18; Wong, *supra* note 1.

60. See UNFCCC Treaty, *supra* note 58; see also UNFCCC, *Bali Action Plan*, 1, 1(d), 1(d)(i)–(ii), Decision -/CP.13 (Dec. 2007), available at http://unfccc.int/files/meetings/cop_13/application/pdf/cp_bali_action.pdf (stating that the Parties were to consider “[w]ays to accelerate deployment, diffusion and transfer of affordable environmentally sound technologies”).

61. See, e.g., Hall & Helmers, *supra* note 18, at 510–12 (advocating a combination of policy interventions such as a carbon tax and R&D incentives such as subsidies and tax

The Author has previously documented some of the large-scale deployments of clean technologies in the context of international business transactions in which technology transfer forms the backbone of the deals.⁶² Clean tech companies both large and small are partnering with firms in developing countries to commercialize renewable energy generation equipment such as wind turbines and solar concentrators, lay critical infrastructure such as electric charging stations, and retrofit emissions reduction technologies on existing fossil fuel-fired power plants.⁶³

Patent rights are often critical to these international transactions. In at least some deals, the developing country partner enjoys some form of exclusivity in its home market in exchange for contributing capital, labor, or some combination thereof.

In what was the biggest solar thermal deal ever when announced in January 2010, California solar thermal startup eSolar and its Chinese partner Penglai Electric (“Penglai”) entered into an agreement to build at least two gigawatts of solar thermal power plants in China.⁶⁴ The deal was structured as a master licensing agreement between eSolar and the Chinese electrical power equipment manufacturer.⁶⁵ Penglai would be the exclusive licensee in China of eSolar’s modular, scalable solar thermal technology, which includes several patents and pending patent applications relating to concentrating solar power equipment and supporting software.⁶⁶ Penglai would develop the power plants over the course of the next decade, and China Huadian Engineering Company would lead the construction process.⁶⁷ The plants, to be co-located

credits to encourage climate change-related technology development and transfer from developed to developing countries); Derclaye, *supra* note 18, at 659–69 (proposing patent pools, free access to publicly-funded technology, enforcement of existing treaties, and a green economic index to foster transfer of clean technologies for climate change mitigation).

62. See Eric L. Lane, *Clean Tech Reality Check: Nine International Green Technology Transfer Deals Unhindered by Intellectual Property Rights*, 26 SANTA CLARA COMPUTER & HIGH TECH. L.J. 533, 543 (2010) (“The reality is that clean technologies are being deployed in the context of international business transactions by companies both large and small with partners in developing countries, especially in some of those countries that have been the most vocal about weakening or eliminating IP rights to facilitate tech transfer.”).

63. See *id.* at 544–48, 552–53 (describing eSolar’s deals to build solar thermal power plants in China and India, GE’s plan to install coal gasification technology in China, and ECOTALITY’s deal to distribute EV charging systems in China).

64. See Press Release, eSolar, eSolar Partners with Penglai on Landmark Solar Thermal Agreement for China (Jan. 8, 2010), available at http://www.esolar.com/news/press/2010_01_08.

65. See *id.*

66. See *id.*

67. See *id.*

with biomass electricity generation facilities, are projected to reduce carbon dioxide emissions by fifteen million tons annually.⁶⁸

Similarly, in March 2009 eSolar announced an agreement with Indian developer ACME Group (“ACME”) to build up to 1,000 megawatts (one gigawatt) of solar thermal power plants.⁶⁹ ACME will build, own, and operate plants in India using eSolar’s technology and will work with other companies to build additional plants using the technology.⁷⁰ As part of the deal, ACME will make a \$30 million equity investment in eSolar.⁷¹ In its press release regarding the ACME deal, eSolar announced “an exclusive licensing agreement” that named ACME master licensee of eSolar’s technology in India.⁷²

Thus, it seems likely that eSolar’s patent rights in China and India helped the company find willing partners in those countries. Indeed, it is hard to imagine Penglai and ACME investing in such large-scale projects without the exclusivity in their home markets guaranteed by the master licensing agreements. Without exclusive, and later enforceable, rights to the technology protected by eSolar’s portfolio of international patent applications, Penglai and ACME would have no protection against competitors in their home markets copying eSolar’s innovative solar thermal power plant architecture.

In addition, if eSolar had not made binding commitments through exclusive licenses, it could have entered into agreements with other developers in China and India and Penglai, and ACME might have faced competitors using the same technology with eSolar’s blessing. Such risks easily could have undermined those deals. Thus, eSolar’s success in finding willing partners in India and China to implement its renewable energy technology may have been driven, at least in part, by patent rights.

In a major deal involving emissions reduction technologies, General Electric (“GE”) entered into a memorandum of understanding with Chinese coal and energy company Shenhua Group Corporation (“Shenhua”) to deploy commercial scale power plants with GE’s coal gasification

68. *See id.*

69. *See* Press Release, eSolar, eSolar Signs Exclusive License with ACME to Construct 1 Gigawatt of Solar Power Plants in India (Mar. 3, 2009), *available at* http://www.esolar.com/news/press/2009_03_03.

70. *See id.*

71. *See id.*

72. *Id.* (eSolar “names ACME as a master licensee of its modular, scalable technology and grants the company the exclusive right to represent eSolar in India developing its own utility-scale solar thermal projects and working with other companies that want to build solar thermal power plants in India using eSolar technology”).

technology.⁷³ The two companies formed a joint venture to combine GE's expertise in gasification technologies, particularly its integrated gasification combined cycle solutions, with Shenhua's expertise in building and operating coal-fired power plants and coal gasification facilities.⁷⁴ With coal plants currently contributing about twenty-five percent of the world's total greenhouse gas emissions,⁷⁵ development and deployment of carbon capture technologies will be critical to curbing global warming.

According to Thaddeus Burns, an intellectual property lawyer at GE who focuses on international trade, intellectual property rights are important to GE's partners in developing countries and emerging markets.⁷⁶ In the context of joint ventures such as the deal with Shenhua or other technology transfer agreements in which "customers who are either putting resources on the table to help develop that technology or paying [GE] for a solution to a problem, [intellectual property rights] help[] make sure that they enjoy the full benefits of that business deal."⁷⁷ According to Burns, the intellectual property system "rationalizes the diffusion" of its technology by protecting GE from its competitors.⁷⁸

Thus, patents play an important role not only as incentives to invest in clean tech R&D, but also as a powerful vehicle for the other critical piece of innovation—diffusion and deployment of green technologies.

73. *See id.* ("GE and Shenhua Group Corporation today announced that they have agreed to a framework for an industrial coal gasification joint venture which would combine GE's expertise in gasification and cleaner power generation technologies with Shenhua's expertise in building and operating coal gasification and coal-fired power generation facilities, to advance "cleaner coal" technology solutions in China").

74. *See id.* ("The memorandum of understanding . . . would result in a joint venture company, in which GE and Shenhua would execute a strategic vision for expanding to improve cost and performance of commercial scale gasification and integrated gasification combined cycle (IGCC) solutions").

75. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, FOURTH ASSESSMENT REPORT, CLIMATE CHANGE 2007: SYNTHESIS REPORT, SUMMARY FOR POLICYMAKERS, WORKING GROUP III § 4.3 tbl.4.2 (2007), available at http://www.ipcc.ch/publications_and_data/ar4/wg3/en/ch4-ens4-3.html.

76. Kaitlin Mara, *Are Patent Exceptions Necessary For Climate Change Technology? Defining WIPO's Role*, INTELLECTUAL PROPERTY WATCH (March 26, 2009, 11:12 AM), <http://www.ip-watch.org/weblog/2009/03/26/are-patent-exceptions-necessary-for-climate-change-technology-defining-wipo%E2%80%99s-role/>.

77. *See* COP15 Side Event: The Effective Use of ICTs and the IP System for Mitigating Climate Change (Dec. 10, 2009), webcast available at http://www1.cop15.metafusion.com/kongresse/cop15/templ/play.php?id_kongressmain=1&theme=unfcc&id_kongresssession=2409.

78. *See id.* ("In the end, it's not our customers in developed or developing countries . . . that we're trying to use the IP to protect our technology from, it's the competitors, it's companies like Siemens and Philips.").

III. THE ADVENT OF GREEN PATENT FAST TRACK PROGRAMS

Recognizing the importance of green patents, several national intellectual property offices have initiated acceleration examination programs for patent applications directed to green technologies. This Part introduces these programs by providing an overview of which intellectual property offices offer them and how the programs work in each office. This Part also discusses how providing quicker indications of patentability and expediting patent grants helps clean tech applicants and practitioners.

A. OVERVIEW OF THE GREEN PATENT FAST TRACK PROGRAMS

A number of countries have concluded that expedited examination of patent applications relating to green technologies encourages green innovation. Increasingly common around the world, these programs are being or have been established by national intellectual property offices, including those of the United States, the United Kingdom, Canada, Israel, Australia, Japan and Korea.⁷⁹ Though each country's intellectual property office administers its program differently, the basic framework is the same: patent applications directed to environmentally beneficial technologies receive expedited processing and examination to substantially reduce the time it takes to obtain a granted patent. In comparison, other categories of patent applications are examined in the order in which they are received.

The fast track initiatives flow from the premise that patents foster innovation and that increasing the rate of green patents granted will spur development and deployment of green technologies. U.S. Commerce Secretary Gary Locke summed up this view in his remarks on the launch of the U.S. Patent and Trademark Office's ("USPTO") Green Technology Pilot Program: "By ensuring that many new products will receive patent protection

79. At least one other international expedited examination program has been implemented by many national intellectual property offices. The Patent Prosecution Highway ("PPH") allows an applicant that receives allowed claims or an issued patent in the intellectual property office in which the patent application was first filed to accelerate examination of a corresponding patent application in a second intellectual property office where the application is subsequently filed. See United States Patent and Trademark Office, *Patent Prosecution Highway (PPH)—Fast Track Examination of Applications*, http://www.uspto.gov/patents/init_events/pph/index.jsp (last visited Sep. 15, 2012) ("Under the Patent Prosecution Highway (PPH), an applicant receiving a ruling from the Office of First Filing (OFF) that at least one claim in an application filed in the OFF is patentable may request that the Office of Second Filing (OSF) fast track the examination of corresponding claims in corresponding applications filed in the OSF."). However, absent another fast tracking mechanism, the first-filed application is not accelerated under the PPH; only the second-filed application can be accelerated.

more quickly, we can encourage our brightest innovators to invest needed resources in developing new technologies and help bring those technologies to market more quickly.”⁸⁰

1. *The United Kingdom*

The first office to institute such a program was the UK Intellectual Property Office (“UKIPO”), which launched its “Green Channel” initiative in May of 2009 to give priority to patent applications directed to technologies having environmental benefits.⁸¹ The accelerated procedure is available to any applicant who makes a “reasonable assertion that the invention in the patent application” has an “environmental benefit.”⁸² The UKIPO gives deference to the applicant’s assertion; it will not investigate the assertion, though it “will refuse requests” that “are clearly unfounded.”⁸³ Applicants can choose which aspects of the application process they want to accelerate, including “search, examination, combined search and examination, and/or publication.”⁸⁴ Instead of the current average of two to three years for an ordinary patent application to get through the UKIPO, an application can be granted in just nine months under this scheme.⁸⁵

2. *Korea*

In the fall of 2009, the Korean Intellectual Property Office (“KIPO”) announced that green patent applications were eligible for its “superspeed” examination program.⁸⁶ Launched on October 1, 2009, KIPO’s special examination procedure applies to patent applications directed to several categories of technologies relating to the environment or “low-carbon green

80. See Press Release, UK Intellectual Property Office, UK ‘Green’ inventions to Get Fast-Tracked through Patent System (May 12, 2009), available at <http://www.ipo.gov.uk/about/press/press-release/press-release-2009/press-release-20090512.htm> (“David Lammy, Minister for Intellectual Property, will today launch an initiative which will enable inventions with an environmental benefit to be given priority within the patent system.”).

81. *Id.*

82. *Id.*

83. *Green Channel for Patent Applications*, UK INTELLECTUAL PROPERTY OFFICE, <http://www.ipo.gov.uk/pro-types/pro-patent/p-law/p-accelerated/pro-p-green.htm> (last visited Mar. 12, 2012).

84. *Id.*

85. See *supra* note 80 (“It could take only nine months to get a patent granted under this scheme, compared with the current average time of two-to-three years.”).

86. Korean Intellectual Property News Release, Thanks to superspeed examination, green technology acquires patent in a month, available at http://www.kipo.go.kr/kpo/user.tdf?seq=1305&c=1003&a=user.english.board.BoardApp&board_id=kiponews&catmenu=ek20200 (Oct. 20, 2009).

growth.”⁸⁷ The applicant must request that a prior art search be conducted by one of the three search agencies officially sanctioned by the KIPO.⁸⁸ According to the KIPO press release, the “superspeed” system cuts the already quick Korean timeline from application to patent grant from an average of eighteen months to a stunningly short period of less than one month, “the fastest examination period in the world.”⁸⁹

To qualify for “superspeed” examination, green patent applications must fall within certain enumerated technology categories that are automatically eligible or must receive either a specific green certification or funding from the Korean government.⁹⁰ The seven automatically eligible subject matter categories are:

- (1) noise and vibration prevention facilities or methods and sound proofing or dust proofing
- (2) water quality contamination prevention facilities or methods
- (3) air pollution prevention facilities or methods
- (4) waste disposal facilities or methods
- (5) facilities or methods of livestock excretions management, purification and disposal
- (6) recycling facilities or methods
- (7) sewage disposal facilities or methods.⁹¹

87. *See id.* (“To support the patent acquirement of green technologies researched & developed under the national strategy of low-carbon green growth, the Korean Intellectual Property Office (Commissioner: Jung-sik Koh) is planning to apply a superspeed examination system starting October 1. The superspeed examination system is subjected to green technologies that minimize the discharge of pollutants, as well as those which received funding or authentication for green growth.”).

88. *See id.* (“Applicants can apply for the superspeed examination by requesting a prior arts search to an authenticated agency . . . and submitting the results of the search to KIPO.”).

89. *Id.*

90. *See* Eric L. Lane, *Speed Bumps Emerge on KIPO Green Tech Fast Track*, GREEN PATENT BLOG (Oct. 23, 2011), <http://www.greenpatentblog.com/2011/10/23/speed-bumps-emerge-on-kipo-green-tech-fast-track/> (“[a]n eighth category of technologies lists several subcategories which are eligible only if the invention has ‘received financial support or certification from the government’ ”); *see also Super-Highway Patent Examination within 1 month implemented starting October 1, 2009*, HANYANG NEWSLETTER (Oct. 2009), *available at* http://hanyanglaw.com/eng/news/newsletter_preview.asp?curPage=1&ca=116 [hereinafter Hanyang Newsletter].

91. Hanyang Newsletter, *supra* note 90.

An eighth category of technologies lists several subcategories which are eligible only if the invention has “received financial support or certification from the government”⁹² and includes many important green technologies:

- (8)(a) new renewable energy technology
- (8)(b) carbon reduction energy technology
- (8)(c) high powered water handling technology
- (8)(d) LED application technology
- (8)(e) green transportation system related technology
- (8)(f) green city related technology
- (8)(g) technology that economizes and efficiently uses energy and resources to minimize greenhouse gas and contaminated substances
- (8)(h) any technology belonging to one of (a) to (g) that fuses with another technology.⁹³

3. *Japan*

The Japan Patent Office (“JPO”) was the next to introduce a green patent fast track initiative. Launched on November 1, 2009, the JPO program provides accelerated examination for “Green Related Applications.”⁹⁴ Eligible “Green Related Applications” are patent applications directed to inventions that promote energy conservation or reduce carbon dioxide emissions.⁹⁵ To be admitted to the program, the applicant must (1) submit a brief description of the invention explaining that the claimed invention reduces energy consumption or CO2 emissions, and (2) conduct a prior art search, disclose the prior art, and submit an explanation comparing the invention to the prior art.⁹⁶

92. *Id.*

93. *Id.*

94. Onda Techno Intl. Patent Attys., *The JPO implemented a pilot program for Green Accelerated Examination effective November 1, 2009*, <http://www.ondatechno.com/English/ip/patent/report/20091130.html>.

95. *See id.* (“‘Green Related Applications’ means applications that relate to green inventions, i.e., inventions that promote energy conservation, reduce carbon dioxide emissions reductions, and so on”).

96. *See* Press Release, Japan Patent Attorneys Association, Accelerated (Appeal) Examination for Green Technology Patent Applications (Mar. 7, 2010), *available at* http://www.jpaa.or.jp/english/whatsnew/green_technology_patent.

4. *The United States*

The USPTO launched a one-year pilot program to expedite green patent applications in December of 2009.⁹⁷ The Green Technology Pilot Program allowed applications relating to improving environmental quality, conserving energy, developing renewable energy resources, or reducing greenhouse gas emissions to be advanced out of turn for substantive examination.⁹⁸ Applicants who wished to participate in the program had to file a petition with the USPTO requesting participation and indicating that their patent application complied with the program requirements.⁹⁹ An application accepted into the Green Technology Pilot Program began examination immediately instead of languishing for what can be a two- to three-year wait before the ordinary course's examination process begins.

At its onset, the USPTO initiative was restricted in several ways. First, it was a temporary pilot program. The window of opportunity was nominally one year: the program launched on December 8, 2009, and petitions had to be filed before December 8, 2010.¹⁰⁰ Moreover, it was possible that applicants would not even enjoy the full one-year window because, from its start, only the first 3,000 petitions would be accepted into the program.¹⁰¹ A third limitation was that only applications filed before the program launch date of December 8, 2009 that had not begun examination—i.e., had not received a first office action—were eligible.¹⁰² In other words, newly filed

97. Press Release, U.S. Patent and Trademark Office, The U.S. Commerce Department's Patent and Trademark Office (USPTO) Will Pilot a Program to Accelerate the Examination of Certain Green Technology Patent Applications (Dec. 7, 2009), *available at* http://www.uspto.gov/news/pr/2009/09_33.jsp.

98. *See* Pilot Program for Green Technologies Including Greenhouse Gas Reduction, 74 Fed. Reg. 64,666 (Dec. 8, 2009) (“Under the Green Technology Pilot Program, applications pertaining to environmental quality, energy conservation, development of renewable energy, or greenhouse gas emission reduction, will be advanced out of turn for examination without meeting all of the current requirements of the accelerated examination program . . .”).

99. *Id.* (“Applicant[s] may participate in the Green Technology Pilot Program by filing a petition to make special that meets all of the requirements set forth in this notice in a previously filed application.”).

100. *Id.* (“The Green Technology Pilot Program will run for twelve months from its effective date. Therefore, petitions to make special under the Green Technology Pilot Program must be filed before December 8, 2010.”).

101. *Id.* (“The USPTO will accept only the first 3,000 petitions to make special in previously filed new applications, provided that the petitions meet the requirements set forth in this notice.”).

102. *See id.* at 64,667 (“(1) . . . The application must be previously filed before the publication date of this notice . . . (6) The petition to make special must be filed at least one day prior to the date that a first Office action . . . appears in the Patent Application Information (PAIR) system.”).

applications were not eligible for USPTO fast tracking. The subject matter analysis was also rather stringent and required that the patent application be classified in one of the technology classes and subclasses deemed by the USPTO to be eligible green technologies.¹⁰³ There was a cap on the number of claims in an application as well, though that could be met via a preliminary amendment at the time the petition for the program was filed.¹⁰⁴

The basic eligibility requirements for the Green Technology Pilot Program, as initially launched, were as follows:

- the application is a non-reissue, non-provisional utility application filed before December 8, 2009 for which a first office action has not been issued;¹⁰⁵
- the invention is classified in one of the specific technological classes approved as a “green technology” class;¹⁰⁶
- the application has three or fewer independent claims, twenty or fewer total claims, and no multiple dependent claims (the applicant can file a preliminary amendment to bring the application in compliance with this requirement);¹⁰⁷
- the application claims a single invention directed to environmental quality, conserving energy, developing renewable energy resources, or reducing greenhouse gas emissions;¹⁰⁸ and
- the applicant must request early publication of the application.¹⁰⁹

103. *See id.* (“(2) The application must be classified in one of the U.S. classifications listed in section VI of this notice at the time of examination.”).

104. *See id.* (“(3) The application must contain three or fewer independent claims and twenty or fewer total claims. The application must not contain any multiple dependent claims. For an application that contains more than three independent claims or twenty total claims, applicants must file a preliminary amendment in compliance with 37 CFR 1.121 to cancel the excess claims and/or the multiple dependent claims at the time the petition to make special is filed.”).

105. *Id.*

106. *Id.*

107. *Id.*

108. *See id.* (“(4) The claims must be directed to a single invention that materially enhances the quality of the environment, or that materially contributes to: (1) the discovery or development of renewable energy resources; (2) the more efficient utilization and conservation of energy resources; or (3) greenhouse gas emission reduction . . .”).

109. *See id.* (“(7) The petition to make special must be accompanied by a request for early publication in compliance with 37 CFR 1.219 and the publication fee set forth in 37 CFR 1.18(d).”).

After initial reports indicated that the response to the program was “underwhelming,” with well short of the 3,000 available slots filled,¹¹⁰ the USPTO eliminated one of the more onerous requirements.¹¹¹ It turned out that the vast majority of green tech petitions filed were being denied, and the most common ground for denial was that the patent application was not in an eligible technology class and subclass. This was, at least in part, because the universe of eligible classes and subclasses represented only a subset of technology that is actually green.¹¹² To counteract this problem and broaden the eligibility requirements for the Green Technology Pilot Program, the USPTO eliminated the requirement that a patent application be classified in one of the specific technology classes and subclasses pre-approved for acceptance into the fast track program.¹¹³ This improvement to the program allowed more green patent applications to be fast tracked. It also made the process easier and less expensive for applicants, obviating the need to creatively amend the claims to shoehorn the application into one of the eligible classes and subclasses.

In November 2010, when the GTPP Green Technology Pilot Program was approaching its conclusion, the USPTO announced that it would continue the program for another year.¹¹⁴ The program schedule was

110. See *US-UK prioritization of Green Tech patents underwhelming*, PATENTS.COM (Jan. 27, 2010), <http://www.patents.com/patentscommunity/blogs/pschein/my-blog/105/us-uk-prioritization-of-green-tech-patents-underwhelming> (“We are now reading blog reports that the USPTO [green technology pilot] program ‘has had an underwhelming response.’ It has been reported that ‘only a third of the 3000 positions (under the pilot program guidelines) available’ were filled.”).

111. See BC Upham, *Exclusive: Green Patent Program Widened Under New Rule Change*, TRIPLE PUNDIT (May 21, 2010), <http://www.triplepundit.com/2010/05/exclusive-green-patent-program-widened-under-new-rule-change/> (“The United States Patent and Trademark Office published an important change to its Green Patent program this morning which should expand the number of patent applications that qualify for the program. The revision, which comes after industry complaints, removes a requirement that applications fall into certain technological classifications, such as solar cells or electric vehicles, in order to qualify for the program.”).

112. See *Elimination of Classification Requirement in the Green Technology Pilot Program*, 75 Fed. Reg. 28,554 (May 21, 2010) (“The USPTO has determined that the classification requirement . . . was causing the denial of petitions for applications that are drawn to green technologies.”).

113. See *id.* (“The USPTO is hereby eliminating the classification requirement for any petitions that are decided on or after the publication date of this notice. This will permit more applications to qualify for the program, thereby allowing more inventions related to green technologies to be advanced out of turn for examination and reviewed earlier.”).

114. See *Expansion and Extension of the Green Technology Pilot Program*, 75 Fed. Reg. 69,049, 69,050 (Nov. 10, 2010) (“The program is also being extended until December 31, 2011.”).

extended until December 31, 2011 or until 3,000 green patent applications were accepted into the program, whichever comes first.¹¹⁵ In a welcome eligibility change, the USPTO also expanded the program to include green patent applications filed on or after December 8, 2009.¹¹⁶ The effective date of these changes was November 10, 2010.¹¹⁷ Thus, any U.S. green patent application that had not begun substantive examination, including newly filed applications, could petition for the USPTO fast tracking procedure.

With the subject matter eligibility change and the door open to new applications, the petition process became much smoother. First, applicants could be more confident that their technologies were eligible and their applications would be accepted into the program so long as they broadly related to environmental quality, energy conservation, development of renewable energy resources, or greenhouse gas emissions reduction. Second, whether an applicant wished to take advantage of the U.S. fast track program became a standard intake question for a clean tech patent practitioner at the start of the patent application process. Finally, the application process became more efficient as preparation of the program petition and a claim set conforming to the program rules could be rolled into the initial preparation and filing of a green technology patent application.

On December 15, 2011, the USPTO announced that the Green Technology Pilot Program would end in early 2012.¹¹⁸ While the program was extended a second time to the earlier of March 31, 2012 or acceptance of 3,500 patent applications, the USPTO said the green patent fast track initiative “will soon draw to a close.”¹¹⁹ On February 27, 2012, the Green Technology Pilot Program reached its acceptance limit, and the USPTO announced that the program was closed.¹²⁰

115. *See id.* (“The Green Technology Pilot Program will run until December 31, 2011, except that the USPTO will accept only the first 3,000 grantable petitions to make special under the Green Technology Pilot Program in unexamined applications irrespective of the filing date of the application.”).

116. *See id.* (“The USPTO is hereby expanding the eligibility for the pilot program to include application filed on or after December 8, 2009.”).

117. *Id.*

118. *See* Press Release, USPTO Extends Deadline to Participate in Green Technology Pilot Program (Dec. 15, 2011), *available at* <http://www.uspto.gov/news/pr/2011/11-72.jsp> (“While both the Green Technology and Project Exchange programs will soon draw to a close, in the future all applicants may use the newly enacted Prioritized Examination (Track I) program, which is currently available to all technologies and categories of invention, to have their application accorded special status.”).

119. *Id.*

120. *See* United State Patent and Trademark Office, *Green Technology Pilot Program – CLOSED*, http://www.uspto.gov/patents/init_events/green_tech.jsp (“The Office is **no**

5. *Australia*

Australia's intellectual property office, IP Australia, announced its fast tracking program in September of 2009.¹²¹ IP Australia's accelerated procedure for environmentally friendly technologies allows green patent applications to jump to the front of the queue, reducing the examination process from over a year to between four and eight weeks.¹²² To qualify for the program, an applicant must provide a statement that the patent application relates to green technology.¹²³

6. *Israel*

Israel's fast track program launched in December 2009.¹²⁴ To qualify for the program, a patent application must be directed to an invention that falls into one of the Israel Patent Office's ("IPO") green classifications. To be properly classified, applicants must include with their patent applications a letter with a brief description of the invention and an explanation of its environmentally friendly features.¹²⁵ A patent application that qualifies for the "green classification code" will be prioritized and examined within three months.¹²⁶

7. *Canada*

Most recently, the Canadian Intellectual Property Office ("CIPO") launched its expedited examination program for green patent applications.¹²⁷

longer accepting Petitions to Make Special Under the Green Technology Pilot Program or requests for reconsideration based solely on a defective original petition. The program will meet its limit based on petitions that were previously filed and are awaiting decision." (emphasis in original).

121. Richard Marles MP Media Release, Fast Tracking Patents for Green Technology Solutions (Sep. 15, 2009), available at <http://archive.innovation.gov.au/ministersarchive/2010/Marles/Pages/fasttrackingpatentsforgreentechnologysolutions.html>.

122. *See id.*

123. *See* Kathryn Morris & Mark Roberts, *IP Australia Encourages Rapid Examination of "Green Patent Applications"*, DAVIES COLLISON CAVE (Sept. 16, 2009), <http://www.davies.com.au/pub/detail/79/ip-australia-encourages-rapid-examination-of-green-patent-applications> ("[T]he simple statement that a patent application related to a field of green technology will constitute a suitable reason in support of a request for expedited examination.").

124. Aviad Glickman, *State to Prioritize 'Green' Inventions*, YNET NEWS (Dec. 24, 2009), <http://www.ynetnews.com/articles/0,7340,L-3819855,00.html>.

125. *See* Susan E. Lifshitz, *IP-Israel Newsletter 2009 4th Quarter*, LIFSHITZ AND TREITEL/IP-ISRAEL GROUP, <http://www.ip-israel.com/index-6.html>.

126. *Id.*

127. CANADIAN INTELLECTUAL PROPERTY OFFICE, *Expedited Examination of Patent Applications Related to Green Technology* (Dec. 2, 2011), available at <http://www.cipo.ic.gc.ca/eic/>

To be accepted into the fast track program, the applicant must submit a declaration stating that its application relates to technology that could mitigate environmental impacts or conserve resources.¹²⁸ CIPO will not question or challenge an applicant's declaration.¹²⁹ For expedited applications, CIPO would provide an office action within two months of receipt of an applicant's request to enter the program.¹³⁰

Another important jurisdiction for clean technologies, Brazil, announced that its National Institute of Industrial Property would start a green patent fast track program in June 2012.¹³¹

B. BENEFITS OF THE GREEN PATENT FAST TRACK PROGRAMS

There is much to commend in these expedited examination programs. Significantly, the fast track initiatives expand the green patent practitioner's tool kit and provide applicants with strategic flexibility. With high speed patenting procedures available in several different corners of the world, a patent attorney can suggest to clients a number of options for filing patent applications and obtaining quick results. These options provide the practitioner with greater flexibility to calibrate a global patent filing strategy to best suit the business needs of green tech clients. For example, a clean tech company active in both the United States and Europe that previously filed its patent applications in the United States first might now be better served by filing first in the United Kingdom, where it can obtain a patent in only nine months through the UKIPO fast track program. One can imagine that clean tech companies for which Asia is an important market might take a similar approach and file first in Korea to enjoy "superspeed" patent examination there.¹³²

Viewed more broadly as climate change policy, the expedited processing of green patent applications could speed commercialization of green technologies and reduce their time to market by encouraging investment in clean tech companies. The fast examination results and rapid turnaround from application filing to patent grant—nine months in the United Kingdom

site/cipointernet-internetopic.nsf/eng/wr02462.html ("The Canadian Intellectual Property Office's (CIPO) initiative to expedite the examination of patent applications related to green technology came into force March 3, 2011.").

128. *Id.*

129. See CIPO, *Green Patents: Coming into effect—Qs and As* ("Will the Office question the declaration from the applicant? No. It is the applicant's responsibility to ensure the accuracy of their declaration").

130. *Id.*

131. See Robert Wulff, *Brazil to fast-track green patent applications*, GRIFFITH HACK CLEAN IP BLOG (Dec. 1, 2011), <http://cleanip.com.au/?p=2960>.

132. Korean Intellectual Property News Release, *supra* note 86.

and only one month in Korea—can provide the clean tech patentee with a very quick indication of patentability. This official stamp of approval by a national intellectual property office lends credibility to an invention and deposits a gloss of innovation on the patented technology.

More importantly, an issued patent provides reasonable assurance of exclusivity in the claimed invention, which can be critical for a clean tech startup trying to raise capital. As discussed in Section II.A, *supra*, in the clean tech industry commercial scale up is very capital intensive, securing funding is challenging, and clean tech companies are very dependent upon capital investment.¹³³ But a clean tech startup just beginning to build a patent portfolio may wait several years for a patent application to mature into a granted patent.

With the advent of the green patent fast track programs, the patent attorney now has an alternative to offer clean tech startups and their prospective investors. These initiatives can drastically reduce the time needed to determine the patentability of an invention. The clean tech startup that has only pending patent applications may improve its position in soliciting investors by turning its applications into granted patents as quickly as possible. By using the new fast track programs, this can be achieved in months instead of years, as is common in some national intellectual property offices. Thanks to expedited green patent application processing and examination, clean tech startups can quickly demonstrate to potential investors that they have exclusive rights to their technologies. This showing could provide some level of assurance of return on investment (“ROI”) and encourage earlier capital investment in clean tech startups. The sooner the infusions of cash come, the quicker clean tech companies can bring their products to market.

IV. CRITICAL ANALYSIS OF THE GREEN PATENT FAST TRACK PROGRAMS

While the availability of fast track programs is potentially beneficial for green innovation, there are some significant problems with their operation that hamstring their effectiveness in practice. This Part conducts a two-part analysis to tease out and explain these problems.

133. See Meryl Epstein, Brady Berg & Tavis Morello, *Venture Debt, Another Tool for Cleantech*, INTERPV.NET, http://www.interpv.net/market/market_view.asp?idx=271&part_code=03&page=9 (“Because of their capital intensive nature and lengthy project timelines, cleantech companies may be more likely than other emerging technology companies to experience a funding gap.”).

It is important, first, to examine all of the fast track programs as an interconnected network of initiatives that together represent a unified green patent policy offering. For green patent applicants and the practitioners who do their patent work, the starting point is accelerated examination as a whole, and the initial question is whether to take advantage of expedited examination at all. Therefore, the general benefits and drawbacks of the green patent fast track network need to be analyzed to understand and improve upon them.

Second, an intra-program analysis of the individual initiatives and their operation is necessary to gauge the effectiveness of different program rules. Only this micro-analysis will inform policymakers of which parameters work and which do not, so the programs can be improved or, better still, an optimized global program can be initiated. As discussed in Part V, ideally a harmonized green patent fast track system would be implemented based on the lessons learned from the critical analysis of each individual program.

A. THE COLLECTIVE CRITIQUE: A DISPARATE PATCHWORK OF PROGRAM REQUIREMENTS

When viewed as a whole, the most serious problem with the green patent fast track programs is the wide variability in their rules—both the eligibility requirements and the formal process requirements.¹³⁴ The eligibility requirements govern which patent applications are eligible to participate in the fast track programs. They comprise two parameters: the subject matter of the application and the status of the application, which may be unfiled or filed and pending. The more complex and important eligibility parameter is subject matter, which defines the categories of green technology eligible for accelerated examination. The formal process requirements are non-subject matter restrictions such as limitations on the number of claims permitted.

The subject matter eligibility requirements of the fast track programs range from very broad and deferential to the applicants' explanations of the invention to severely restrictive and tied to narrow, enumerated technology classes. On the permissive end of the spectrum is the UKIPO's Green Channel initiative, which merely requires a reasonable assertion that the patent application is directed to technology that has an environmental benefit.¹³⁵ The Green Channel does not use a classification system; any type of technology could qualify so long as the applicant's statement sufficiently

134. See discussion *infra* Section IV.B (presenting a critical analysis of the rules of each program).

135. See Press Release, UK Intellectual Property Office, *supra* note 80.

explains the environmentally beneficial aspect of the invention.¹³⁶ Similarly, IP Australia requires a brief explanation of the invention and how it benefits the environment,¹³⁷ and applicants to the CIPO must submit a declaration that the invention would help resolve or mitigate environmental impacts or conserve the environment and natural resources.¹³⁸

The most restrictive subject matter eligibility rules are those put forth by KIPO. To qualify for the Korean “superspeed” examination program, a patent application will be automatically eligible if it falls within one of several enumerated technology classes, some of which are quite esoteric.¹³⁹ Alternatively, a patent application directed to an invention in the broad category of “new renewable energy technology” or other well-recognized fields such as emissions reduction, LEDs, and green transport, is eligible only if the invention has received funding or certification from the Korean government.¹⁴⁰

The subject matter eligibility requirements of the IPO, the JPO, and the USPTO fall at different points along the middle of the spectrum between UKIPO and KIPO.

Unfortunately, like the national intellectual property offices themselves, the formal process requirements are all over the map. While IP Australia and the CIPO allow an unlimited number of claims and the CIPO is more liberal on the unity of invention requirement,¹⁴¹ the USPTO pilot program has a limit of twenty claims (and within the twenty a limit of three independent claims) and imposes a telephonic election without traverse in response to a restriction requirement.¹⁴² In their ordinary patent prosecution process,

136. See *Green Channel Frequently Asked Questions*, INTELLECTUAL PROP. OFFICE, <http://www.ipo.gov.uk/pro-types/pro-patent/p-law/p-accelerated/pro-p-green/pro-p-green-faq.htm>.

137. See Morris & Roberts, *supra* note 123.

138. See Press Release, Canadian Intellectual Property Office, *supra* note 127.

139. See Hanyang Newsletter, *supra* note 90.

140. See *id.*

141. See E-mail from Justin Blows, Griffith Hack, to Eric L. Lane (Jan. 2, 2012 4:01 PM) (on file with the author) (stating there are “no claim limitations” for the IP Australia green patent fast track application); e-mail from Marcelo Sarkis, Heenan Blaikie, to Eric L. Lane (Jan. 2, 2012 1:28 PM) (on file with the author) (“I am not aware of any limitations on the number of claims for a green fast track application with CIPO.”); e-mail from Marcelo Sarkis, Heenan Blaikie, to Eric L. Lane (Jan. 2, 2012 1:39 PM) (on file with the author) (“In Canada, product and process claims are considered the same invention . . .”).

142. See Pilot Program for Green Technologies Including Greenhouse Gas Reduction, 74 Fed. Reg. 64,666, 64,667 (Dec. 8, 2009), available at www.uspto.gov/patents/law/notices/74fr64666.pdf (“(3) The application must contain three or fewer independent claims and twenty or fewer total claims. The application must not contain any multiple dependent claims. For an application that contains more than three independent claims or twenty total

certain national intellectual property offices, the JPO being a prominent example, determine their examination fees on a per claim basis¹⁴³ and impose strict unity of invention requirements.¹⁴⁴ These requirements may impose a de facto limit on the number and scope of claims for many applicants by making larger claim sets cost prohibitive. Taken together, these disparate patent claims rules mean that a single set of claims typically will not be acceptable for green technology fast track programs in multiple jurisdictions.

With the current state of variability in green patent fast track program requirements, an applicant seeking to participate in several of the programs must undertake a time-consuming and costly series of steps. First, the putative applicant (and/or the patent practitioner) has to investigate each program's rules by gathering the necessary information and analyzing each set of requirements. Based on that understanding, the applicant must then determine if the invention meets the subject matter eligibility standards for each program. This is not a trivial task; as discussed earlier in this Section, the categories of eligible subject matter vary from broad and vague to narrow and esoteric. Moreover, in some instances this determination is an indefinite one in which the putative applicant or practitioner cannot say with certainty that an invention qualifies based on its subject matter. Rather, an invention may fall in a gray area of subject matter so the applicant must exercise some judgment to gauge the chance of acceptance of a patent application and weigh the risk of rejection.

Once an applicant has decided the patent application would satisfy the subject matter eligibility requirements of one or more accelerated examination programs (or has a good enough chance of satisfying the requirements to proceed), the applicant must then determine and prepare the requisite submissions for each program. For most programs, these will include a declaration, statement, or letter describing the invention and its environmental benefits. However, the content of such statements is likely to vary depending on the program. For the USPTO, the statement should

claims, applicants must file a preliminary amendment in compliance with 37 CFR 1.121 to cancel the excess claims and/or the multiple dependent claims at the time the petition to make special is filed.”).

143. See Japan Patent Office, *Schedule of Fees*, available at http://www.jpo.go.jp/tetuzuki_e/ryoukin_e/ryokine.htm.

144. See Japan Patent Office, *Requirements of Unity of Invention*, available at http://www.jpo.go.jp/tetuzuki_e/t_tokkyo_e/Guidelines/1_2.pdf (explaining that the unity of invention requirement is based on multiple inventions' technical relationship, which means “two or more inventions must be linked so as to form a single inventive concept by having the same or corresponding special technical features among them . . . defining a contribution made by an invention over the prior art”).

indicate into which of the four broad areas (environmental quality, conserving energy, developing renewable energy resources, or reducing greenhouse gas emissions) the claimed inventions falls.¹⁴⁵ Similarly, for the IPO fast track program, the statement needs to be drafted with the classification system in mind so the description of the invention puts the patent application in the best position for acceptance.¹⁴⁶ In other countries, such as the United Kingdom, Canada, and Australia, a relatively simple statement of the invention and its environmental benefits will suffice.¹⁴⁷

Finally, the patent practitioner needs to make sure the claims of the patent application meet the requirements of each program. To do so may require that the practitioner draft several different claim sets. The claims, of course, are the most critical part of the patent application as they define the “metes and bounds” of the invention, i.e., the legal scope of protection.¹⁴⁸ As such, in this step the practitioner must craft claims that would provide broad enough protection for the applicant and also comport with the claims rules of each jurisdiction.

For the USPTO pilot program, the claim set must consist of twenty or fewer claims with three or fewer of the twenty being independent claims.¹⁴⁹ In addition, the claim set should be directed to a “single invention”;¹⁵⁰ this means laser-like focus on one embodiment of the invention and may necessitate forgoing a subset of method claims. In the JPO, the applicant may want to limit the number of claims to keep costs under control and must carefully draft claims that adhere to the unity of invention requirement.¹⁵¹

145. See Pilot Program for Green Technologies Including Greenhouse Gas Reduction, 74 Fed. Reg. 64,666, 64,667 (“(4) The claims must be directed to a single invention that materially enhances the quality of the environment, or that materially contributes to: (1) the discovery or development of renewable energy resources; (2) the more efficient utilization and conservation of energy resources; or (3) greenhouse gas emission reduction . . .”).

146. See Lifshitz, *supra* note 125.

147. See, e.g., *Green Channel for Patent Applications*, *supra* note 83.

148. See, e.g., Lauren Maida, *Patent Claim Construction: It's Not a Pure Matter of Law, So Why Isn't the Federal Circuit Giving the District Courts the Deference They Deserve?*, 30 CARDOZO L. REV. 1773, 1776–77 (“Claims are concise statements which define what the patentee ‘regards as his invention.’ They are critical aspects of a patent because they define the metes and bounds of the patentee’s exclusive rights. Claim construction is the process by which courts determine the scope and meaning of claims, in order to establish ‘what constitutes the ‘patented invention’ that persons cannot make, use or sell without the authority of the patent owner.’”).

149. See Pilot Program for Green Technologies Including Greenhouse Gas Reduction, 74 Fed. Reg. 64,666, 64,667 (“(3) The application must contain three or fewer independent claims and twenty or fewer total claims.”).

150. See *id.* (“(4) The claims must be directed to a single invention . . .”).

151. See Japan Patent Office, *supra* note 145.

However, the relatively circumscribed claim sets for the USPTO and JPO fall short of the protection available in, for example, IP Australia and CIPO where the unity of invention rules are more lax.¹⁵² An applicant applying for the fast track programs in these jurisdictions would likely want to draft longer claim sets with more independent claims, more embodiments, and both system and method claims to obtain optimal protection in Australia and Canada.

Because of the above-described disparities in subject matter eligibility and process, certain green technology inventions may be eligible in some countries and not others, different submission documents may need to be prepared, and claim sets often need to be re-drafted multiple times to ensure participation in multiple fast track programs. As a result, it can be costly and time consuming for applicants and their patent attorneys to select which green patent fast track programs to utilize, to determine whether and how to utilize such programs, and to actually participate in multiple programs.

As discussed in Part V, *infra*, harmonization of the disparate program requirements could be an effective solution to these collective problems. But before we can determine the optimal set of program parameters for a standardized international fast track initiative, we first need to conduct a microanalysis of the existing fast track initiatives at the individual program level.

B. INDIVIDUAL PROGRAM CRITIQUES

Each of the accelerated examination programs has its own iteration of program rules. The variations among the disparate sets of rules range from the nuanced—such as subtle gradations in how to explain the environmental benefits of an invention—to the substantial—like the very different approaches to identifying eligible technologies discussed in Sections III.A and IV.A, *supra*. Each set of rules has its strengths and weaknesses, which will be analyzed in this Section.

For this analysis (and for the determination of a harmonized program proposal) it is useful to focus separately on each of the two categories of program rules: the eligibility rules—particularly the subject matter eligibility

152. *See, e.g.*, Australia Working Group on Multiple Invention Disclosures and Complex Application: Response to Circular C. 6717 (“The application of [the unity of invention] standard in the national phase is however tempered by a recognition that the rationale for the unity requirement is substantially a matter of cost recovery and hence the practice is that: ‘An objection that the claim or claims of a complete specification do not “relate to one invention only” should only be taken where there are claimed inventions which are clearly not so linked as to form a single inventive concept and it would require significant additional effort to examine all of the inventions.’”).

requirements—and the formal process requirements. Subject matter eligibility requirements are the protocols for determining which categories of technology qualify for the fast track programs. The formal process requirements are non-subject matter restrictions such as limitations on the number of claims permitted and other prosecution procedures.

1. *The USPTO's Green Technology Pilot Program*

After a rocky start, the USPTO's Green Technology Pilot Program ultimately achieved a relatively good balance in its program rules. The initial subject matter eligibility rule required that a patent application be classified in one of seventy-nine technology classes and one of a number of particular subclasses to qualify for the program.¹⁵³ This was unduly restrictive and was at least one significant factor contributing to the program's initially low participation levels.¹⁵⁴

More particularly, many truly green inventions that convey environmental benefits were not eligible because they did not fall into one of the pre-selected classifications.¹⁵⁵ Some scholarly analysis of the USPTO Green Technology Pilot Program has criticized the initial classification scheme for this reason. In a new article, Professor Sarah Tran, a scholar who focuses on the use of administrative regulations to promote innovation and sustainable development, notes that “many environmentally-beneficial inventions had been ineligible for the program due to the classification requirement.”¹⁵⁶ As one example of such exclusion, Tran cites U.S. Patent No. 7,644,828, directed to a bottle coupling system that reduces landfill waste.¹⁵⁷ Of greater concern, entire categories of technology were excluded from eligibility, such as inventions that conserve energy through temperature and humidity

153. Pilot Program for Green Technologies Including Greenhouse Gas Reduction, 74 Fed. Reg. 64,666, 64,667 (“(2) The application must be classified in one of the U.S. classifications listed in section VI of this notice at the time of examination.”).

154. See Kate Nuehring, *Our Generation's Sputnik Moment: Comparing the United States' Green Technology Pilot Program to Green Patent Programs Abroad*, 9 NW. J. TECH. & INTELL. PROP. 609, 612 (“about 184 requests were made per month after the elimination of the classification system, a 26% increase”); see also Jeffrey S. Whittle et al., *Qualifying Barriers Lower for “Green Technology” Patent Applications*, NAT'L L. REV., Jun. 16, 2010, available at <http://www.natlawreview.com/article/qualifying-barriers-lower-green-technology-patent-applications>.

155. See Elimination of Classification Requirement in the Green Technology Pilot Program, 75 Fed. Reg. 28,554 (May 21, 2010) (“The USPTO has determined that the classification requirement . . . was causing the denial of petitions for applications that are drawn to green technologies”).

156. Sarah Tran, *Expediting Innovation*, 36 HARV. ENVTL. L. REV. 123, 145 (2012).

157. *Id.*

controls, classified in Class 236.¹⁵⁸ A petition filed by the present author on behalf of a client was initially denied, despite the patent application being directed to an energy storage process for use with intermittent renewable energy sources such as wind and solar.

Moreover, the onerous classification requirement created inefficiencies and increased the cost to the applicant to participate in the USPTO fast track program. For those applicants who tried to participate at the time, the ultra-specific classification requirement was the most common ground for denial of the fast track petitions.¹⁵⁹ Much work was involved in formulating a successful petition based on these classifications and typically included re-drafting claims to shoehorn them into one of the eligible classes and subclasses.¹⁶⁰ The patent practitioner had to conduct many steps in this process. First, he or she had to review the USPTO's list of acceptable technology classes and subclasses and select some classes and subclasses that seemed to match the invention at issue. Next, it was necessary to research the class and subclass definitions used by the USPTO to place a patent application in a particular class and subclass and extract the key words from those class and subclass definitions. The practitioner then had to analyze the patent application to find support for claim amendments that would include some of those key words and draft amendments to the claims to incorporate the key words. Finally, the practitioner would draft a preliminary amendment that included a list of the target classes or subclasses and a statement that the applicant believes the application is appropriately classified in one or more of those subclasses because of the particular features in the amended claims.¹⁶¹

Thus, a technology classification scheme like the one that initially comprised the USPTO fast track subject matter eligibility requirement is a serious drawback. First, some important green inventions that would convey environmental benefits are inevitably excluded from eligibility when specific, pre-selected classification requirements are imposed. Second, the definitions inherent in such classification schemes reduce efficiency and increase the

158. *Id.* (“the classification requirement originally excluded all applications drawn to systems and methods promoting energy conservation using temperature and humidity controls (USPC 236’”).

159. See Eric L. Lane, *It's Not Easy Being Green: Navigating the USPTO's Green Tech Pilot Program*, GREEN PATENT BLOG (Mar. 20, 2010), <http://www.greenpatentblog.com/2010/03/20/its-not-easy-being-green-navigating-the-usptos-green-tech-pilot-program/> (“As I discovered first-hand, the most common ground for denial of a green tech petition is that the patent application is not in an eligible technology class and subclass”).

160. See *id.* (describing the steps necessary “for getting a patent application that has not yet been assigned a class/subclass, or has been assigned an ineligible class/subclass, classified or reclassified, respectively, in an eligible technology class”).

161. *Id.*

burden on the applicant because the patent practitioner must tailor the submissions to meet the definitional requirements.

As discussed in Section III.A.4, *supra*, the USPTO corrected this problem by breaking the tie to the enumerated technology classes and subclasses and instituting a new classification scheme.¹⁶² With the classification requirement eliminated, the pre-existing program rule describing the nature of an eligible patent application became the operative subject matter eligibility requirement for patent applications pertaining to environmental quality, energy conservation, development of renewable energy resources, or greenhouse gas emissions reduction. Accordingly, more green technologies became eligible, and applicants had a higher level of assurance that their patent applications would be accepted into the program.

While liberalizing the subject matter eligibility requirement did indeed open the USPTO program to previously excluded green technologies,¹⁶³ some inefficiencies in implementation remained. Even under the more liberal standard, the USPTO initially rejected a petition filed by the author on behalf of a client for a patent application directed to solar thermal technology. In a telephone call with the USPTO, the Supervisory Program Examiner (“SPE”) who conducted the review of the petition revealed the problem was a rather tortured reading of the phrase “development of renewable energy resources.” Specifically, the SPE indicated that, although independent claim 1 of the subject patent application recited a solar reflector apparatus, the apparatus failed to actually generate energy from the concentrated sunlight. On the telephone and in a request for reconsideration of the petition, the author pointed out that a later dependent claim added the limitation of a generator to produce electricity from the solar radiation. Although the petition was subsequently granted, this account points to the continuing problems with implementation of a subject matter eligibility scheme tied to enumerated green technology definitions.

Other eligibility parameters initially utilized by the USPTO’s green patent fast track program have been the subject of some recent scholarly articles.¹⁶⁴ One of the drawbacks of the program was that it was initially limited to patent applications that had already been filed as of the program launch date

162. See discussion *supra* Part III.

163. Nuehring, *supra* note 154, at 612 (“about 184 requests were made per month after the elimination of the classification system, a 26% increase”); Tran, *supra* note 156, at 14 (“The PTO eliminated the classification restriction on May 21, 2010. This revision opened up the program to all viable ‘green technologies.’”).

164. See Tran, *supra* note 156, at 149–54 (discussing the program’s barriers to participation and “laundry list of restrictions”); see also Nuehring, *supra* note 154, at 615–18 (describing the temporary and permanent disadvantages of the program).

of December 8, 2009.¹⁶⁵ According to an article by Kate Nuehring, the restriction to pending applications “provided no incentive for recalcitrant green technology inventors to file a patent application.”¹⁶⁶ Empirical data discussed by Nuehring suggests that this restriction was a significant factor in limiting the number of petitions to the USPTO program.¹⁶⁷ As with the initial classification scheme, the USPTO remedied this problem by eliminating the requirement that a patent application must have been filed as of the program launch date to be eligible for accelerated examination. However, it is important to note that a pendency requirement foreclosing participation by newly-filed patent applications is a serious flaw to be avoided as it severely limits the universe of eligible patent applications.

A pair of process limitations sometimes posited to create an additional burden on applicants are the cap on the permissible number of claims and the requirement to elect a single invention “without traverse.”¹⁶⁸ As discussed in Section III.A.4, *supra*, to be accepted into the USPTO Green Technology Pilot Program a patent application must contain three or fewer independent claims, no more than twenty total claims, and no multiple dependent claims.¹⁶⁹ The application must also be directed to a single invention; if the patent examiner finds the claims recite multiple inventions the applicant cannot dispute the finding and must elect (typically by telephone) one invention for examination.¹⁷⁰ Wong has called for removal of the claims restrictions,¹⁷¹ and it is true that the applicant has to draft claims in compliance with these requirements and may need to conduct a strategic analysis to elect a subset of claims for examination. However, these tasks are not inherently problematic.¹⁷² Rather, they may create an undue burden

165. See discussion *supra* Part III.

166. Nuehring, *supra* note 154, at 618.

167. See *id.* at 612–13 (“As a result [of the announcement that the USPTO would extend the program deadline and open eligibility to applications filed on or after December 8, 2009], the number of requests to have applications included in the program increased dramatically . . . [T]he number of requests per month increased by approximately 53% after the November 10, 2010 announcement”).

168. See Tran, *supra* note 156, at 150 (listing the requirement of a telephonic election without traverse among the “laundry list of restrictions”); see also Nuehring, *supra* note 154, at 615 (describing same as a permanent disadvantage of the program).

169. See discussion *supra* Part III.

170. See *id.*

171. See Wong, *supra* note 1, at 251 (“[T]he claim restrictions must be removed so that all eligible applications can participate regardless of the number of claims . . .”).

172. In fact, as discussed in Section V.D, *infra*, such reasonable process restrictions as a single invention requirement and a cap on number and type of claims could be beneficial for maintaining the speed and efficiency of accelerated examination programs.

should the applicant apply to multiple fast track programs.¹⁷³ As such, where these claims-based process requirements do create a burden on an applicant, it is a symptom of the collective disparity problems of the entire fast track network described in Section IV.A.

An obvious process problem is that the USPTO program was temporary, and, as discussed in Section III.A.4, closed on February 27, 2012.¹⁷⁴ Though extended twice, it was, from the start, a “pilot” program, and the USPTO never expressed any intention to make it permanent. As launched, the program was to expire at the earlier of one year from the start date or upon acceptance of 3,000 petitions.¹⁷⁵ The USPTO subsequently extended the program for another year to December 31, 2011 or until 3,000 green patent applications were accepted into the program.¹⁷⁶ Despite another recent extension—to the earlier of March 31, 2012 or 3,500 accepted petitions—the USPTO’s pilot program will soon come to an end.¹⁷⁷

Beyond the obvious participation problem its termination will raise, the fact that the USPTO Green Technology Pilot Program was temporary from its inception may have been a problem throughout its operation. Tran argues that the transient nature of the program precluded its ability to foster green innovation because it did not last long enough to accommodate the inventive process.¹⁷⁸ Along those lines, Nuehring notes that the pilot program remained “untested,” and practitioners did not come to rely upon it.¹⁷⁹ Its very nomenclature trumpeting pilot status may have been problematic, Nuehring posits, as “[t]he mere designation as a pilot program has sometimes been considered a harm to participation.”¹⁸⁰ Thus, both reality

173. See discussion *supra* Section IV.A.

174. See *supra* note 120.

175. See discussion *supra* Part III.

176. See Expansion and Extension of the Green Technology Pilot Program, 75 Fed. Reg. 69049, 69050 (Nov. 10, 2010) (“The program is also being extended until December 31, 2011”).

177. See discussion *supra* Part III.

178. See Tran, *supra* note 156, at 152–53 (“Even though the PTO later expanded the program to include pending applications, the program still fails to provide an incentive for innovation as it is set to expire less than a year after the expansion took effect. As the PTO is likely well aware, for many technologies, one year is insufficient time for an inventor to conceive of an idea, reduce it to practice, and prepare an application for the invention.”).

179. See Nuehring, *supra* note 154, at 618 (“Another temporary issue with the Green Technology Pilot Program is that it is an untested pilot program and, as such, has not become a tried and true program relied upon by patent practitioners”).

180. *Id.*

and perception make the temporary or pilot status of a fast track program a drawback.¹⁸¹

2. *The KIPO's "Superspeed" Program*

Turning to Korea, the onerous subject matter eligibility scheme stands out as seriously flawed. To qualify for the Korean "superspeed" examination program, an applicant has two potential admission paths. First, the patent application could relate to one of seven enumerated technology classes, some of which are quite narrow, such as "noise and vibration prevention" and "livestock excretions management, purification and disposal"; others are broader like waste disposal, sewage disposal, recycling, water quality, and air pollution prevention.¹⁸² A patent application directed to a technology in one of these areas is automatically eligible for the program.¹⁸³

An eighth category of technologies lists several subcategories for which a patent application is eligible only if the invention has "received financial support or certification from the government."¹⁸⁴ One problem is that these subcategories include the lion's share of important green technologies: "new renewable energy technology" (which includes, *inter alia*, solar, wind, geothermal, batteries, tidal and wave energy) or "carbon reduction technology," LEDs, green transport, greenhouse gas emissions, or green cities technologies.¹⁸⁵ These enumerated green technology subcategories of category eight are fleshed out with some examples, to make crystal clear exactly what KIPO is shutting out of its green tech program—e.g., solar, wind energy, geothermal energy, tidal energy, wave energy, bioenergy, batteries, carbon capture and storage, LED lighting, hybrid cars, plug-in hybrid cars.¹⁸⁶ Thus, inexplicably, wind energy and hybrid vehicles are subordinated to livestock excretion disposal and vibration prevention methods.

Moreover, to apply for the necessary green certification, a non-Korean applicant must have a separate corporate entity with a branch office in Korea, making the certification path a dead end for most applicants.¹⁸⁷ It is

181. While making the program permanent might cause a spike in petitions, the process restrictions proposed in Section V.D, *infra*, should temper any associated adverse effects on patent office and examiner workload.

182. See Lane, *supra* note 90.

183. See *id.*

184. See Hanyang Newsletter, *supra* note 90.

185. See *id.*

186. See *id.*

187. See Eric L. Lane, *KIPO Green Tech Fast Track Inaccessible for Most Applicants*, GREEN PATENT BLOG (Nov. 7, 2011), <http://www.greenpatentblog.com/2011/11/07/kipo-green->

unlikely that more than a small fraction of non-Korean patent applicants have received funding from the Korean government.¹⁸⁸ The Author has had to advise multiple U.S. clean tech clients that their patent applications are not eligible for accelerated examination in Korea because of the certification or funding requirement. Thus, the dual roadblocks of the sometimes esoteric automatic categories coupled with the funding or certification requirement for a host of critical green technologies leaves the KIPO “superspeed” program inaccessible for many clean tech companies seeking green patent protection in Korea.¹⁸⁹

3. *The IPO’s Green Patent Fast Track Program*

The Israeli fast track initiative also suffers from a flawed subject matter eligibility scheme. To qualify for the program, the patent application must be directed to an invention that falls into one of the IPO’s enumerated green classifications.¹⁹⁰ The applicant has the burden of explaining the invention’s environmentally friendly features in a manner that will slot the patent application into an acceptable green class. As in the United States, the IPO’s classification-based subject matter eligibility requirement can be costly and inefficient as applicants expend resources to draft (and perhaps re-draft) submissions to shoehorn their inventions into enumerated green classifications.

4. *The JPO’s Green Patent Fast Track Program*

The JPO fast track program raises a serious process problem through its requirement that the applicant conduct a prior art search and analysis. Specifically, the search and analysis component requires the applicant to conduct a prior art search, disclose the prior art to the JPO, and submit to the JPO an explanation comparing the invention to the prior art.¹⁹¹ While disclosure of known material prior art is an ordinary duty of a patent

tech-fast-track-inaccessible-to-most-applicants/ (discussing email correspondence from Korean patent attorney Terry Kang which explains that “only if [a] foreign company has a branch office which is a separate entity in Korea, that branch office can apply for the ‘Green Certification.’”).

188. To the Author’s knowledge, none of his clients has received funding from the Korean government in connections with research or development of a clean tech invention.

189. Though beyond the scope of this Article, the protectionist “certification or funding” requirement begs the question whether the KIPO “super speed” program is designed to promote global green innovation, or rather, is intended to serve only Korean green technology applicants.

190. See Lifshitz, *supra* note 125.

191. See Japan Patent Attorneys Ass’n, *Accelerated (Appeal) Examination for Green Technology Patent Applications* (Mar. 7, 2010), http://www.jpaa.or.jp/english/whatsnew/green_technology_patent.pdf.

applicant in some jurisdictions,¹⁹² the search and explanation responsibilities shift much of the patent office's burden onto the applicant.

For an idea of how these additional burdens affect an applicant, the USPTO's existing (i.e., pre-Green Technology Pilot Program) accelerated examination program based on special status is instructive. Petitions to make special and obtain accelerated review in the USPTO must comply with a number of requirements, including submission of a pre-examination search report¹⁹³ and an examination support document.¹⁹⁴ As an initial matter, the task of conducting a prior art search can be quite costly.¹⁹⁵ Though it is unclear how rigorous the search for the JPO fast track needs to be relative to the USPTO's search, any prior art search should be conducted by a patent professional and thus adds significant expense to the application process.

The comparative explanation required by the JPO is analogous to the examination support document ("ESD"), which must include an explanation of what the prior art teaches and how the applicant's invention is patentable over the prior art. In addition to the added expense of this analysis and explanation, the ESD has been dubbed the "express suicide document" because of the heightened risk of inequitable conduct applicants face based on the representations made in their ESD.¹⁹⁶ The comparative explanation for the JPO could expose the applicant to similar risks. For these reasons, the ESD has discouraged participation in the USPTO accelerated examination program¹⁹⁷ and the similar requirement in the JPO likely has the same effect.

192. See, e.g., 37 C.F.R. § 1.56 (2011) ("Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section"); see also *Keisen's Policy on the IDS System in Japan*, KEISEN ASSOCIATED, <http://www.keisenassociates.com/IP%20News%20Flash-%20IDS.htm> ("The Japan Patent Office (JPO) has implemented an information disclosure system whereby applicants have a duty to disclose prior art that they know of at the time of filing a patent application").

193. See MPEP § 708.02(a)(1)(H) ("At the time of filing, applicant must provide a statement that a preexamination search was conducted, including . . . class and subclass and the date of the search . . .").

194. See MPEP § 708.02(a)(1)(I).

195. See Tran, *supra* note 156, at 141 ("This search could easily cost the applicants thousands of dollars in additional legal fees").

196. Gene Quinn, *Accelerated Exam in Inequitable Conduct Friendly Era*, IP WATCHDOG (Aug. 11, 2009), <http://www.ipwatchdog.com/2009/08/11/accelerated-exam-in-inequitable-conduct-friendly-era/id=4833/>.

197. See Tran, *supra* note 156, at 140 ("Even though the revised Accelerated Examination program strives to provide inventors with a final decision on their applications within twelve months . . . and holds the potential to raise the quality of issued patents, the program has attracted little interest from inventors due to the liabilities and burdens it places on applicants"); see also Quinn, *supra* note 196 ("Unless and until the Patent Office revises the

5. *The UKIPO, CIPO, and IP Australia Green Patent Fast Track Programs*

There is little to fault in the fast track programs administered by the UKIPO, the CIPO, and IP Australia. Their program rules include none of the drawbacks in subject matter eligibility or process requirements that hamper some of the other initiatives. Specifically, CIPO, IP Australia, and UKIPO do not have a classification scheme with enumerated technology categories; a green patent application need only broadly relate to environmentally beneficial technology to be eligible for accelerated examination. As to process, these programs impose no onerous search or submission requirements, and only a declaration or similar written statement describing the invention is necessary. Finally, there are no restrictions on claim number or scope so applicants need not re-draft claim sets to specially tailor them to satisfy restrictive subject matter eligibility standards. While the lack of process restrictions could negatively impact the speed of these programs should the offices receive an overwhelming number of applications, that problem has yet to arise.¹⁹⁸ As discussed in Section V.D, *infra*, certain process restrictions would benefit a harmonized fast track system by maintaining the speed and efficiency of the system.

V. PROPOSAL FOR HARMONIZATION

To remedy the problems discussed in Part IV, *supra*, this Part proposes a harmonized international accelerated examination system for patent applications directed to green technologies. The goals of such a system, such as boosting participation by clean tech applicants while avoiding free-riding non-beneficial green technologies and maintaining the requisite speed and efficiency, are laid out herein. This Part argues that an expansive subject matter eligibility scheme unrestricted by enumerated technology classifications would increase participation. A “material environmental benefit” standard of review would strengthen the eligibility scheme and serve as a policing mechanism to ameliorate the free-rider problem. In addition, this Part posits that reasonable process restrictions such as limits on the number and type of claims and a single invention requirement would reduce

accelerated examination requirements I think this procedure will continue to be undesirable It simply makes no sense to me to have such a procedure be severely under utilized, and so over burdensome.”).

198. As of early March 2012, 429 applications had been accepted into the UKIPO Green Channel, and the IP Australia fast track program has processed only twenty-eight applications. See *Database of Green Channel Applications*, <http://www.ipo.gov.uk/types/patent/p-os/p-gcp.htm>; see also IP Australia, List of Green Technology Applications (on file with author).

patent examiner workload and streamline the examination process. This Part concludes with a proposed statement of rules for the Global Green Patent Highway—a harmonized international fast track system for green patent applications having a single, standardized set of rules—to make accelerated examination in multiple intellectual property offices more efficient.

A. ADVANTAGES OF HARMONIZATION

In light of the burdens imposed on green patent applicants by the need to understand and satisfy the disparate patchwork of expedited examination program rules, a standardized global system of green technology fast track requirements would be a major boost to participation in such programs. In turn, greater international participation in green patent fast track programs could expedite green innovation by encouraging investment in R&D and speeding deployment of green technologies through patent licensing.

A harmonized global green patent fast track initiative would provide two advantages over the current system of individual programs. First, it would provide a single, standardized set of program rules that would apply to each and every national intellectual property office offering expedited examination for green patent applications. A universal list of requirements would obviate the need to investigate, understand, and comply with several very different iterations of program rules, thereby eliminating a substantial burden on applicants. Gone would be the extra expense associated with preparing different explanations of the invention, determining the most pertinent enumerated technology classification, and re-drafting claim sets of different number and scope. In short, harmonization would greatly simplify a complicated process by reducing costs and creating efficiencies.

Second, by implementing a universal set of rules now, we have the opportunity to build the best possible green patent fast track program from the various rules and restrictions being employed by the existing programs. To compile the optimal set of program parameters for the Global Green Patent Highway, it is important to identify goals for its operation. With those goals in mind, we can look to the individual programs as laboratories and examine them to determine which rules, if any, have been successful in attaining those goals. While at least one commentator has suggested the USPTO might be improved by borrowing some rules from green patent fast track programs abroad,¹⁹⁹ optimization of just one of the many accelerated examination initiatives falls far short of the reform necessary to boost

199. See Neuhring, *supra* note 154, at 619 (“One way to determine how a fully implemented green technology patent program could be structured in the United States without overloading our patent system is to look at the standards used in other countries.”).

participation in a way that would foster global green innovation. Rather, taking the analysis a step further to consolidate all the programs into the best possible single harmonized global system would be the best approach.

B. GOALS OF THE GLOBAL GREEN PATENT HIGHWAY

Of course, the core purpose of a global green patent fast track system (hereinafter “Global Green Patent Highway” or “Global GPH”) is to significantly reduce the period of time from filing a green patent application to patent grant. To this end, the Global GPH must prevent patent examiners from being overworked and thus slowing down examination. If any individual intellectual property office becomes overloaded and is therefore unable to deliver a satisfactory reduction in examination time, it would undermine the system’s *raison d’être*. As discussed *infra*, the speed of the Global GPH can be maintained by imposing reasonable process restrictions on participating patent applications. Another important goal is to maximize participation by applicants who own patent applications directed to beneficial green technologies. Although process requirements may have some effect on participation, it is chiefly the eligibility parameters that determine participation levels.²⁰⁰ The subject matter eligibility scheme, in particular, must be carefully tailored to permit a sufficient diversity of green technologies while excluding technologies devoid of environmental benefits.

The best way to accomplish these goals is to create a balanced system that couples broad subject matter eligibility requirements with reasonable process restrictions. The former is geared toward expanding participation to include as many useful green technologies as possible while the latter serves a check on examiner workload levels to maintain sufficiently high-speed examination. In scholarly critiques of the USPTO program, some commentators have argued that the large number of program restrictions compromise the effectiveness of the program,²⁰¹ while others have called for lifting certain specific restrictions, such as those on the number of claims.²⁰² Although it is undoubtedly true that eliminating all of the eligibility and

200. *See id.* at 612–13 (discussing the spikes in petitions for the USPTO Green Technology Pilot Program after the subject matter eligibility requirement was relaxed and after the program was opened to newly-filed patent applications).

201. *See Tran, supra* note 156, at 150 (“While many of these restrictions were fairly benign and had only minimal impacts on the eligibility of applicants when considered individually, applications that satisfied all of the restrictions for eligibility in the pilot program were bound to take less time to review than the average application on a green technology due to their inherent simplicity, rather than due to any efforts by the PTO to expedite them.”).

202. *See Wong, supra* note 1, at 251 (“[T]he claim restrictions must be removed so that all eligible applications can participate regardless of the number of claims”).

process restrictions would satisfy the goal of easing participation, that benefit must be weighed against the need to manage the workload of the patent examiners and maintain high-speed examination.

In this regard, not all program rules are created equal. Rather, it is helpful to distinguish between rules that pertain to subject matter eligibility and those non-subject matter-based rules that relate to process parameters. By their nature, the subject matter eligibility rules are best suited for expanding participation because they dictate the size of the universe of eligible technologies, and therefore applicants, that can take advantage of the program. Moreover, an expansive subject matter eligibility rule would minimize the odds of excluding potentially beneficial green technologies that do not fall into currently recognized technology classes. The process rules, on the other hand, are good tools for ensuring the examiner workload is manageable as they serve to limit the size and scope of the patent applications being examined on the fast track.²⁰³

C. OPTIMAL SUBJECT MATTER ELIGIBILITY RULES: EXPANSIVE SUBJECT MATTER ELIGIBILITY AND A “MATERIAL ENVIRONMENTAL BENEFIT” STANDARD

The optimal subject matter eligibility requirement would be expansive to include all green technologies, but not so broad that patent applications directed to inventions conferring minimal environmental benefit can take advantage of the Global GPH.²⁰⁴ Clean technology is not a unified category, but an umbrella term that covers many areas of technology.²⁰⁵ It includes renewable-energy generation technologies such as solar, wind, hydro, wave and tidal, geothermal and biofuels, energy storage technologies such as fuel cells and advanced batteries, transportation technologies such as hybrid and electric vehicles, energy infrastructure technologies including smart grid, energy-efficient power systems, building materials and lighting technologies, bio-based plastics and other materials, water filtration and desalination systems, technologies that reduce pollution and emissions, and even carbon

203. *But see* Nuehring, *supra* note 154, at 626 (suggesting that the USPTO reinstitute a green technology classification requirement once the program becomes more popular).

204. *See* Tran, *supra* note 156, at 154–55 (“If the definition is too restrictive, it will exclude beneficial technologies from eligibility. On the other hand, if the definition is too broad it will allow for excessive free riding by inventions of little social worth.”) (citations omitted).

205. *See* Cleantech Group, *What is Cleantech?*, <http://www.cleantech.com/about-cleantech-group/what-is-cleantech/> (last visited Mar. 15, 2012) (“Cleantech represents a diverse range of products, services, and processes . . . Cleantech spans many industry verticals which we have organized into 13 categories.”).

trading schemes and other green policies and investment mechanisms.²⁰⁶ Therefore, if a fast track system is to effectively promote green innovation, it must be open to all beneficial green technologies without limitation. That is, no specific technology fields should be excluded from eligibility. However, technologies that provide only minimal, tangential, or speculative environmental benefits should not enjoy accelerated examination, as such patent applications would divert resources from the truly beneficial green technologies.

On this score, the UKIPO Green Channel's protocol stands out as the best model, with the CIPO program also exemplary.²⁰⁷ To qualify for the Green Channel, the applicant must make a reasonable assertion, by way of a brief written statement, that the patent application is directed to an invention that has an environmental benefit.²⁰⁸ The expansive scope of eligible green technology conferred by the "environmental benefit" standard is the best approach to encourage wider participation. For instance, after the USPTO relaxed its subject matter eligibility rule by eliminating the technology classification requirement, the number of fast track petitions filed rose twenty-six percent²⁰⁹ and the number of petitions granted increased approximately twenty-five percent.²¹⁰ This spike suggests that broad technology eligibility has a positive effect on program participation.

This approach has another important advantage over a classification-based eligibility scheme: it makes the Global GPH accessible to any type of green technology—now known, or later discovered, conventional or unconventional—even if it would not immediately be recognized as green. Any technology is eligible so long as the applicant demonstrates an invention's environmental benefit. Technologies for which the

206. *See id.*

207. *See supra* Section III.B (discussing the favorable rules of these programs, including expansive subject matter eligibility with no enumerated technology classification requirement).

208. *See* UK Intellectual Property Office, *supra* note 80.

209. *See* Nuehring, *supra* note 154, at 612 ("[A]bout 184 requests were made per month after the elimination of the classification system, a 26% increase").

210. *See id.* at 612 ("[I]the percentage of applications actually granted accelerated examination under the Green Technology Pilot Program increased after the elimination of the classification system. Approximately 350 of the 950, or approximately 37% of the requests filed between December 2009 and mid-June 2010 were granted accelerated examination. In contrast, approximately 795 of the 1,286, or approximately 62%, of the requests filed between mid-June 2010 and mid-January 2011 were granted accelerated examination. Therefore, the percentage of applications granted accelerated examination actually increased approximately 25% after the classification system was eliminated, presumably because a wider variety of inventions were considered eligible for the program.").

environmental benefit is immediately apparent such as solar or wind power would need a very brief statement, while a more detailed explanation may be required for a less obviously green technology such as an energy efficient manufacturing process.²¹¹ The UKIPO recognizes that in a very diverse clean tech industry it is necessary to have a flexible standard:

This is because inventions which have an environmental benefit can arise in any area of technology. For example, we would accept an acceleration request for a manufacturing process which uses less energy, in the same way as we would accept an acceleration request for a wind turbine or a recycling process.²¹²

To make the subject matter eligibility scheme more robust, a materiality component should be added to the “environmental benefit” standard. In this regard, the standard could borrow language from the USPTO Green Technology Pilot Program, which defines green technologies as those inventions that “materially enhance[] the quality of the environment, or materially contribute[] to” certain environmental benefits such as renewable energy generation, energy efficiency, or emissions reduction.²¹³ Tran argues that the materiality hurdle is an important check on acceptance that helpfully circumscribes to some extent the eligible technologies: “[T]he materiality standard serves as a policing mechanism to ensure that inventions that have only tangential or speculative effects on the environment cannot avail themselves of special status.”²¹⁴ To meet the materiality standard, then, a patent application must be directed to a green technology that has a substantial and direct environmental benefit.²¹⁵

211. *See Frequently Asked Questions*, UKIPO, <http://www.ipo.gov.uk/pro-types/pro-patent/p-law/p-accelerated/pro-p-green/pro-p-green-faq.htm> (“The applicant needs to provide as much justification as is necessary to explain why their invention is environmentally-friendly. If, for example, the application relates to a solar panel or a wind turbine then a simple statement is likely to be sufficient. If however the application relates to, for example, a more efficient manufacturing process which uses less energy, then a more detailed explanation is likely to be necessary to explain how the invention has an environmental benefit.”).

212. *Id.*

213. *See* Pilot Program for Green Technologies Including Greenhouse Gas Reduction, 74 Fed. Reg. 64,666, 64,667.

214. Tran, *supra* note 156, at 139.

215. *See* Pilot Program for Green Technologies Including Greenhouse Gas Reduction, 74 Fed. Reg. 64,666, 64,667 (“The materiality standard does not permit an applicant to speculate as to how a hypothetical end-user might specially apply the invention. . . . Nor does such standard permit an applicant to enjoy the benefit of advanced examination merely because some minor aspect of the claimed invention may [be directed to one of the grounds for special status].”).

The written statements of the applicants should not be rubber stamped, and some measure of oversight is necessary to provide a further check on the admissible green technologies. Here, the UKIPO, CIPO and USPTO fast track programs are instructive. The Green Channel reviewers in the UKIPO evaluate the written statements on a case-by-case basis and, while they do not conduct a detailed investigation into the assertions of environmental benefits, they refuse cases that are clearly unfounded.²¹⁶ Similarly, the CIPO does not question or challenge an applicant's declaration of environmental benefits.²¹⁷ The USPTO provides guidance on who might be best suited to conduct these initial reviews. In the pilot program it was Supervisory Program Examiners ("SPE") reviewing the petitions for, *inter alia*, subject matter eligibility. Tran argues that having SPEs conduct the eligibility review is another important quality assurance mechanism because the SPEs are few in number and highly trained, and as such, would maintain a certain level of consistency in their eligibility determinations.²¹⁸ With an expansive technology definition circumscribed somewhat by the materiality standard—essentially a "material environmental benefit" standard—and written statements screened by a small number of trained reviewers, this subject matter eligibility protocol would encourage wider participation and admit a high percentage of beneficial green technologies.

An eligibility parameter unrelated to subject matter might bear on participation to some extent. That is, the Global GPH should be open to newly filed applications. All of the existing green technology accelerated examination programs are structured this way, and the USPTO's course correction on this aspect suggests that it boosts participation. After the USPTO eliminated the restriction that only patent applications filed before the pilot program launch date of December 8, 2009 were eligible, the number of petitions per month increased by approximately fifty-three percent.²¹⁹

216. See UK Intellectual Property Office, *supra* note 80 ("The IPO will not conduct any detailed investigation into these assertions, but will refuse requests if they are clearly unfounded, for example if the application relates to a perpetual motion machine.").

217. CIPO, *supra* note 129 ("Will the Office question the declaration from the applicant? No. It is the applicant's responsibility to ensure the accuracy of their declaration.").

218. Tran, *supra* note 156, at 156 ("[T]here is only one Supervisory Program Examiner in each of the eight Technology Centers. These eight individuals have received the same training on the standards for determining the eligibility of petitions for special status 'to ensure uniformity to the maximum extent possible.' Given the small number of these specialized and highly-trained Supervisory Program Examiners, the likelihood that patent applicants would receive inconsistent determinations as to eligibility is likely negligible.").

219. See Nuehring, *supra* note 154, at 613 ("[T]he USPTO announced that the program had been extended to include patent application filed on or after December 8, 2009. As a result the number of requests to have applications included in the program increased

Thus, in addition to the liberal subject matter eligibility scheme, a broad patent application status eligibility rule that includes newly-filed applications should be included in the Global GPH.

D. OPTIMAL PROCESS REQUIREMENTS: REASONABLE RESTRICTIONS
PROVIDE A CHECK ON EXAMINER WORKLOAD

The optimal process requirements should further the critical core purpose of the Global GPH, that is, to reduce the period of time from filing a green patent application to patent grant. Although overly restrictive subject matter eligibility rules directly hamper participation by precluding some technologies, process restrictions are not inherently detrimental but are instead problematic primarily due to significant disparities across the fast track network. If standardized, reasonable process restrictions can help to maintain the speed of the Global GPH by ensuring that examiner workloads remain manageable even while participation increases due to the broad eligibility rules. This is critical because the USPTO suffers from a severe backlog.²²⁰ With the JPO, these two intellectual property offices rank first and second in number of patent applications processed.²²¹ Thus, the Global GPH must contain mechanisms to manage the processing of the additional patent applications that would hopefully enter the national intellectual property offices, particularly the USPTO and the JPO.

Certain process restrictions, particularly those that pertain to the claims, would be very useful as they serve to limit the size and scope of the patent applications being examined on the fast track. The USPTO pilot program offers the most detailed menu of options to regulate claim number and scope, and some of these should be incorporated into a standardized fast track system. First, the number of claims should be limited to twenty, perhaps even fewer, with three or fewer independent claims and no multiple dependent claims. Contrary to some commentary calling for no limitations on claim number,²²² a range of ten to twenty claims allows a patent practitioner ample latitude to claim the truly innovative features of any single

dramatically. Between mid-January and late May 2011, an additional 1,291 requests were made, approximately 287 requests per month. Therefore, the number of requests per month increased by approximately 53% after the November, 10, 2010 announcement.”)

220. See, e.g., Lily J. Ackerman, Note, *Prioritization: Addressing the Patent Application Backlog at the United States Patent and Trademark Office*, 26 BERKELEY TECH. L.J. 67 (2011).

221. See Nuehring, *supra* note 154, at 623–24 (“In 2009, the USPTO examined nearly 483,000 patent applications. . . . In 2009, the JPO received approximately 349,000 patent applications”).

222. See Wong, *supra* note 1, at 251 (“[T]he claim restrictions must be removed so that all eligible applications can participate regardless of the number of claims.”).

invention. A closely related second restriction is that the claims should be limited to recitation of a single invention, as in the USPTO pilot program. On this point, the JPO's rigorous unity of invention standard might be incorporated into the single invention requirement. It is not unreasonable to require applicants to file separate fast track petitions should they wish to accelerate examination of additional inventions.

These restrictions would go a long way toward streamlining the examination process for patent examiners. To examine a claim set directed to a single invention, an examiner has to conduct only one prior art search rather than formulating a separate search for each additional invention. A reasonable number of claims with only single dependencies further limits the time an examiner needs to spend examining a patent application and writing up office actions. Reasonable claims restrictions such as these can manage the workload of the patent examiners and maintain high-speed examination while still allowing applicants enough latitude to claim key features of their inventions.

With the basic contours of the Global GPH established, the Article now turns to a proposed statement of the Global Green Patent Highway Program and Rules.

E. WHAT IT SHOULD LOOK LIKE: A PROPOSED STATEMENT OF THE GLOBAL GREEN PATENT HIGHWAY PROGRAM AND RULES

This Section proposes a statement of the program and rules for the hypothetical Global Green Patent Highway. This statement would appear in the patent prosecution guidelines of each national intellectual property office that elects to participate in the Global GPH. For the statement below, this Section assumes participation by all the national intellectual property offices that have had, currently have, or will soon have, accelerated examination programs for green technologies.²²³

The Global Green Patent Highway Program and Rules

The Global Green Patent Highway ("Global GPH") is a uniform international system for accelerated examination of patent applications

223. As mentioned in note 187, *supra*, the "certification or funding" requirement of the KIPO "super speed" program may indicate that the office's goal is to further green technology development for Korean applicants only, in which case the KIPO might not elect to participate in an international harmonized green patent fast track system. Other national intellectual property offices, such as the USPTO, which recently ended its pilot program, might forgo participation in such a system as well. In any event, if even a small number of intellectual property offices were to participate in a standardized system, it would be an improvement over the current disparate patchwork of programs.

relating to green technology. Though individually administered by each participating national intellectual property office, the Global GPH has one standardized set of rules and requirements employed by every participating office. The Global GPH is a permanent program.

The participating offices are the U.S. Patent and Trademark Office, the United Kingdom Intellectual Property Office, the Japan Patent Office, the Canadian Intellectual Property Office, the Korean Intellectual Property Office, IP Australia, the Israel Intellectual Property Office, and the Brazil National Institute of Industrial Property.

To qualify for the Global GPH, an applicant must submit a written request containing a reasonable assertion that the invention confers a material environmental benefit. The offices will require no further reasons for expedited processing and examination; a satisfactory reasonable assertion will suffice for this purpose.

The accompanying patent application must meet the following requirements:

- The application contains two or fewer independent claims, fifteen or fewer total claims, and no multiple dependent claims.
- The application claims a single invention that confers a material environmental benefit. Should the patent examiner find multiple inventions, the applicant must make a telephonic election of a single invention for examination.
- The application is newly filed with the request or previously filed and currently pending, but has not yet received a first office action.

A Supervisory Program Examiner (or its equivalent in some offices) will review each request on a case-by-case basis with deference to the applicant's reasonable assertion and will only reject requests that are clearly unfounded. The timing of the first substantive office action and further prosecution will vary by national intellectual property office, but in no case shall the first substantive office issue an action more than three months after the filing date of the request.

There is no limit on the number of requests and patent applications that can be accepted into the Global GPH. There is also no additional fee for accelerated examination on the Global GPH; the usual patent application fees for each office apply. Aside from the special requirements of the Global GPH, all other patent laws and rules for each jurisdiction and office apply.

Note that the applicant need only prepare one submission containing the written request and the conforming patent application to apply for the

Global GPH in any number of participating offices. The same submission may be filed in each participating office (subject to translation requirements) and will satisfy the Global GPH requirements in each office.

By offering a uniform system with one set of rules, the Global GPH aims to increase participation in accelerated examination programs for green technology patent applications around the world and foster green innovation.

VI. CONCLUSION

Patents play a critical role in green innovation by providing incentives to invest in R&D and facilitating implementation and international diffusion of green technologies. Accordingly, several national intellectual property offices offer accelerated examination procedures for patent applications directed to green technologies so clean tech innovators can obtain patents more quickly. While these programs in their current form are beneficial for the global clean tech industry, they suffer from some serious drawbacks. In particular, the disparate fast track programs vary widely in their rules and requirements. Because of these disparities, it can be costly and time consuming for applicants and their patent attorneys to participate in multiple fast track programs.

Harmonization of the disparate green patent fast track programs into a uniform system with a single set of rules and requirements would greatly streamline the process for green patent applicants and boost participation. A standardized green technology accelerated examination system should encourage wide participation, be open to all environmentally beneficial technologies, and keep patent examiner workloads at manageable levels to maintain sufficient speed in patent application processing. A system that has expansive subject matter eligibility requirements and reasonable process restrictions would accomplish these goals. Critical analysis of the existing green patent fast track programs points to a “material environmental benefit” standard for subject matter eligibility and the process restrictions of a claim number cap and a strict single invention requirement. As such, the proposed Global Green Patent Highway would be a powerful mechanism for fostering green innovation and should be employed as a tool in the battle to combat climate change.