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Andrea Nocito

INNOVATORS BEAT THE CLIMATE CHANGE HEAT WITH HUMANITARIAN LICENSING AND PATENT POOLS

ANDREA NOCITO*

* Special thanks to Robert R.M. Verchick, Gauthier-St. Martin Eminent Scholar and Chair in Environmental Law, Loyola University New Orleans College of Law.

I. INTRODUCTION

Salt-water intrusion, erosion, and drought are hardly new problems across the globe. Humans have braced themselves against, or run from climactic events since the first hominid stood up. But, mankind is unprepared to handle these events (and more) all at once now that climate change has reared its ugly head. Worse, human activities caused anthropogenic climate change and without tremendous technological advances, the clock cannot be turned back. Rising temperatures equate to less water, less land, more famine and more wars. These severe impacts will affect the quality of life on Earth and humans' ability to survive.

Handling climate change impacts means dealing with two competing values: preservation and wealth. National leaders and scientists (to say nothing of worldwide grassroots and humanitarian organizations, and the people of hundreds of nations) acknowledge the realities of climate change. They call upon all able persons, businesses and governments to halt climate change contributions and to develop technology to combat impacts. In other words, they call upon everyone to preserve life on Earth.

However, technological innovation is valued as a means to wealth, and that wealth cannot be achieved without shrewdly protecting intellectual property rights, where "he who has the gold" gets the technology. This leaves no opportunity for the poor, aging, and vulnerable to persevere, much less thrive. Perhaps there is a time and place for encouraging shrewd legal protection of intellectual property. When it comes to climate change, time is not an encouraging friend because technological advancement was needed yesterday. New mechanisms are essential to promoting technological solutions, which can guide societies in mitigating and adapting to climate change. This paper proposes breaking from the traditional wealth-focused intellectual property scheme and instead, proposes innovators use humanitarian licensing and patent pools to respond to the call for preservation.

II. CLIMATE CHANGE POSES SIGNIFICANT ISSUES FOR LIFE ON EARTH

Climate change is the increase in atmospheric warming of the Earth.[1] This warming creates impacts on the health of ecosystems and human living conditions.[2] Some fluctuation in Earth's average temperature is common, but the recent (20th century) 1.5°C (34°F) increase is a dramatic shift from historical variations.[3] Much of this increase results from fossil fuel consumption (i.e., coal, petroleum).[4] Additional increases are projected because consumption patterns will not immediately cease, particularly as developing countries increase their energy consumption under economic growth, and developed countries continue to produce for stable and healthy economic conditions.[5] In fact, the U.S. Environmental Protection Agency projects a rise of 0.5 to 8.6°C (32.9 to 47.48°F).[6] Similarly, the Intergovernmental Panel on Climate Change projects a global mean surface temperature increase above 1.0°C (33.8°F).[7]

Anticipated climate change impacts involve more frequent and extreme weather events such as: prolonged droughts, reductions in snow pack and glaciers, occurrence of category 4 and 5 hurricanes, flooding, heat waves, and changes in El Niño and La Niña patterns.[8] Other anticipated impacts include: melting glaciers that raise sea levels affecting coastal areas and developments, changing pH levels of oceans, increases in the swarm areas of vector species, expansion of refugees fleeing from drought and barren soils, stress on ecosystems' flora and fauna, wildfires, and increases in air pollution and smog.[9]

Recognizing the seriousness of climate change, nations are beginning to take action. National and international climate change policies are looking for ways to curb greenhouse gas emissions and to lessen the effects of drought, famine, sea level rise and ecosystem stress. Technological

1. *See generally* WORKING GRP. I, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2013: THE PHYSICAL SCIENCE BASIS 4–29 (Cambridge University Press, 2013).

2. *See id.* at 955.

3. *See id.* at 121; *see also Climate Change: Basic Information*, U.S. ENVIRONMENTAL PROTECTION AGENCY, https://19january2017snapshot.epa.gov/climatechange/climate-change-basic-information_.html (last visited Feb. 27, 2016).

4. *See* WORKING GRP. I, *supra* note 1, at 663.

5. *See id.* at 56; *see also Climate Change: Basic Information*, *supra* note 3.

6. *See Climate Change: Basic Information*, *supra*, note 3.

7. *See* WORKING GRP. I, *supra* note 1, at 956.

8. *See id. generally* at 953–1136; *see also Climate Change: Basic Information*, *supra* note 3.

9. *See Climate Change: Basic Information*, *supra* note 3; *see also The Consequences of Climate Change*, NASA, http://climate.nasa.gov/effects/ (last visited Feb. 27, 2016).

advancement "is an essential component of any effective climate change solution"[10] and is the path forward for mitigating and adapting to climate change.

> *"Climate change is real. Climate change is being substantially increased by humans and the carbon we put into the atmosphere. And it appears to be speeding up. If science has made any mistakes, science has been underestimating it." James Balog.*[11]

III. AN INTERNATIONAL RESPONSE TO MITIGATING AND ADAPTING TO CLIMATE CHANGE

Nations are coming together now that climate science has proven that there is a problem, it is caused by human activity, and the impacts will be severe and numerous.[12] The United Nations has not only explored and reported on the science of climate change, but also developed policies and goals for global adoption to reduce continuing climate change contributions.[13]

The United Nations Framework Convention on Climate Change, manager of the Conference of Parties forums, has cultivated mitigation strategies at its more than 20 conferences in Kyoto, Cancun, and most recently, Paris.[14]

Paris is considered the most successful of these conferences because it produced an agreement amongst hundreds of countries setting aggressive targets to dramatically cut back greenhouse gas emissions, encourages technological development to mitigate and adapt to climate change, as well

10. Daniel Van Fleet, *Legal Approaches to Promote Technological Solutions to Climate Change*, 2008 DUKE L. & TECH. REV. 8, ¶30 (2008).

11. James Balog, Time-lapse Proof of Extreme Ice Loss, TEDTALK.COM (July 2009) https://www.ted.com/talks/james_balog_time_lapse_proof_of_extreme_ice_loss.

12. *See COP—What's it all about?*, COP21PARIS, http://www.cop21paris.org/about/cop21/ (last visited Mar. 18, 2016); *see also* Jessica Kershaw, *Press Release, Secretary Jewell Statement on COP21 Climate Framework Agreement*, U.S. DEPT. OF THE INTERIOR (Dec. 12, 2015), https://www.doi.gov/pressreleases/secretary-jewell-statement-cop21-climate-framework-agreement (stating that the U.S. Department of Interior has committed to "fostering clean energy development, reducing harmful carbon emissions, building climate resilient communities, recognizing the benefits of forests, wetlands, grasslands and oceans to carbon sequestration, and supporting investments in sound science").

13. *See generally Meetings*, UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE, http://unfccc.int/2860.php (last visited Mar. 20, 2016).

14. *See Session Archive*, UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE, http://unfccc.int/meetings/items/6237.php?filtbody=53 (last visited Mar. 18, 2016).

as established plans to assist developing countries in affording clean technology.[15] Some environmentalists, scientists and community leaders criticize the agreement because it lacks precise caps on peak emissions and enumerated strategies for assisting the aging, poor, and vulnerable populations who face sea level rise, extreme weather, and displacement.[16] But, even these critics appreciate the momentum gained.[17]

With nearly 200 nations on board, the Paris Agreement included: (1) a commitment to reduce global temperature increases to less than 1.5°C (34.7°F), (2) creation of national climate action plans that detail a country's national greenhouse gas contributions along with objectives to reduce those contributions, (3) a commitment to peak greenhouse gas emissions and begin to walk emissions backward, (4) financial support to developing countries, (5) voluntary cooperative action to develop clean technologies and transfer that intellectual property globally for adoption (note: this is not an exhaustive list).[18] The later commitment is the means to achieving any of the Agreement's actions. A traditional intellectual property scheme is in conflict with a commitment to transfer intellectual property globally because it is rooted in using exclusive rights to achieve wealth. Two solutions, humanitarian licensing and patent pools, must be utilized to accomplish COP21 goals and preserve life.

A. Legal Hurdles to Making the Paris Agreement Business-As-Usual: Science and Politics in Conflict

The Paris Agreement is not binding law for the United States, yet. President Obama, like other national leaders in Paris, committed to bring the agreement back to the United States for acceptance and then nationwide policy development implementing the fruits of the Agreement. To secure its binding effect as a national policy, the Agreement must be ratified by Congress. This requires a political battle with a Republican-controlled Senate reluctant to accept climate change as a problem worth solving, and which has frequently pushed back against President Obama's policies.

15. *See* Xiawan Liu, *The Paris Agreement: Miracle or Mirage?*, GEO. ENVTL. L. REV. (Feb. 16, 2016), http://gelr.org/2016/02/16/the-paris-agreement-miracle-or-mirage/; *see also* Practical Law Environment, *UNFCCC, the Kyoto Protocol and the Paris Agreement*, Practical Law UK Practice Note 5-385-9604.

16. *See* Fiona Harvey, *Paris Climate Change Deal Too Weak To Help Poor, Critics Warn*, THE GUARDIAN (Dec. 14, 2015), http://www.theguardian.com/environment/2015/dec/14/paris-climate-change-deal-cop21-oxfam-actionaid.

17. *See id.*

18. *See* Practical Law Environment, *supra* note 15.

Members of the House of Representatives (Representative Yoho of Florida, Representative Gosar of Arizona, Representative Walker of North Carolina, Representative Benishek of Michigan, and Representative Fitzpatrick of Pennsylvania) introduced House Resolution 544 on December 1, 2015.[19] The resolution reads,

> Expressing the sense of the House of Representatives that the President should submit any binding and universal agreement on climate change adopted at the Conference of the Parties ("COP21") of the United Nations Framework Convention on Climate Change to the Senate as a treaty under article II, section 2, clause 2 of the Constitution . . . .
>
> Whereas, according to the organizing committee of COP21, the objective of the COP21 is to achieve a binding and universal agreement on climate from all countries of the world;
>
> Whereas statements by United States Special Envoy for Climate Change, Todd Stern, and other United States Government officials indicate that President Obama does not intend to submit the agreement that results from COP21 to the Senate for its advice and consent to ratification of the agreement; and
>
> Whereas the Constitution clearly states in article II, section 2, clause 2 that the President is empowered to propose and negotiate agreements between the United States and other countries only with advice and consent of the Senate: Now, therefore, be it
>
> > *Resolved*, That it is the sense of the House of Representatives that the President should submit any binding and universal agreement on climate change adopted at the Conference of the Parties ("COP21") of the United Nations Framework Convention on Climate Change to the Senate as a treaty under article II, section 2, clause 2 of the Constitution.[20]

19. H.R.Res. 544, 114th Cong. (2015).
20. *Id.*

The resolution had not passed the House before the COP21 conference was held and completed.[21] Perhaps this resolution was not a step toward gaining congressional support, but rather an attempt to force President Obama into seeking congressional ratification knowing such an act would ultimately fail as other COP agreements have failed. For instance, the Kyoto Protocol's attempt to address climate change contributions in the late 1990s was never adopted.[22] Of the many reasons the Kyoto Protocol was never adopted, one frequently touted reason was the uncertainty in climate science.[23] In stark contrast to the United States' earlier uncertainty, 200 nations at COP21 emphatically agreed that climate change is real and any denial of climate change science is irresponsible. If House Resolution 544 was another shot at continuing to deny climate change (and to prevent national action by adopting an international binding agreement), then another route is necessary to bring the United States on board with COP21 goals and responding to climate change.

Congressional ratification may not be necessary.[24] The Clean Air Act, as interpreted after *Massachusetts v. Environmental Protection Agency*, permits the U.S. Environmental Protection Agency (EPA) to regulate carbon dioxide, a greenhouse gas contributing greatly to climate change, as an air pollutant, which can endanger public health and welfare.[25] COP21 policies can be implemented under the EPA's strategies for regulating carbon dioxide in two ways: 1) Congress's grant of authority to the EPA Administrator in charge of administering the Clean Air Act, and 2) the President of the United States issues Executive Orders (the EPA is an executive agency reporting to the President of the United States).[26] Existing statutes and case law "provide the necessary legal authority for the President to enter into binding commitments on behalf of the United States in the form of an executive agreement."[27] Courts have held such agreements constitutional (permissible under the Treaty provision of Art. II, § 2) and within the Executive's powers.[28] When the executive adopts an international agreement, the

21. *Id.*

22. *See generally* Practical Law Environment, *supra* note 14.

23. *See id.*

24. David A. Wirth, *The International and Domestic Law of Climate Change: A Binding International Agreement Without the Senate or Congress?*, 39 HARV. ENVTL. L. REV. 515, 542 (2015).

25. *See generally* Massachusetts v. Envtl. Protection Agency, 549 U.S. 497, 528–532 (2007).

26. *See* Wirth, *supra* note 24, at 533, 543.

27. *See id.*; *see also* Youngstown Sheet & Tube Co. v. Sawyer, 343 U.S. 579, 585 (1952) ("The President's power, if any, to issue the order must stem either from an act of Congress or from the Constitution itself," where the Clean Air Act is an act of Congress giving the executive authority to act.).

28. Wirth, *supra*, note 24, at 544 n.172.

agreement becomes national law.[29] In sum, a president can order the EPA to implement COP21 goals as Clean Air Act policy, or the EPA can do so at their own discretion in keeping with its requirement to see to the public's health and welfare, which will certainly be impacted by climate change.

B. Legal Hurdles to Transferring Intellectual Property: Wealth and Preservation In Conflict

As recognized in the Paris Agreement, climate change is not singularly a nations issue: it is a human issue.[30] Innovators are creating products and processes to halt and lessen the effects of climate change as nations develop goals and policies to implement mitigation and slow contributions to climate change.

The problem is that under the traditional intellectual property scheme, innovators value wealth first and preservation of the environment and people second, if at all. Innovators leverage their intellectual property rights in order to charge for access to their innovations. Yes, some entrepreneurs hold others hostage by charging enormous prices to utilize the technology. Entrepreneurs are driven by realizing a return on their many years of financial investment and sweat equity expensed in creating the final prototype that finally worked well enough to place it into commerce. This system affords inventors exclusive and flexible rights to use of their innovations by third parties.

All the while, climate change confers a tremendous urgency to develop and transfer technological solutions to begin mitigating and adapting globally. Sometimes when urgency reigns, rights retreat. Humanitarian licensing and patent pools are strategies for meeting this dire need without eliminating intellectual property rights altogether. These flexible strategies serve as methods for transferring solutions around the globe for the preservation of all in keeping with the goals of the Paris Agreement and the value of preservation.

Before juxtaposing the flexibility of the humanitarian licensing and patent pools, this paper briefly discusses the foundational tenants of intellectual property.

> *"Saving our planet, lifting people out of poverty, advancing economic growth . . . these are one and the same fight. We must connect the dots between climate change, water*

29. *See id.* at 546 n.181.

30. "[N]o country can solve this issue alone." *Secretary Jewell Statement on COP21 Climate Framework Agreement*, *supra* note 12.

> *scarcity, energy shortages, global health, food security and women's empowerment. Solutions to one problem must be solutions for all." Ban Ki-moon.*[31]

IV. THE BASIC TENANTS OF INTELLECTUAL PROPERTY

Intellectual property (IP) law in the United States is law related to the rights and protections of "property created by the mind."[32] This IP is the "thought processes, creativity, and original capabilities of individuals and legal entities."[33] There are five classes of IP law; patents, trademarks and service marks, unfair competition, copyrights, and trade secrets.[34] Each of these classes may be a factor in how climate change innovation is incentivized and protected (a system focused on wealth) and eventually, shared (a system focused on preservation).

A. Patents

A patent is the approval and granting of an "exclusive right" to one's innovation.[35] The United States Constitution provides, "To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writing and Discoveries," (also applies to copyright protections) securing a constitutional protection for innovators for their created "new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof."[36] A patent does not cover ideas or brainstorms, but only the manifestation of those ideas in a new process or device.[37] Case law and decisions of the United States Patent and Trademark Office have held that "laws of nature, physical phenomena, and abstract ideas are not patentable

31. Ban Ki-Moon, Former Secretary-General of the United Nations, Address to the 66th General Assembly: "We the Peoples", United Nations General Assembly (Sept. 21, 2011) (transcript available at https://www.un.org/sg/en/content/sg/speeches/2011-09-21/address-66th-general-assembly-we-peoples).

32. David C. Brezina, *A Practical Overview of Intellectual Property Law*, 7 CBA Rec. 20 (May/June 1993).

33. Chris A. Caseiro, *Basics of Intellectual Property*, 17 GPSolo 18 (Apr./May 2000).

34. *See* Brezina, *supra* note 32, at 20; *see also* Caseiro, *supra* note 33, at 18.

35. U.S. CONST. art. I, § 8, cl. 8; *see* Brezina, *supra* note 32, at 20; *see also* Caseiro, *supra* note 33, at 18.

36. U.S. CONST. art. I, § 8, cl. 8; 35 U.S.C.A. § 101 (West 2017).

37. Virgina Alexandria, *General Information Concerning Patents*, U.S. PATENT AND TRADEMARK OFFICE (Oct. 2015), http://www.uspto.gov/patents-getting-started/general-information-concerning-patents.

subject matter."[38] The innovation must be new or "sufficiently different" from what is already on the market or patented so that it is "non-obvious to a person having ordinary skill in the area of technology related to the invention."[39] Climate change technology will provide the new and useful technologies to reduce climate change impacts.

The United States Patent and Trademark Office accepts patent applications, reviews the invention for compliance with the statutory requirements of U.S.C § 35: Patents, and the American Inventors Protection Act of 1999 (AIPA), and then makes a determination on the application.[40] Upon approval of a patent application, the innovator has earned his or her exclusive rights.[41]

Exclusive rights prevent others from using the innovation without the permission of the patent holder (where use includes: "making, suing, or selling the invention described and claimed in the patent" application).[42] These exclusive rights are limited, however, per the U.S. Constitution ("for limited Times") and Congressional decisions (see title 35 and AIPA) to 20 years beginning on the date of approval.[43] Additionally, the patent holder must comply with maintenance filings and fees on the patent over the life of the 20 years, and agree to publically disclose the patent.[44]

Exclusivity means that patent holders get to choose how their technology is utilized and who gets to access it.[45] Often, the highest bidder wins leaving little access to those without the gold. Further, the 20-year exclusivity period prevents others from accessing that technology when they lack the financial capability having implications on whether a global response to climate change can be made.

38. *Id.*; *see* Bilski v. Kappos, 130 S. Ct. 3218 , 3239 (2010) (explaining and quoting "that claims that are close to 'laws of nature, natural phenomena, and abstract ideas,' Diamond v. Diehr, 450 U.S. 175, 185, (1981), do not count as 'processes' under § 101, even if they can be colloquially described as such."

39. *Id.*

40. *See id.*

41. *See* Caserio, *supra* note 33, at 19–20. (No rights are conferred during the patent pending status while the application is under review, and an inventor cannot sue to prevent or halt infringement before patent approval).

42. Caserio, *supra* note 33, at 18.

43. 35 U.S.C.A. § 154 (a)(2) (West 2017).

44. *See* Alexandria, *supra* note 37; *see* Brezina, *supra* note 32, at 21.

45. *See, e.g.*, Zachary Brennan, *Patens vs. Market Exclusivity: Why Does it Take So Long to Bring Generics to Market?*, RAPS, (Aug. 17, 2016) http://www.raps.org/Regulatory-Focus/News/2016/08/17/25632/Patents-vs-Market-Exclusivity-Why-Does-it-Take-so-Long-to-Bring-Generics-to-Market/.

B. Trademarks and Service Marks

A trademark is:

> any word, name, symbol or device, or any combination thereof—(1) used by a person, or (2) which a person has a bona fide intention to use in commerce and applies to register on the principal register established by this chapter, to identify and distinguish his or her goods, including a unique product, from those manufactured or sold by others and to indicate the source of the goods, even if that source is unknown.[46]

A service mark:

> means any word, name, symbol, or device or any combination thereof—(1) used by a person, or (2) which a person has a bona fide intention to use in commerce and applies to register on the principal register established by this chapter, to identify and distinguish the services of one person, including a unique service, from the services of others and to indicate the source of the services, even if that source is unknown. Titles, character names, and other distinctive features of radio or television programs may be registered as service marks notwithstanding that they, or the programs, may advertise the goods of the sponsor.[47]

Trademark and service mark laws (statutes and common law) serve two purposes: (1) to protect an entity's identity and reputation against unfair competition, and (2) to assist consumers in identifying a mark with a brand and its values, quality, and reputation.[48] Specifically, the owner of a mark may assert likelihood of confusion claims to prevent or stop others from using the mark in commerce if the similar or copied marks will cause consumer confusion between the marks.[49] The mark's owner also has

46. 15 U.S.C.A. § 1127 (West 2017).
47. *See id.*
48. *See* Brezina, *supra* note 32, at 22.
49. *See id.*

"substantive presumptions of validity" to the mark if they have registered the mark, and if they are the first to continuously use the mark in commerce.[50]

Again, exclusivity reigns threatening to impair the ability of others to access technology solutions to climate change.

C. Unfair Competition

Unfair competition is deceptive and, or, fraudulent acts made in commerce that harm the intellectual property of business entities.[51] To bring a claim of unfair competition, a party "must prove that defendant (1) used designation or false designation of origin, (2) in interstate commerce, (3) in connection with goods or services, (4) the designation is likely to cause confusion, and (5) plaintiff already has been or is likely to be damaged."[52] This element of intellectual property law provides methods for asserting exclusive rights that prevent third parties from accessing similar technology if that similar innovation is likely to lead to confusion between the source, reputation and goodwill of the owners.[53] Communities responding to climate change by accessing technology may have to battle unfair competition claims, or be scared off from accessing technology all together.

D. Copyrights

A copyright is a protection for:

> original works of authorship fixed in any tangible medium of expression, now known or later developed, from which they can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device. Works of authorship include the following categories:
>
> (1) literary works;
>
> (2) musical works, including any accompanying words;
>
> (3) dramatic works, including any accompanying music;

50. *Id.*

51. *See id.* at 23. (Unfair competition tort law expands to many areas, only a portion of which applies to intellectual property).

52. Guantanamera Cigar Co. v. Corporacion Habanos, S.A., 672 F. Supp. 2d 106, 109 (D.D.C. 2009).

53. *See* Brezina, *supra* note 32, at 23.

> (4) pantomimes and choreographic works;
> (5) pictorial, graphic, and sculptural works;
> (6) motion pictures and other audiovisual works;
> (7) sound recordings; and
> (8) architectural works.[54]

A copyright is not an: "idea, procedure, process, system, method of operation, concept, principle, or discovery, regardless of the form in which it is described, explained, illustrated, or embodied in such work."[55] A copyright protection requires that the "work is fixed . . . it is a work of authorship in a copyrightable medium; and . . . that the work has sufficient originality contributed by the person claiming copyright."[56] An owner's rights are limited to preventing or stopping the copying of their work.[57]

Software is frequently copyrighted.[58] Exclusivity prevents others from operating machines and devices that run on copyrighted software assuming they have managed to pass other intellectual property exclusivity hurdles.[59] If software cannot be shared or transferred, communities responding to climate change cannot operate.

E. Trade Secrets

A trade secret means:

> information, including a formula, pattern, compilation, program, device, method, technique, or process . . . that: (i) derives independent economic value, actual or potential, from not being generally known to, and not being readily ascertainable by proper means by other persons who can obtain economic value from its disclosure or use and (ii) is subject to efforts that are reasonable under the circumstances to maintain its secrecy.[60]

54. 17 U.S.C.A. § 102(a) (West 2017).
55. *See id.* § 102(b).
56. *See* Brezina, *supra* note 32, at 22.
57. *See id.*
58. *See* Comput. Assoc. Int'l, Inc. v. Altai, Inc., 982 F.2d 693,721 (2d Cir. 1992).
59. *See* Pamela Samuelson, *Fair Use for Computer Programs and Other Copyrightable Works in Digital Form: The Implications of Sony, Galoob and Sega*, 1 BERKELEY J. INTELL. PROP. L. 49, 52, 57 (1994).
60. Caseiro, *supra* note 33, at 22 (quoting Unif. Trade Secrets Act § 1).

To protect their rights to this private information, owners of trade secrets must act to keep their information secure from public viewing (where rights are eliminated upon sharing or making information publically available), which may include, but is not limited to operational policies such as: operating in secure facilities, requiring visitors to sign in and out, limiting employee access, having employees and contractors sign non-disclosure agreements and other contracts prohibiting disclosure, etc.[61]

Exclusivity here can heavily stall a user who has gained entry to a technology by limiting access to valuable institutional knowledge about operating such technology.

Third party actions, which copy or pass-off a product or the service of another are infringements, and violate an owner's exclusive rights to his or her IP. Evaluating likely infringements assists the inventor in determining which protections to take, understanding the degree of rights associated with each class of intellectual property, and developing a customized pathway forward for selling and licensing their technology while preventing others from copying their product without paying for it. Each class of IP law has specific protections and rights associated with it, and some features may overlap with the other. No one class is sufficient to protect for every potential need. Under a traditional IP system, innovators must carefully evaluate their needs and the potential future infringements to their products, processes and, or, images.

How does all of this relate to advancing climate change technology using humanitarian licensing and patent pools? Infringement happens in the marketplace all the time and climate change technology is likely to face similar hurdles because there is a dire urgency to halt sea level rise, brace for extreme weather events and ward off starvation. Traditional IP law does little to encourage transfer of technology for a global response to climate change because it is so rooted in protecting one's exclusive rights and using those rights for wealth building. But, innovators can break away from the traditional legal method of protecting from infringements while developing climate change technologies for the marketplace and still access some financial benefit by participating in patent pools and using humanitarian licensing.

Before delving into humanitarian licensing, a brief discussion of the traditional licensing scheme used for intellectual property is provided. This traditional scheme fortifies an innovator's exclusive rights before and after

61. *See* Brezina, *supra* note 32, at 23; *see also* Caseiro, *supra* note 33, at 22.

infringement, a portion of which are carried forward in humanitarian licensing.

V. LICENSING INTELLECTUAL PROPERTY

Intellectual property can be transferred permanently through sale (exhaustion) or conditionally through licensing.[62] Licensing plays a substantial part in commercializing intellectual property, incentivizing innovation, and encouraging investments in technology.[63] Licenses are used in two common scenarios: (1) intellectual property (typically patented, trademarked, or copyrighted technology) developed at government labs and/or public universities licensed out to private entities (may include publicly traded companies), and (2) intellectual property developed by private entities (and perhaps their employees) licensed out to other private entities (may include publicly traded companies).[64]

Licensing is the contractual arrangement between the owner of intellectual property and a user.[65] Parties license the ability to use the intellectual property for some term under certain circumstances with specific limitations.[66] Rights transferred can be exclusive, sole or non-exclusive.[67] Exclusive licenses transfer all rights to use the intellectual property—short of ownership—to a single user (i.e., to assist in manufacturing of a product).[68] Sole licenses transfer permission to use the intellectual property while the owner retains ownership rights to also use the intellectual property.[69] Non-exclusive licenses transfer the rights to use the intellectual property to multiple users (e.g., franchisees or manufacturers).[70]

Important features of licensing agreements (as opposed to contracts in general) include: a description of permitted territory the users may operate

62. *See* Caseiro, *supra* note 33, at 22–3. (Where patents are sold or licensed from the patent holder to a business or government user; trademarks and service marks are licensed out to franchises; copyrights are licensed out to users, particularly in educational contexts; trade secrets are sold or licensed to businesses or government users; and contractual agreements to sell or license intellectual property prevent unfair competition and deceptive trade practices).

63. *See* Viktor Braun, *Licenses as Critical Sources of Innovation*, 44 LES NOUVELLES 9, 10 (Mar. 2009).

64. *See* Peter Lee, *Toward a Distributive Commons in Patent Law*, WIS. L. REV. 917, 943–46 (2009).

65. *See* Vicktor Braun, *Licenses and Critical Sources of Innovation*, 43 LES NOUVELLES 225 (Dec. 2008).

66. *See id.*

67. *See* Paul R. Morico, *Considerations in Drafting Settlement and License Agreements—Part 1*, 28 No. 2 INTELL. PROP. & TECH. L.J. 3 (Feb. 2016).

68. *See id.* at 3–4.

69. *See id.* at 3.

70. *See id.* at 3–4.

under (i.e., United States or worldwide), ability or inability of the user to transfer rights to other users (e.g., component part manufacturers), conditions which prompt revocability of the license, term setting for expiration dates and, or, renewal, enforcement and maintenance provisions guarding against infringement by other parties, and indemnities (from future infringements with third parties, or product tort liability).[71] These standard features offer innovators methods for retaining exclusive rights to their intellectual property, while also letting portions of it to third parties for their use in commerce, continued design/development, as well as mitigation and adaptation to climate change. Under this letting system, owners license their technology at higher prices to affect demand, long term income, and their own future projects.

If the United States adopts the Paris Agreement or implements it under the Clean Air Act, a key provision requires that climate change technologies be transferred to other nations so that they may also mitigate and adapt to climate change impacts. Requiring a mandatory transfer is likely to discourage innovation in the United States, especially if intellectual property rights are not secured. If licensing agreements are a proven method for retaining and exercising exclusive intellectual property rights, then innovators are faced with finding a licensing scheme that complies with mandatory transfer requirements, while protecting their own interests. Humanitarian licensing and patent pools are solutions for addressing this dilemma, and in doing so, allows developing countries to access climate change technology affordably.

> *"We were proposing, in a sense, that the rest of the world be made safe for American ideas, as they adopted intellectual property rights that gave patent protection to our very innovative economy." Jeffrey Sachs*.[72]

71. *See id.* at 4–6; *see also* Paul R. Morico, *Considerations in Drafting Settlement and License Agreements—Part 2*, 28 No. 3 INTELL. PROP. & TECH. L.J. 8 (Mar. 2016).

72. *Interview with Jeffrey D. Sachs*, FRONTLINE (Spring 2009), http://www.pbs.org/wgbh/pages/frontline/shows/crash/interviews/sachs.html.

VI. INNOVATORS CAN BEAT THE CLIMATE CHANGE HEAT USING PATENT POOLS AND HUMANITARIAN LICENSING

Licensing and commercialization are the end goals for those innovators and investors who must earn a return on their dollars and sweat equity. This is also true for the universities and government agencies which need the profits of licensing and commercialization to operate and continue to fuel technological advancement. But, the traditional features of licensing agreements do not have a mechanism for recognizing a mandatory transfer of technology to third parties for global adoption with ease of access and affordability. Recognizing that a license is essentially a specific type of contract, it is possible to work around the shortcomings of traditional licensing agreements. This includes crafting limitations on the kind of use, length of use, and the available market use permitted; how to manage supply chains; and strategies for managing the prohibitive costs to manufacture and, or, distribute the technology.[73] The legal benefit of such non-exclusionary provisions then becomes preserving some rights for the intellectual property owner for (1) future or additional uses, (2) future scenarios where an owner must assert rights against infringement, and, or, (3) potential exhaustion to government entities (and therefore, payment or royalty fees).[74] Patent pools, and humanitarian licensing schemes make use of these non-exclusive licensing provisions and are the pathway forward to transfer technology to manage climate change.

A. Patent Pools

Non-exclusive licensing concepts manifest in two ways: patent pools and humanitarian licensing. Patent pools are agreements between intellectual property owners (typically on patents, copyrights and trade secrets) to "pool" (share, transfer) their intellectual property through conditional licensing while relinquishing exclusionary rights to the property.[75]

For example, the Open Source Initiative is a patent pool of sorts. It is a collective of software developers who pool "software that can be freely accessed, used, changed, and shared (in modified or unmodified form) by

73. *See* Joshua D. Sarnoff, *The Patent System and Climate Change*, 16 VA. J.L. & TECH. 301, 352 (2011).

74. *See id.* at 351–52.

75. *See* Eben Allen, *Prosecution Benefits: A New Hope for Bridging the Patent Law Access Gap*, 10 SEATTLE J. FOR SOC. JUST. 407, 423 (2011); *see also* Michael A. Carrier, *An Antitrust Framework for Climate Change*, 9 NW. J. TECH. & INTELL. PROP. 513, 525 (2011).

anyone," under license agreements that meet the Open Source Initiative's standards.[76] People may use a software available through Open Source, modify and profit from it, but must agree to the Initiative's standards relinquishing exclusive rights to the software.[77]

Similarly, the Eco Patent Commons Pool exists for the advancement of technological solutions that solve environmental problems. "Bosch, Dow, DuPoint, Fuji-Xerox, HP, IBM, Nokia, Pitney Bowers, Ricoh, Sony, Taisei and Xerox" created and expanded the pool by each agreeing to share patents that offer solutions to environmental problems free of exclusive licensing arrangements.[78] The Eco Patent Commons Pool participants agree that patents submitted to the pool will "improve or protect the environment and ecology of our planet,"[79] like "pollution prevention or efficient energy use."[80] Like Open Source's standards for compliance, patent users must be willing to forgo exclusive rights to their technology.

The Eco Patent Commons Pool successfully created a pool of complementary patents for users to employ in reducing environmental harms, while dramatically saving on research, development, and licensing costs.[81] Criticisms of the Eco Patent Commons Pool center on whether the intellectual property is actually and effectively used by third parties, whether the quantity and quality of the intellectual property within the pool is sufficient to create positive environmental benefit,[82] and whether inventors are incentivized to continue creating and submitting technology to the pool. Still, it is conceivable that nations may sign on to the Eco Patent Commons Pool or others like it to access and transfer climate change technology in order to respond to the call for preservation and the Paris Agreement.

Patent pools are the more aggressive scheme of non-exclusive licensing. In fact, it may be a stipulation upon joining a patent pool that an innovator licenses the use of his or her patent "royalty-free," that is, without drawing fees for a third party's use of his or her technology.[83] Patent pools

76. *Frequently Answered Questions*, OPEN SOURCE INITIATIVE, https://opensource.org/faq (last visited on Mar. 19, 2016). (The standards include a commitment to free redistribution of revised or modified software, to not discriminate against persons, groups, fields of endeavor, and to continue the culture of license sharing (among other mandates)).

77. *See id.*

78. *See* Carrier, *supra* note 75, at 526–28.

79. *Id.* at 527.

80. *See id.*

81. *See id.* at 529; *see also* Andrew Boynton, *Eco-Patent Commons: A Donation Approach Encouraging Innovation Within The Patent System*, 35 WM. & MARY ENVTL. L. & POL'Y REV. 659, 678–679 (2011).

82. *See* Boynton, *supra* note 82, at 681.

83. *See* Carrier, *supra* note 75, at 526 (describing the Eco Patent Commons Pool).

work well for communities in developing countries who need access to shovel-ready technology. In other words, technology that is ready to be implemented without a significant amount of further refinement or development.

For some innovators, a stipulation to license royalty-free discourages participation in the patent pool. Without incentives for climate change innovation, dire circumstances result. But, there is a second option for innovators found in humanitarian licensing. Humanitarian licensing is a less aggressive licensing scheme that uses non-exclusive licensing agreements without royalty-free stipulations allowing innovators to retain some financial benefits.

B. Humanitarian Licensing

Humanitarian licensing is a distinctive approach to transferring technology and intellectual property while keeping some rights and financial benefits. It has evolved from pharmaceutical intellectual property, where companies agreed to eliminate or greatly reduce profits to provide medication for preservation and quality of life.[84]

Humanitarian use is defined as "technology likely to preserve human life by meeting basic needs that if unmet due to poverty or disaster would likely ultimately result in death within six months or be the direct cause of death. Such needs include food, medicine, medical supplies, sanitation, healthcare and the like."[85]A humanitarian license contracts around standard licensing provisions (and applicable statutes and industry norms) where non-exclusive licensing provisions govern.[86] Innovators with humanitarian purposes willing to "sacrifice profits to achieve important social welfare goals" can now release technology under this license granting access and opportunities to end users.[87]

A second scenario for using humanitarian licensing is in public universities, government, and some non-profit laboratories. These laboratories utilize public dollars to research and develop technologies.[88] Licensing agreements here serve three purposes: (1) to limit the rights of the creator because the creator is employed by an entity and upon becoming an employee, the employee consents to either reduced rights or forgo all rights

84. *See* Allen, *supra* note 75, at 421.

85. *See* Allen, *supra* note 75, at 448

86. *See id.*

87. *See* Sarnoff, *supra* note 73, at 351; *see also* Lee, *supra* note 64, at 922; Allen, *supra* note 75, at 421, 447.

88. *See* Allen, *supra* note 75, at 427.

to the technology created, (2) to use the created intellectual property for public benefit, especially since it was created with public funds, and (3) to permit the entity to license out use of the intellectual property to commercial users for financial resources (i.e., universities are not profiting outright, rather universities are using the royalties gained from licensing contracts which can in theory, supplement public funds used to operate public schools).[89] Public universities, government agencies and non-profits may retain rights to how technology is used, charge nominal fees under licensing agreements for use of the technology (forgoing significant profit that would otherwise be had in a commercial setting), and still receive public funds for continued research and development. Under this licensing scheme, innovators of climate change technologies may retain enough financial incentives and intellectual property rights to advance climate change technologies, and can continue to afford to develop new innovations.

C. Humanitarian Licensing and Patent Pools are the Way Forward

If ever there was a significant humanitarian need, it is responding to climate change and preventing further contributions to the problem. Wealth and exclusivity can no longer govern. Patent pools and humanitarian licensing should be adopted as part of future COP agreements and under the Paris Agreement because they both foster technological advancement providing users with affordable options for the transfer of intellectual property. These licensing mechanisms give more nations and communities opportunities to block and tackle climate change.

> *"Success doesn't necessarily come from breakthrough innovation but from flawless execution. A great strategy alone won't win a game or a battle; the win comes from basic blocking and tackling." Naveen Jain.*[90]

National policies and future COP agreements must break from traditional technological advancement and, instead, promote patent pools where developing countries may affordably access mitigation and adaptation technology. For example, as photovoltaic costs decline, and efficiency and

89. *See id.*

90. Naveen Jain, *Naveen Jain – Top Ten Lessons for an Entrepreneur*, FORBES (Jun. 16, 2011), https://www.forbes.com/sites/naveenjain/2011/06/16/naveen-jain-top-ten-lessons-for-an-entrepreneur/#2d32867e77f8.

technological advancement increases, patent designs, software, and trade secrets of manufacturing specifications could be moved into patent pools. This would promote the use of clean energy instead of the burning of fossil fuels fulfilling at least two of the Paris Agreement's goals: to peak greenhouse gas emissions and to transfer intellectual property for climate change mitigation and adaption.

Accompanying the promotion of patent pools in future COP agreements, the IPCC should adopt the definition of humanitarian licensing adding the following to it:

> Humanitarian technology means technology likely to preserve human life by meeting basic needs that if unmet due to *poverty*, *natural disasters*, *extreme weather events, and other climate change impacts*, would likely ultimately result in *homelessness, refugee status, or death* within six months or be the direct cause of death. Such needs include food, medicine, medical supplies, sanitation, healthcare, *shelter*, and the like.

(italicized for emphasis to indicate proposed revisions.)

Under this definition, clean technologies like smart grids, for example, that switch populations from burning coal and other fossil fuels to more efficient energy distribution and expand renewable energy supplies reducing climate change impacts while providing viable, needed energy supplies.

Since humanitarian licensing permits the innovator to retain some rights (through contract and licensing negotiations), but also transferring the intellectual property of the technology either through voluntary action outright (akin to a patent pool), or a non-exclusive licensing mechanism that allows for some financial benefits, innovators share technology, and increase the volume of technology accessible around the world.

VII. SMART GRIDS: AN APPLICATION OF LICENSING CLIMATE CHANGE TECHNOLOGY

The smart grid, made up of hundreds of technological components, is one of many technologies that can reduce greenhouse gas contributions, and allow communities to respond to climatic changes. The smart grid is an electricity network managed by software systems and computer hardware

(typically sophisticated metering systems and their component devices) designed to increase energy efficiency, reliability, and interconnectivity between other utility grids and micro grids (e.g., homes and buildings generating solar or geothermal energy).[91] A smart grid system ensures "two-way flow of electricity and information between the power plant and the appliance [in a home or building], and all points in between. Its distributed intelligence, coupled with broadband communications and automated control systems, enables real-time market transactions and seamless interfaces among people, buildings, industrial plants, generation facilities, and the electric network."[92] Smart grids increase energy efficiency and reduce wasted electricity preventing climate change contributions and air pollutant emissions as a result of burning less fossil fuels. Utility-scale renewable energy projects and microgrids that interconnect to the smart grid also contribute to these same environmental and climate change benefits in addition to the displacement of fossil fuel energy.

Smart grid technologies are divided into five groupings: integrated communications, sensing and measurement technologies, advanced components, advanced control methods, and improved interfaces and decision support.[93] Specifically, these technologies include: inverters that switch renewable energy currents from direct to alternating so that the energy can be used in buildings and sent to the grid and vice versa, synchro phasors that provide details about the operation of the grid, software that measures and models transmission of energy, automation applications and software for controlling the grid, relays and breakers that help manage the uptime of energy flow, fault locator devices and software that manage distribution of energy, and smart meters that record the generation and consumption of electricity.[94] Increasingly, smart grid systems are integrating renewable energy tie-ins through utility projects and individual homeowners and buildings.[95]

Smart grid technologies fulfill the goals of the Paris Agreement worldwide and in the United States if mandated through executive order or ratification by: (1) increasing energy efficiency across grids leads to less consumption of energy generated by fossil fuels and coal; (2) reducing

91. *Grid Modernization and the Smart Grid*, U.S. DEP'T OF ENERGY, http://energy.gov/oe/services/technology-development/smart-grid (last visited Mar. 22, 2016); *see also* LINCOLN L. DAVIES, ET AL., ENERGY LAW AND POLICY 705 (1st ed. 2014).

92. *See* LINCOLN L. DAVIES, ET AL., *supra* note 91, at 709 (quoting U.S. Dep't of Energy).

93. *Smart Grid and the Importance of Intellectual Property*, GOODWIN PROCTER (Jun. 29, 2011), https://www.goodwinlaw.com/publications/2011/06/20110629/29_02.

94. *See* LINCOLN L. DAVIES, ET AL., *supra* note 91, at 711–12.

95. *See id.* at 706.

demand for fossil fuel and coal energy, which equates to less greenhouse gas emissions from communities and thereby, the United States; and (3) adding tie-ins with renewable energy at the micro grid level, which do not directly increase greenhouse gas emissions, but instead, begin to "walk emissions backward" helping to achieve peak emissions, reduction in contributions, and a commitment to reducing global temperatures by reducing greenhouse gas contributions.

The hardware and software applications that connect to form a smart electrical grid face infringement. The most obvious being interference with patents and trade secrets. For example, in *Solarex Corp v. Arco Solar, Inc.*, Plaintiff-Licensee won its patent infringement claim regarding a solar cell semiconductor (smart grid hardware) where defendants were found to have unwittingly violated multiple patents.[96] In *Xantrex Technology, Inc. v. Advanced Energy Industries, Inc.*, the plaintiff successfully sued for an injunction against defendants[97] who accessed and benefited from trade secrets related to the production and sales of three-phase solar inverters (smart grid hardware) used in converting "DC power captured by solar panels into AC electrical energy that can then be provided directly to a customer or applied to a utility or electrical [smart] grid."[98]

But, trademark, unfair competition, and copyright infringement is also concerning and increasingly common. For example, in *Garden Meadow, Inc. v. Smart Solar, Inc.*, the plaintiff successfully sued for an injunction against defendants under copyright infringement, trademark and trade dress infringement, and unfair competition related to the advertising and sale of solar-powered lanterns (potential hardware connection to smart grid).[99] Infringement actions cause innovators to seize up desperately holding on to their exclusive rights. Such reactions will prevent transfer of smart grid technology globally.

As is often the case in intellectual property litigation, asserting rights imposes a heavy burden of explaining to courts and juries, the scientific complexities of technology. For example, in *Mesh Comm, LLC v. E.ON US, LLC*, the plaintiff filed an infringement action claiming defendants, a smart grid component manufacturer and utility (among others), willfully and

96. *See* Solarex Corp. v. Arco Solar, Inc., 805 F.Supp. 252, 288 (D. Del. 1992).

97. Xantrex Tech., Inc. v. Advanced Energy Indus., Inc., No. 07-CV-02324-WYD-MEH, 2008 WL 2185882 (D. Colo. May 23, 2008). Defendants included: Advanced Energy Industries, Inc. and Christopher S. Thompson, a former employee of Plaintiff and then current employee of Advanced Energy Industries, Inc.

98. Xantrex Tech., Inc. v. Advanced Energy Indus., Inc., No. 07-CV-02324-WYD-MEH, 2008 WL 2185882, at *1 (D. Colo. May 23, 2008).

99. *See* Garden Meadow, Inc. v. Smart Solar, Inc., 24 F.Supp.3d 1201, 1212 (M.D. Fla. 2014).

deliberately infringed various claims of their patent.[100] Defendants denied their work infringed Plaintiff's patent, counterclaimed that the patent was invalid because it lacked novelty and non-obviousness, and filed a motion to bifurcate issues of damages and infringement.[101] The court agreed to bifurcation because the matter was "of a highly technical nature that would challenge the intellectual reserves of even the most diligent lay juror, and "bifurcation would promote judicial economic, reduce expense and avoid unnecessary juror confusion."[102] Such technical difficulties causes more seizure-like reactions from innovators, promotes exclusivity, and runs counter to global access and transfer of climate change technological solutions.

Establishing non-exclusive licensing agreements in each of these cases could have prevented infringement and the associated arduous litigation. Further, accessing smart grid technology from patent pools removes these hurdles. Using the modified humanitarian licensing scheme allows innovators to retain at least some rights, even if they do not retain all financial benefits. Having non-exclusive licensing agreements for smart grids via patent pools and/or the modified humanitarian licensing scheme aligns with the Paris Agreement's commitment to development of clean technologies, and to transfer the intellectual property of clean technologies for global adoption.

VIII. CONCLUSIONS: HUMANITARIAN LICENSING AND PATENT POOLS LEAD TO RESILIENCY

Dozens of other smart grid cases are moving through the courts. Unanswered questions remain. For example, how will use of smart grids impact the price of electricity especially since smart grid technology allows for real-time pricing and provides consumers with details about usage patterns?[103] Energy law, a significant portion of which deals with ratemaking, will have to tackle pricing to ensure consumers get the legally required *just and reasonable* rate.[104] How will communities and governments successfully pay for infrastructure upgrades to create system-

100. *See* Mesh Comm, LLC v. E.ON US, LLC, No. 3:09-CV-641-S, 2011 WL 11563901, at *1–2 (W.D. Ky. May 10, 2011).

101. *See id.* at 3, 5.

102. *See id.* at 4–5.

103. *See* Sidney A. Shapiro & Joseph P. Tomain, *Rethinking Reform of Electricity Markets*, 40 WAKE FOREST L. REV. 497, 517–41 (2005).

104. *See id.* (emphasis added).

wide smart grids instead of slowly interconnecting one building at a time?[105] Will consumers front the costs for these changes? Regarding intellectual property issues, how will private and public utilities manage hundreds of smart grid technology licenses so as not to infringe? Will humanitarian licensing schemes be a one-size-fits-all response? At what point does licensing out each component of a smart grid system bankrupt a public utility? Should policy dictate that public utilities and governments only make use of smart grid technology that is available under public domain or from a patent pool? If so, how will that be monitored and will it allow for continued upgrades? One thing is for sure: answering these questions requires switching from a wealth-centric value system to a preservation-focused (maybe even a resiliency-focused) value system. Patent pools and humanitarian licenses will advance this switch.

The modified humanitarian licensing scheme and a system similar to the Eco Patent Commons Pool supports growth of other clean technologies designed to mitigate and adapt to climate change impacts by allowing the competing interests of wealth and preservation to work together. Innovators will develop solutions that can preserve life on Earth, while accessing avenues to some wealth. This incentivizes technological development. An entire globe needs solutions. Moreover, using patent pools (at least some depending upon their internal requirements) and humanitarian licensing with nominal earnings will result in volume use and licensing of technology. Therefore, wealth and preservation now act in tandem. Humanitarian licensing and patent pools are now the "essential components to effect climate change solutions."

President Barack Obama summarized the current scenario: "[t]he shift to a cleaner energy economy won't happen overnight, and it will require tough choices along the way. But, the debate is settled. Climate change is a fact."[106] Technological advancement is coming and is underway. Using intellectual property mechanisms like patent pools and humanitarian licensing, innovators can contribute greatly to global climate change mitigation and adaptation without relinquishing all intellectual property rights. Humanitarian licensing and patent pools move intellectual property beyond wealth, past preservation and toward resiliency.

105. *Id.*

106. Barack Obama, 44th President of the United States, State of the Union Address at The White House (Jan. 28, 2014), available at https://obamawhitehouse.archives.gov/the-press-office/2014/01/28/president-barack-obamas-state-union-address.