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ARTICLE

Intellectual Property and International Clean Technology Diffusion: Pathways and Prospects

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Abstract

International clean technology diffusion is essential to mitigate and adapt to climate change, while fast and optimal diffusion can be prevented by the paywall of patents. This article explores the deficiency in clean technology diffusion caused by the legal fragmentation and rule complex of international environmental law and intellectual property law. It systematically examines three pathways to foster international clean technology diffusion through: restriction of intellectual property, including imposing external restraints in environmental law; striking internal balancing in maximizing TRIPS flexibilities; and keeping the status quo. It argues that treaty pathways may not work, and an operable pathway to promote clean technology diffusion is to maximize and consolidate TRIPS flexibilities in national laws. This option challenges the popular proposal of a "Doha-like" declaration on TRIPS and climate change due to the paralyzed multilateral trade mechanism, asymmetrical negotiation power of developing countries, prolonged negotiation process, and categorization problem in treaty negotiations.

Keywords: Environmental Law; International Economic Law; Other Areas of International Law; Law of Development

Climate change is currently an existential threat to human beings. Civil society and international organizations have taken initiatives in this space. The Office of the United Nations High Commissioner for Human Rights (OHCHR) has linked human rights to climate change since 2009.[1] Investor and consumer-led fossil fuel divestment movements,[2] and international youth protests and strikes for climate have gained momentum in the real world as well as through social media.[3] More and more jurisdictions have pledged their goals to achieve carbon neutralisation as early as the 2040s.

Any proposal to reach the 1.5°C target in the 2018 IPCC report[4] will require a sharp slowdown of the CO_2 emissions. An effective response to climate change will critically

[1] Office of the United Nations High Commissioner for Human Rights, "Climate Change Reports and Related Activities (from 2014 to 2016)", online: OHCHR <https://www.ohchr.org/EN/Issues/Environment/SREnvironment/Pages/ClimateChange.aspx>.

[2] Julie AYLING and Neil GUNNINGHAM, "Non-State Governance and Climate Policy: The Fossil Fuel Divestment Movement" (2017) 17 Climate Policy 131.

[3] Shelley BOULIANNE, Mireille LALANCETTE, and David ILKIW, "'School Strike 4 Climate': Social Media and the International Youth Protest on Climate Change" (2020) 8 Media and Communication 208.

[4] Intergovernmental Panel on Climate Change, "Summary for Policymakers of IPCC Special Report on Global Warming of 1.5°C approved by governments" (8 October 2018), online: IPCC <https://www.ipcc.ch/2018/10/08/summary-for-policymakers-of-ipcc-special-report-on-global-warming-of-1-5c-approved-by-governments/>.

depend on the cost, performance, and availability of technologies that can lower greenhouse gas emissions and mitigate and adapt to climate change. The decarbonisation goals may not be achieved without a "technology revolution" because it requires a fundamental change in a short period.[5] Not only are existing efficient technologies for energy conversion and utilisation in all sectors needed, but also breakthroughs in technologies for renewable energies (including but not limited to wind, solar, and renewable hydrogen) as well as technologies for cost-effective carbon capture, use, and storage. As addressing climate crisis cannot be achieved by a single new technology; a *portfolio* of these technologies needs to be deployed. This article generally refers to these technologies as clean technologies.[6]

International negotiations to promote clean technologies diffusion (including transfer and dissemination) have been slow and controversial,[7] although the United Nations Framework Convention on Climate Change (UNFCCC) promoted mechanisms to facilitate technology transfer and access to clean technologies as early as 1992.[8] At the heart of this controversy is the role of intellectual property (IP) in clean technology diffusion. However, the importance of IP cannot be easily discerned if the term "intellectual property" could not even be put on the negotiation agenda.[9]

This article explores possible pathways to restrict IP for clean technologies by examining existing mechanisms in international environmental law and international IP law at multilateral, bilateral, and national levels. The evidence from practices on each pathway so far indicates that developing countries need to maximize The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS)[10] flexibilities at the national level instead of expecting a "Doha-like declaration".

This article makes three contributions to the literature. First, it systematically discusses three theoretical pathways to forester international clean technology diffusion by reviewing fragmented rules in environmental law and intellectual property law at different levels. From this, it proposes an operable pathway. Clean technology diffusion sits at the intersection of international IP law, which is essentially TRIPS and international

[5] Scott BARRETT, "The Coming Global Climate-Technology Revolution" (2009) 23 Journal of Economic Perspectives 53.

[6] There is no agreed definition of clean technologies. Some definitions only concern technologies addressing climate change; for instance, clean technologies are "technologies that generate fewer carbon emissions than current technologies". See Margaret MCINERNEY, "Tacit Knowledge Transfer with Patent Law: Exploring Clean Technology Transfers" (2011) 21 Fordham Intellectual Property, Media & Entertainment Law 449 at 452. Some authors also use related terms such as "environmentally friendly technologies", "environmentally sound technologies", "GHG mitigation technologies", and "carbon mitigation technology" interchangeably with "clean technology". See Antoine DECHEZLEPRÊTRE, Matthieu GLACHANT, and Yann MÉNIÈRE, "The Clean Development Mechanism and the International Diffusion of Technologies: An Empirical Study" (2008) 36 Energy Policy 1273. This article acknowledges the differences of terminologies, as well as the difficulties in reaching an agreement on such definitions. It will use the term "clean technologies" throughout and Section IV. B. I will analyze relevant regulatory issue arising from the definition and scope of relevant terminologies.

[7] Christiane GERSTETTER, Dominic MARCELLINO, and Elena von SPERBER, "Technology Transfer in the International Climate Negotiations – The State of Play and Suggestions for the Way Forward" (2010) 4 Carbon & Climate Law Review 3; Abbe E. BROWN, "Intellectual Property. Climate Change and Technology" in Rochelle DREYFUSS and Justine PILA, eds., *The Oxford Handbook of Intellectual Property Law* (Oxford: Oxford University Press, 2017), 1 at 1; Matthew RIMMER, *Intellectual Property and Climate Change: Inventing Clean Technologies* (Edward Elgar, 2011).

[8] *United Nations Framework Convention on Climate Change*, 9 May 1992, 1771 U.N.T.S. 107 (entered into force 21 March 1994) [*UNFCCC*], arts. 4.5 and 4.7.

[9] See Section III.A.1 for details on how IP was eventually eliminated from the negotiation agenda of Copenhagen Accord.

[10] *World Trade Organization (WTO) Trade-Related Aspects of Intellectual Property Rights Agreement*, 15 April 1994, 33 I.L.M. 81 (entered into force 1 January 1995) [*TRIPS*].

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environmental law (in particular those rules concerning climate change). For instance, Zaman argues that patent protection rules within TRIPS are one of the biggest impediments to the transfer of climate change-related technologies to poor and least developed countries.[11] Recent literature also maps interactions of provisions in international IP law and international environmental law and their chronological development[12] and explores the roles of various international fora on the outcome of negotiations.[13] However, the existing literature has not yet systematically examined available options for clean technology diffusion at different levels and across different disciplines of laws, nor has it explained why some options may be viable while others are not. Three theoretical pathways are identified: imposing external restrictions on IP, striking an internal balance within IP, and keeping the status quo (inaction). Imposing external restrictions would require multilateral environmental agreements specifically restricting the exclusivity of IP over clean technologies. Striking an internal balance would mean maximizing flexibilities within the IP system to balance incentives for innovations with the need for spillover benefits (diffusion). Keeping the status quo refers to the situation of inaction – none of the above is done. If this happens, clean technologies may enjoy more extensive protection over time as the upward ratchet of global IP never stops.[14] It is argued that instead of making efforts at what is likely to be prolonged treaty negotiations to impose external restrictions on IP, states should focus on a practical striking of an internal balance by maximizing and consolidating flexibilities available at TRIPS in national laws. States can do this unilaterally or collaboratively. Patent offices, as sites of national regulatory sovereignty, could be recaptured by the state. While this active defence will benefit the establishment of an international custom and the prevention of further expansion of TRIPS-plus standards, it may risk litigation at different fora, and some states need to be willing to take the burden of litigation.

Secondly, the national law-based solution proposed by this article responds to a popular proposal in the literature, a "Doha-like Declaration" as a solution to promoting access to clean technologies. Scrutinization of IP has been called for in many areas to promote better access to medicines,[15] access to knowledge,[16] and access to seeds.[17] The symbolic success in public health, in particular, the Doha Declaration on TRIPS Agreement and Public Health (Doha Declaration)[18] represents a significant rebalancing achievement by developing countries and civil society.[19] Therefore, some of these public health lessons

[11] Khorsed ZAMAN, "The TRIPS Patent Protection Provisions and Their Effects on Transferring Climate Change Technologies to LDCs and Poor Developing Countries: A Critical Appraisal" (2013) 3 Asian Journal of International Law 137.

[12] Brown, *supra* note 7; Rimmer, *supra* note 7.

[13] Matthew RIMMER, "Beyond the Paris Agreement: Intellectual Property, Innovation Policy, and Climate Justice" (2019) 8 Laws 7.

[14] Susan SELL, "The Global IP Upward Ratchet, Anti-Counterfeiting and Piracy Enforcement Efforts: The State of Play" (2010) 15 PIJIP Research Paper 1.

[15] Carlos M. CORREA, "Ownership of Knowledge – The Role of Patents in Pharmaceutical R&D" (2004) 82 Bulletin of the World Health Organization 784.

[16] The milestone for the access to knowledge campaign was the WIPO Treaty on Access to Knowledge, 9 May 2005 draft. See Amy KAPCZYNSKI, "The Access to Knowledge Mobilization and the New Politics of Intellectual Property" (2007) 117 Yale Law Journal 804.

[17] Susan K. SELL, "Corporations, Seeds, and IP Rights Governance" in Jennifer CLAPP and Doris FUCHS, eds., *Corporate Power in Global Agrifood Governance* (MIT Press, 2009).

[18] World Trade Organization, "Doha WTO Ministerial 2001: Declaration on the TRIPS Agreement and Public Health" (November 2001) [*Doha Declaration*].

[19] Frederick M ABBOTT, "The Doha Declaration on the TRIPS Agreement and Public Health: Lighting a Dark Corner at the WTO" (2002) 5 Journal of International Economic Law 469; Peter DRAHOS, "Four Lessons for Developing Countries from the Trade Negotiations Over Access to Medicines" (2007) 28 Liverpool Law Review 11.

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are often referred to when envisaging mechanisms to foster clean technology transfer. However, a decade after the proposal was first made, it is argued that this approach is not operable due to the paralyzed multilateral trade mechanism, asymmetrical negotiation power of developing countries, prolonged negotiation process, and categorization problem in treaty negotiations.[20]

Thirdly, the COVID-19 global pandemic reminds us of the importance of the fast dissemination of new technology as a response to the existential non-traditional threats to humankind. As a response to the pandemic, nation states are inclined to increase self-sufficiency and improve local supply chains for access to vital technology.[21] Global value chains have been a vital network for cross-border technology transfer,[22] and this trend of localising supply chains may cut the existing networks based on the global value chains. The current call for an IP waver for COVID-19 vaccines may bring about valuable discussions for clean technology diffusion that are otherwise impossible.[23] The demands for equitable access to COVID-19 related technologies, including but not limited to vaccine technologies, not only challenge the patent system in terms of adequacy of the current licensing mechanisms, but also raise the ethical issue of balancing profitability from patents and health equity.[24] Although the impacts are still unfolding, this article draws upon implications from this latest development for clean technology diffusion.

Section I will deal with IP in clean technology diffusion while the rest of this article will proceed as follows: Section II will analyse three theoretical pathways for clean technology diffusion. Section III will discuss the practical considerations for each pathway based on the existing evidence in international negotiations and law making. Section IV will evaluate the options, propose an operable pathway, and discuss implications from the COVID-19 pandemic. Section V concludes.

I. Intellectual Property Obstacle in Clean Technology Diffusion: Elephant in the Room

Acknowledging the importance of clean technologies decarbonization, many environmental and technology policy instruments have been used at the national level, from the overarching climate policy sequencing[25] to increasing the ratio of renewable energy in energy supply[26] or reducing clean technology cost.[27] However, mechanisms to enhance technology diffusion have rarely been mentioned in the literature on clean technology policies in the last decades, after TRIPS established the requirement that every WTO member has to establish an IP system that meets its "minimum" standards. With protecting IP as a

[20] For a detailed discussion, see Section IV. B. I.

[21] See Section IV.B.2.

[22] T. GRIES &, R. GRUNDMAN & I. PALNAU & and M. REDLIN, "Technology Diffusion, International Integration and Participation in Developing Economies – a Review of Major Concepts and Findings" (2018) 15 International Economics and Economic Policy 215.

[23] Parsa ERFANI, Agnes BINAGWAHO, Mohamed Juldeh JALLOH, Muhammad YUNUS, Paul FARMER, and Vanessa KERRY, "Intellectual Property Waiver for Covid-19 Vaccines Will Advance Global Health Equity" (2021) 374 The BMJ n1837.

[24] Fatima HASSAN, Gavin YAMEY, and Kamran ABBASI, "Profiteering from Vaccine Inequity: A Crime against Humanity?" (2021) 374 The BMJ n2027.

[25] Jonas MECKLING, Thomas STERNER, and Gernot WAGNER, "Policy Sequencing toward Decarbonization" (2017) 2 Nature Energy 918.

[26] Carolyn FISCHER and Richard G. NEWELL, "Environmental and Technology Policies for Climate Mitigation" (2008) 55 Journal of Environmental Economics and Management 142.

[27] Alessia ELIA, M. KAMIDELIVAND, F. ROGAN, and B. Ó GALLACHÓIR, "Impacts of Innovation on Renewable Energy Technology Cost Reductions" (2021) 138 Renewable and Sustainable Energy Reviews 110488.

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prerequisite, the focus has been reiterated as *promoting technology transfer while respecting IP* rather than *restricting IP to promote technology diffusion*.

Technology diffusion is the process by which innovations (including new products, new processes, or new management methods) spread within and across economies.[28] Technology diffusion creates positive externalities (benefits that have not been paid for – the positive side of "free-riding"). IP law, in particular the patent system, enables inventors to internalize such externalities through a limited period of monopoly, allowing for the private capture of social value. As pointed out by Nathan Rosenberg, it is an inescapable aspect of a patent system that "to the extent that it offers protection to a patent holder, it does so by slowing down the diffusion of inventions".[29] This has always required a delicate balance between monopoly and diffusion of knowledge and between protecting private profitability and social warfare, within and beyond the patent system.

While TRIPS and post-TRIPS free trade agreements have directed the pendulum towards more extensive IP protection,[30] a longer historical perspective suggests that latecomers of industrialization across the world had long benefited from policies supporting technology diffusion. The Netherlands and Switzerland both abolished the patent system to enhance cross-border diffusion of knowledge to promote domestic industrialisation in the second half of the nineteenth century.[31] The US had provided systematic policy support to appropriate forbidden European know-how, including incentives to attract skilled workers to immigrate to North America, bringing with them the professional training they had acquired in Europe's factories.[32] The patent system was once part of the diffusion mechanism as domestic patent grants were also used to attract foreign skilled labour.[33]

These countries began to lean towards a pro-IP position after they gained industrial power and became knowledge producers. In the late nineteenth century, justifications of IP based on utilitarianism and property theories underpinning the current IP laws became widespread. IP was incorporated into the network of bilateral treaties formalising intra-European commercial relations and was extended to colonial territories.[34] This mutual recognition of IP was further formalized in the Paris Convention[35] and Berne Conventions[36] in the 1880s. France, Germany, Spain, and the UK approved the Berne Convention in 1887, and following Article 19 of the Berne Convention, they included their territories, colonies, and protectorates in their accession to the Convention.[37] The influence of the former colonial powers on IP continued even after the developing

[28] Paul STONEMAN, "Technological Diffusion: The Viewpoint of Economic Theory", Warwick Economic Research Papers (1986). See also Christine MACLEOD, "The Paradoxes of Patenting: Invention and Its Diffusion in 18th- and 19th-Century Britain, France, and North America" (1991) 32 Technology and Culture 885.

[29] Nathan ROSENBERG, *Technology and American Economic Growth* (Harper & Row Publishers, 1972) at 188.

[30] Henning Grosse RUSE-KHAN, "From TRIPS to FTAs and Back: Re-Conceptualising the Role of a Multilateral IP Framework in a TRIPS-plus World" (2018) 48 Netherlands Yearbook of International Law 57.

[31] Eric SCHIFF, *Industrialization without National Patents: The Netherlands, 1869-1912; Switzerland, 1850-1907* (Princeton University Press, 1971).

[32] Doron S BEN-ATAR, *Trade Secrets: Intellectual Piracy and the Origins of American Industrial Power* (Yale University Press, 2004).

[33] Ha-Joon CHANG, "Intellectual Property Rights and Economic Development: Historical Lessons and Emerging Issues" (2001) 2 Journal of human development 287.

[34] Ruth L. OKEDIJI, "Back to Bilateralism? Pendulum Swings in International Intellectual Property Protection" (2004) 1 University of Ottawa Law & Technology Journal 125.

[35] *Paris Convention for the Protection of Industrial Property of 1883 (as Amended on September 28, 1979)*, 28 September 1979, 828 U.N.T.S 305 (entered into force 3 June 1984) [*Paris Convention*].

[36] *Berne Convention for the Protection of Literary and Artistic Works (as amended on September 28, 1979)*, 9 September 1886, 828 U.N.T.S 221 (entered into force 19 November 1984).

[37] Peter DRAHOS and John BRAITHWAITE, *Information Feudalism: Who Owns the Knowledge Economy?* (Earthscan, 2002) at 75.

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countries became sovereign states. Despite the early international harmonisation of the Berne and Paris Conventions, IP rights remained territorial, and both conventions followed the quantitative, incentive-based approach.[38]

Even economic theories on the patent system and technology diffusion in the 1970s and the 1980s took a very cautious perspective. For instance, Stoneman points out "it is the application of innovation (diffusion) rather than the generation of innovations (invention or R&D) that leads to the realization of benefits from technological advance".[39] Profound transformations took place during the late 1970s and early 1980s, along with significant technological changes and the deployment of global value chains, where IP was reconceptualized as core competitiveness and a global trade issue.[40] IP was incorporated in the Uruguay Round negotiations, which produced TRIPS.[41] TRIPS emphasises commodification and transforms IP protection into a right proper rather than an innovation incentive. Nonetheless, Article 7 of TRIPS stipulates that:

> the protection and enforcement of intellectual property rights should contribute to the promotion of technological innovation and the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge and in a manner conducive to social and economic welfare, and to a balance of rights and obligations.

However, there has been an increasing imbalance due to more extensive IP protection through TRIPs-plus provisions bilateral trade agreements in many issues,[42] and climate change is one of them. Technology breakthroughs in zero and negative emission technologies are essential to address the challenge of climate change. If clean technologies are stringently protected by IP (in particular through patents and trade secrets), both the supply and demand for clean technologies will be restrained. Although IP has been justified on various grounds,[43] international clean technology diffusion should be the clear priority given the importance of clean technologies in addressing the global challenge of climate change. This in turn implies the imperativeness of rethinking how to address the cost of the patent system – restrictions on others to have access to patented inventions so that the social value of clean technologies can be recaptured. This article discusses how such a restriction can be achieved at the international level.

II. Three Theoretical Pathways to Promote Clean Technology Diffusion

The IP system lies at the core of technology regulation. The use of patented clean technologies restricts access because of higher monopolistic prices.[44] Firms use their patents themselves. But they further maximize the returns to their IP investment through complex

[38] Chang, *supra* note 33.

[39] Stoneman, *supra* note 28 at 1.

[40] Rochelle DREYFUSS and Susy FRANKEL, "From Incentive to Commodity to Asset: How International Law Is Reconceptualizing Intellectual Property" (2014) 36 Michigan Journal of International Law 552.

[41] Susan K SELL, *Private Power, Public Law: The Globalization of Intellectual Property Rights* (Cambridge University Press, 2003).

[42] Peter DRAHOS, "BITs and BIPs: Bilateralism in Intellectual Property" (2001) 4 The Journal of World Intellectual Property 791; Ruth LOPERT and Deborah GLEESON, "The High Price of 'Free' Trade: US Trade Agreements and Access to Medicines" (2013) 41 Journal of Law, Medicine and Ethics 199.

[43] This has been a continuous research agenda for IP law. For a comprehensive review of various theories, see Sean P. MORRIS, "The Contemporary Ideological Legitimacy of Global Intellectual Property Rights" (2020) Intellectual Property Quarterly 1 at 44.

[44] Nitya NANDA and Nidhi SHRIVASTAVA, "Clean Technology Transfer and Intellectual Property Rights" (2009) 9 Sustainable Development Law & Policy 42.

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business strategies; for instance, licensing without production, strategic licensing to maintain dominance in a supply chain, or cross-licensing among competitors. These rational choices by firms have hindered optimal technology diffusion to address climate change.[45] Recent international initiatives[46] and negotiations have manifested demands for change.

The gap between technology supply and demand is often located in different countries. Therefore technology diffusion and transfer may not be well addressed solely by the national law of one state. Global coordination is necessary to promote the large-scale and fast deployment of clean technologies. Nonetheless, the disparity in levels of technology development has, to some extent, shaped the positions of different states towards clean technology diffusion. Clean technology diffusion is often framed as a zero-sum game across the North-South divide. IP has been centralized and prioritized in negotiations to guarantee returns on IP investment. Protected as a proprietary right, patents prohibit a third party from access to clean technologies without the consent of rights holders. Patent holders can charge a monopoly price, but if they do so demand will be less than it would be at a lower price in licensing practices.[47]

Developed countries have been reluctant to transfer clean technologies to countries in need by arguing that there is insufficient IP protection to prevent unremunerated technology diffusion in the recipient country. This reluctance is facilitated by the international fragmentation of environmental law and IP law. However, if the environment continues to deteriorate without sufficient and speedy clean technology diffusion, everyone will be a loser. This points to the likelihood of demand for restrictions over IP.

There are two approaches to implement such restrictions to promote clean technology diffusion – those pursued *outside of* the international IP system and those pursued *within* the international IP system. The debate about technology diffusion also reflects the contest of values and which one shall be prioritized.[48] Prioritizing ecological objectives over private profits for IP rights holders, international environmental law could be a useful external restriction over IP and promote clean technologies diffusion. Negotiations within the IP system consist of exceptions and limitations within the IP law. These internal balances, however, often prioritize the value of innovation stimulation and the interest of rights holders. This differentiation refers to previous research on the interaction between IP law and human rights law, which takes a similar approach.[49] In addition to referring to this differentiation of external and internal restrictions, this paper also discusses a third possibility of taking no action, with the focus on possible consequences of no action.

A. Imposing External Restrictions

IP is ubiquitous and increasingly interacting with laws governing human rights, public health, preserving biodiversity, access to knowledge, and other issues.[50] The nexuses

[45] Shabalala DALINDYEBO, *Climate change, technology transfer and intellectual property: options for action at the UNFCCC* (Maastricht University, 2014).

[46] For the purpose of this article, initiatives refer to policy agendas that are not formally pursued by text-based international negotiations.

[47] IP may be further abused for royalty overcharge through patent holdup and royalty stacking. See Mark A. LEMLEY and Carl SHAPIRO, "Patent Holdup and Royalty Stacking" (2006) 85 Texas Law Review 1991.

[48] For the discussion on value as priorities, see Marc TADAKI, Jim SINNER, and Kai MA CHAN, "Making Sense of Environmental Values: A Typology of Concepts" (2017) 22 Ecology and Society 1.

[49] Henning Grosse RUSE-KHAN, "Overlaps and Conflict Norms in Human Rights Law: Approaches of European Courts to Address Intersections with Intellectual Property Rights" in Christophe GEIGER, ed., *Research Handbook on Human Rights and Intellectual Property* (Cheltenham, Massachusetts: Edward Elgar, 2015), 70.

[50] Laurence R HELFER, "Regime Shifting: The TRIPs Agreement and New Dynamics of International Intellectual Property Lawmaking" (2004) 29 Yale Journal of International Law 1.

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between these other areas of law and IP law have provided opportunities to address the substantive law overlaps, interfaces, tensions, and even conflicts. For the present purpose, external restrictions are efforts to incorporate clear provisions on restricting IP in multilateral environmental law.

Research on legal fragmentation and global legal pluralism has provided theoretical foundations on how one area of international law can define and delineate its relations with another.[51] Such clarification is made either by treaty provisions or judicial decisions. The treaty negotiation pathway is exemplified by the relationship between the Convention on Biological Diversity (CBD)[52] and TRIPS. Article 16.5 of the CBD provides that:

> the Contracting Parties, recognizing that patents and other IP rights may influence the implementation of this Convention, shall cooperate in this regard subject to national legislation and international law to ensure that such rights are supportive of and do not run counter to its objectives.

This provision deals with the overlaps between the CBD and IP law (mainly TRIPS) and recognizes that the CBD objectives are to be given equal weight. However, this may not be an effective restriction because the vague expression "not run counter" in the CBD is subject to different interpretations and so is unlikely to safeguard the implementation of relevant rules. Although this non-contravention principle was further reaffirmed in a proposal for a new Article 29bis of TRIPS on Disclosure of Origin of Genetic Resources and/or Associated Traditional Knowledge,[53] text-based negotiations on this issue have never happened at the TRIPS Council. Consequently, Article 16.5 of the CBD only has symbolic meaning as it has not been, and probably will never be, concretely implemented. This treaty warns that an external restriction can only work effectively if it is guaranteed by a clearly articulated implementation mechanism.

In terms of clarification through judicial reviews, the European Court of Human Rights (ECHR) and the Court of Justice of the European Union (CJEU) have both examined the relationship between overlapping norms of human rights and IP.[54] In both cases, the courts used human rights law as the principal parameter for assessing the relationship – specifically the conflict between (1) national IP protection and enforcement measures and (2) freedom of expression and information or the right to privacy. The two courts took different approaches: the CJEU reconstructed international IP rules so that they fit with the court's approach to European Union (EU) human rights law while the ECHR allowed external rules to justify limitations on the right to property. Despite different approaches by the two courts, the use of judicial review itself has provided a possibility of procedurally rearranging the priorities between IP and other disciplines of law. This becomes increasingly relevant when the environment is framed as a human rights issue.[55] For instance, the United Nations Human Rights Council has stated in one of its resolutions that:[56]

[51] Andreas FISCHER-LESCANO and Gunther TEUBNER, "Regime-Collisions: The Vain Search for Legal Unity in the Fragmentation of Global Law" (2004) 25 Michigan Journal of International Law 999; Paul Schiff BERMAN, "Global Legal Pluralism" (2007) 80 Southern California Law Review 1155.

[52] *Convention on Biological Diversity*, 5 June 1992, 1760 U.N.T.S. 79 (entered into force 29 December 1993) [*CBD*].

[53] Draft Decision to Enhance Mutual Supportiveness between the TRIPS Agreement and the Convention on Biological Diversity: Communication from Brazil, China, Colombia, Ecuador, India, Indonesia, Peru, Thailand, the ACP Group, and the African Group, TN/C/W/59 (19 April 2011).

[54] Ruse-Khan, *supra* note 49.

[55] Alan BOYLE, "Human Rights and the Environment: Where Next?" (2012) 23 European Journal of International Law 613; *ibid*.

[56] *Human Rights and Climate Change*, UNHRC Res. 10/4, UN Doc. A/HRC/RES/10/4 (2009).

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> Noting that climate change-related impacts have a range of implications, both direct and indirect, for the effective enjoyment of human rights including, inter alia, the right to life, the right to adequate food, the right to the highest attainable standard of health, the right to adequate housing, the right to self-determination and human rights obligations related to access to safe drinking water and sanitation, and recalling that in no case may a people be deprived of its own means of subsistence.

With such developments in human rights law, there will be a possibility in the future that judicial review can also be used to resolve conflicts between IP and climate change on a case-by-case basis.

Considering both IP and climate change are subject to multilevel governance, external restrictions can be imposed at different levels. At the multilateral level, restrictions on IP could be incorporated into multilateral environmental agreements. Despite being fragmented, multilateral environmental arrangements aim to incorporate provisions promoting clean technology diffusion where the IP protection of such technology is an indispensable issue. At the bilateral and national levels, imposing external restrictions means incorporating restrictions on IP in various bilateral and plurilateral agreements, specifically into energy, climate change, or environment related treaty chapters. At the national level, external restrictions on IP can be imposed by domestic environmental protection laws. However, such rules may risk being accused of a TRIPS violation if there is no simultaneous breakthrough in multilateral negotiations.

B. Striking Internal Balance: TRIPS Flexibilities

The second approach is to strike an internal balance within the IP system. An internal balance has long been the cornerstone of the social contract theory of patents.[57] Economically, the social contract theory of patents requires that an effective and efficient patent system should balance the incentives for innovation and achieve sufficient spillover benefits to offset monopoly costs.[58] Flexibilities, either as limitations or exceptions to patentable subject matter or patent rights, have been an integral part of TRIPS.[59] Therefore, striking an internal balance for clean technology diffusion means exploration and maximization of available flexibilities within the IP system.

Article 27(1) of TRIPS requires WTO Members to make patents available for any inventions in all fields of technology and to patent rights enjoyable without discrimination as to the place of invention, the field of technology, and whether products are imported or locally produced. This non-differentiation in patent protection across technological fields is considered a demonstration of the principle of technology neutrality in patent law.[60] This provision sets the boundary of obligations for WTO members as well as rights for patent holders. Nonetheless, such obligations and rights are not absolute because flexibilities allow variations in implementation, which may mean less restrictive

[57] Shubha GHOSH, "Patents and the Regulatory State: Rethinking the Patent Bargain Metaphor after Eldred" (2004) 19 Berkeley Technology Law Journal 1315.

[58] Hazel VJ MOIR, "Empirical Evidence on the Inventive Step" (2013) 35 European Intellectual Property Review 246.

[59] However, it is argued that these flexibilities are not sufficiently implemented in practice. See Carolyn DEERE, *The Implementation Game: The TRIPS Agreement and the Global Politics of Intellectual Property Reform in Developing Countries* (Oxford University Press, 2009).

[60] For the discussion on Article 27.1 and its manifestation of technology neutrality, see Nari LEE, "Revisiting the Principle of Technological Neutrality in Patent Protection in the Age of 3D Printing Technology and Cloud Computing" in Hanns ULLRICH, Reto M. HILTY, Matthias LAMPING, and Josef DREXL, eds., *TRIPS plus 20: From Trade Rules to Market Principles* (Springer, 2016).

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Table 1: TRIPS flexibilities WTO Members may enact in national law

Boundaries of patentability	Boundaries of patent rights
Obligations of WTO members to confer patents: • Novel;ty, non-obviousness, and industrial applications • Available for any invention in all fields of technology • Available for domestic and foreign applicants	Prevent unauthorized third parties from "making, using, offering for sale, selling, or importing" a patented product or the product directly obtained from the patented process.
Patentability related flexibilities	**Exceptions and limitations to patent rights**
Exclusion from the patentable subject matter: ○ inventions the exploitation of which is against *ordre public* or morality; ○ diagnostic, therapeutic, and surgical methods for the treatment of humans and animals; ○ plant and animal varieties; ○ plants and animals other than microorganisms; ○ essentially biological processes for the production of plants and animals; ○ discovery, abstract ideas, natural phenomena and laws of nature"	• Exceptions to rights conferred ○ Compulsory licensing ○ Government use (crown use) ○ Bolar exception ○ Experimental use • Exhaustion of patent rights
• Flexibilities for least developed country Members • Transition period • Technology transfer to the least developed countries	

obligations for states in setting a patent standard or a lower level of protection for a granted patent.[61]

Various flexibilities are available in TRIPS. Table 1 categorizes these flexibilities according to their relation to patentability and patent rights. Patentability related flexibilities allow WTO Members to provide variations in their national patent law when implementing WTO obligations through exclusion from the patentable subject matter. Flexibilities for patent rights are designed for right holders in the form of limitations or exceptions to their rights. Some of these flexibilities are only available to pharmaceutical patents such as the Bolar exception and experimental use. TRIPS also design flexibilities for the least developed county Members in the WTO, including a transition period to implement TRIPS and receiving technology transfer from developing country Members.

1. Patentability related flexibilities

Articles 27.2 and 27.3 of TRIPS list subject matter that a WTO Member may exclude from patentability in their national patent laws. Some WTO members, such as Brazil and India, have a broader scope of exclusion while others have narrower exclusions.[62] There are two

[61] The UN Secretary-General's High Level Panel defines flexibility as "a set of norms, rules and standards that allow variations in the implementation of the TRIPS Agreement's obligations, including limits on the exercise of IP rights". See High-Level Panel on Access to Health Technologies, "Report of the United Nations Secretary-General's High-Level Panel on Access To Medicines: Promoting Innovation and Access to Health Technologies" (September 2016), online: High-Level Panel <http://www.unsgaccessmeds.org/final-report>.

[62] World Intellectual Property Organization, "Exclusions from Patentable Subject Matter and Exceptions and Limitations to the Rights" (February 2009), online: WIPO <https://www.wipo.int/meetings/en/doc_details.jsp?doc_id=116712>.

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subject matter grounds for exclusion in TRIPS. The first is specific technologies –diagnostic, therapeutic, and surgical methods for the treatment of humans or animals and plants and animals other than microorganisms (but plant varieties must be protected under the *sui generis* system). These exclusions were widespread in pre-TRIPS patent law (as were chemical compositions). While software is not specifically mentioned, TRIPS provides that software shall have copyright protection and, at the time TRIPS was being negotiated, this was the principal means by which software was protected in the EU and the USA. The implementation of this exclusion varies at the regional and national level. For instance, Article 52(2) of the European Patent Convention lists as non-patentable subject matter: "discoveries, scientific theories and mathematical methods; aesthetic creations; schemes, rules, and methods for performing mental acts, playing games or doing business, and programs for computers; presentation of information". The US does not proscribe specific exclusion in its statutory law, but abstract ideas, natural phenomena, and laws of nature may be excluded on the basis of case law.

Another ground for exclusion is *ordre public*, which is included in the patent laws of many countries and regions.[63] This exclusion was introduced to patent laws because of its long tradition within the English Statute of Monopolies exclusions.[64] In WTO jurisprudence this provision also mirrors Article XX(a) of General Agreement on Tariffs and Trade (GATT)[65] and Article XIV(a) of General Agreement on Trade in Services (GATS).[66]

While on the face of it *ordre public* indicates a broad scope in TRIPS – "to protect human, animal or plant life or health or to avoid serious prejudice to the environment, provided that such exclusion is not made merely because the exploitation is prohibited by their law"[67] – it has thus far only been applied to exclude life forms from patentability in biotechnology. For instance, Article 6(1) of the EU Biotechnology Directive provides that certain inventions presumptively fall within the remit of the exclusion from patentability on the grounds of *ordre public*. Additionally, religious communities (in particular Catholic churches) have been involved in the debates on the patentability of human genes and related technologies such as the use of human embryos, and human cloning.[68]

What constitutes a contravention against public order and morality depends on the time, place, and culture of a certain country. There has been a call for a broad interpretation of Article 27.2 that *ordre public* should exclude clean technologies from patentability to "avoid serious prejudice to the environment".[69] Action on climate change and other forms of environmental degradation become increasingly imperative, particularly in environmentally vulnerable countries. Therefore it is time to rethink about excluding clean technologies from patentability to avoid serious prejudice to the environment, even if it might not be a solid ground for *ordre public* when TRIPS was signed. WTO

[63] For instance, *Convention on the Grant of European Patents*, 5 October 1973, 1065 U.N.T.S. 199 (entered into force 7 October 1977) [*European Patent Convention*], art. 53(a); *Patent Law of the People's Republic of China*, October 17, 2020, Order of the President of the People's Republic of China No. 55 (entered into force June 1, 2021) [*Patent Law of China*], art. 5.1.

[64] Edward WALTERSCHEID, "The Early Evolution of the United States Patent Law: Antecedents (Part 2)" (1994) 76 Journal of Patents and Trademarks Office Society 849.

[65] *General Agreement on Tariffs and Trade 1994*, 15 April 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1A, 1867 U.N.T.S. 187, 33 I.L.M. 1153 (1994) [*GATT*].

[66] *General Agreement on Trade in Services*, 15 April 1994, 1869 U.N.T.S. 183 (entered into force 1 January 1995) [*GATS*]; Caroline HENCKELS, "The Ostensible Flexibilities in TRIPS: Can Essential Pharmaceuticals Be Excluded from Patentability in Public Health Crises" (2006) 32 Monash University Law Review 335.

[67] World Trade Organization (WTO) Trade-Related Aspects of Intellectual Property Rights Agreement, 15 April 1994, 33 I. L. M. 81 (entered into force 1 January 1995) [*TRIPS*], art. 27.2.

[68] Audrey R CHAPMAN, "Religious Contributions to the Debate on the Patenting of Human Genes" (2012) 10 University of St. Thomas Law Journal 650.

[69] Rimmer, *supra* note 7 at 91.

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members should have the freedom to interpret excluding clean technologies from patentability as a circumstance of *ordre public* to solve their current social and environmental problem. However, such experiments become uncertain, with influential IP scholars like Keith Maskus arguing that it may require a significant change in Article 27 of TRIPS to allow interested countries to exclude environmentally sound technologies from patent eligibility.[70] Consequently, as current Article 27.2 does not explicitly mention excluding clean technologies from patentability as an *ordre public* issue, any attempt to implement it in national law may risk the United States Trade Representative (USTR) acting, or a WTO dispute. Negotiators from developing countries did pursue this exclusion for clean technologies for Copenhagen Accord, but the attempt failed in the end (Section III.A.1).

2. Exceptions and limitations to patent rights

Once a patent is granted, Article 28.1 of TRIPS specifies the rights of patent owners to prevent unauthorized third parties from "making, using, offering for sale, selling, or importing" a patented product or the product directly obtained from the patented process. Articles 30 and 31 of TRIPS provide exceptions and limitations to patent rights.[71] The exercise of exceptions is constrained by three conditions in Article 30 of TRIPS:[72]

(i) that the exceptions to the exclusive rights must be "limited"
(ii) that the exceptions do not unreasonably conflict with a normal exploitation of the patent; and
(iii) that the exceptions do not unreasonably prejudice the legitimate interests of the patent owner, taking account of the legitimate interests of third parties.

State practice to promote access to technologies based on the exceptions under Article 30 may give rise to disputes under the WTO. In *Canada – Patent Protection of Pharmaceutical Product*, the European Communities (EC) challenged the extensive exceptions in Canadian patent law that were designed to ensure generic pharmaceutical products could enter the market the day after the patent expired. Canada's counterargument was that the three conditions stated in Article 30 of TRIPS should be given a liberal interpretation. While the panel found that the "limitations stated in Articles 7 and 8.1 must be borne in mind, as well as other provisions of TRIPS which indicate its objective and purposes",[73] the WTO panel report has been criticized as its interpretation of rules was almost solely in light of expectations of the private right

[70] Keith MASKUS, "Differentiated IP Regimes for Environmental and Climate Technologies", Organisation for Economic Co-operation and Development, OECD Environment Working Papers No. 17, 5 May 2010.

[71] Exceptions can be understood as carve outs from IP owners' rights while the boundary of IP rights is delineated by limitations to the right. See Andrew CHRISTIE, "Maximising Permissible Exceptions to Intellectual Property Rights" in Annette KUR and Vytautas MIZARAS, *The Structure of Intellectual Property Law: Can One Size Fit All?* (Edward Elgar, 2011). However, it is worth noticing that while the terms 'exceptions' and 'limitations' are widely used under the three-step text, there is no agreement on the definition or uniform practices on exception and limitations. See Annette KUR, "Of Oceans, Islands, and Inland Water - How Much Room for Exceptions and Limitations Under the Three-Step Test?" (2009) 8 Richmond Journal of Global Law and Business 287. For a further discussion of TRIPS exceptions and limitations, see Lee, *supra* note 60; Eric M. SOLOVY and Pavan KRISHNAMURTHY, "TRIPS Agreement Flexibilities and Their Limitations: A Response to the UN Secretary-General's High-Level Panel Report on Access to Medicines" (2017) 50 George Washington International Law Review 69.

[72] World Intellectual Property Organization, *supra* note 62.

[73] *Canada – Patent Protection of Pharmaceutical Products*, Panel Report of 17 March 2000, WT/DS114/R at para 7.26.

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holders.[74] If "normal" exploitation of patents is given weight by reference to existing practice when interpreting Article 30, it will be difficult to introduce a new exception. While Article 30 can surely be relied on to justify an exception in the case of a global climate emergency, the Canadian pharmaceutical case indicates the associated legal uncertainty – a state considering such application is also required to be prepared for taking on the burden of litigation.

(a) Compulsory licensing. In addition to the Article 30 exceptions, Article 31 of TRIPS provides explicit exceptions as "use without authorization of the right holder", which primarily includes compulsory licensing and government use (Crown use). Compulsory licensing is a mechanism whereby a licensee can obtain a licence for the patent without the consent of the patent owner when public interests are threatened. The purpose of the compulsory licensing system is to enhance the supply, which would otherwise be hindered by the patent right holders' refusal to trade or through the imposition of an unreasonably high royalty rate. TRIPS allows for compulsory licensing in conditions of "emergency", but only from domestic sources of supply. So far, TRIPS signatories have only recognized public health emergencies as meriting compulsory licensing. Even within the public health sector, it is often narrowly issued for communicable diseases instead of non-communicable chronic health problems such as cancer or heart disease.[75] Negotiations continued in the post-TRIPS era and eventually generated a WTO Ministerial Declaration on TRIPS and Public Health,[76] which further led to an amendment to TRIPS.[77]

As the practical ability of states to issue compulsory licences for pharmaceuticals in emergencies has been heavily circumscribed, there has been a debate about whether compulsory licensing could be used for climate change related technologies.[78] Correa argues that "compulsory licensing or government use can be implemented to ensure access to other technologies outside the pharmaceutical field, for instance, technologies necessary to address climate change adaptation or mitigation".[79] Zaman specifies that climate change mitigation and adaptation technologies would create strong demand for compulsory licensing, which is comparable to cases of access to essential generic drugs. Nonetheless, he acknowledges that compulsory licensing for clean technologies would be a critical issue under TRIPS because Article 31(b) does not define what constitutes "emergency" or "extreme urgency".[80] The major opposition to a broad definition is based on a fear of a harmful backlash from the patent owners and their respective states, the differences between pharmaceuticals and clean technologies, and the effectiveness of issuing a compulsory licence as compared with removing tariffs and non-tariff barriers.[81]

The real barriers for defining climate change as an "emergency" to suffice the compulsory licensing condition are the absence of obligation in multilateral environmental law

[74] Ruth L OKEDIJI, "Public Welfare and the Role of the WTO: Reconsidering the TRIPS Agreement" (2003) 17 Emory International Law Journal 820.

[75] Dina HALAJIAN, "Inadequacy of TRIPS and the Compulsory Licence: Why Broad Compulsory Licensing Is Not a Viable Solution to the Access Medicine Problem" (2013) 38 Brooklyn Journal of International Law 1191.

[76] World Trade Organization, "Doha WTO Ministerial 2001: Declaration on the TRIPS Agreement and Public Health" (November 2001).

[77] World Trade Organization, "Amendment of the TRIPS Agreement" (December 2005). This amendment introduced a new Article 31*bis*.

[78] Robert FAIR, "Does Climate Change Justify Compulsory Licensing of Green Technology?" (2010) 6 BYU International Law and Management Review 21.

[79] Carlos M. CORREA, "The Use of Compulsory Licences in Latin America" in Reto M. HILTY and Kung-Chung LIU, eds., *Compulsory Licensing: Practical Experiences and Ways Forward* (Springer, 2015), 43 at 58–59.

[80] Zaman, *supra* note 11 at 156.

[81] Fair, *supra* note 78 at 25.

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and international legal fragmentation. The existential threat of climate emergency has been reiterated by environmental organizations such as the United Nations Environment Program (UNEP) and Intergovernmental Panel on Climate Change (IPCC).[82] For instance, the UNEP's periodic emissions gap report in 2019 states the urgency and magnitude of the challenges and urges that economies must shift to a decarbonization pathway now: "[c]ountries collectively failed to stop the growth in global GHG emissions, meaning that deeper and faster cuts are now required. ... The technologies for rapid and cost-effective emission reductions have improved significantly."[83] However, there seems to be a couple of gaps for such technologies to be effectively diffused through a compulsory licensing mechanism. First is to translate "climate emergency" from a mere advocate into a legally binding term in multilateral environmental law.[84] The second is to require Article 31(b) of TRIPS to interpret "emergency" or "extreme urgency" by reference to such multilateral environmental law, which seems unlikely in the existing "trade-related" TRIPS jurisprudence.[85]

(b) Government use. Government use is another mechanism to use a patent without authorization. It enables governments and other parties authorized by a government[86] to exploit patented inventions for public non-commercial purposes or emergencies without the consent of or consulting with patent rights holders. Governments are still required to notify and ultimately remunerate the relevant rights holders but at a fair rate. Although compulsory licensing and government use both constrain exclusivity, they overlap conceptually. The two mechanisms may have different legal bases, different administrative or judicial implementation procedures, and different economic dynamics.[87] Government use of patents originated from Crown use in English patent law and is used in many Commonwealth countries such as Australia. Although rarely used in practice, the threat of use imposes pressure on the patent owner and can facilitate improved prices or licensing agreements.[88] Nonetheless, there are a lot of uncertainties regarding the circumstances where Crown use can be invoked, who may invoke it, the level of remuneration, and related transparency and accountability issues.[89]

[82] IPCC issues many scientific reports about global warming. See Intergovernmental Panel on Climate Change, *supra* note 4.

[83] United Nations Environment Programme, "Emissions Gap Report 2019 - Executive Summary" (2019), online: UNEP <https://unepdtu.org/publications/emissions-gap-report-2019-executive-summary/>.

[84] In reality, however, environmental agreements such as Paris Agreement was criticized as a "successful failure" as the commitments are voluntary. See Barry GILLS and Jamie MORGAN, "Global Climate Emergency: After COP24, Climate Science, Urgency, and the Threat to Humanity" 17 (2020) Globalizations 885; *ibid*.

[85] Antony S. TAUBMAN, "The Coming of Age of the TRIPS Agreement: Framing Those 'Trade-Related Aspects'" in Christophe GEIGER, eds., *The Intellectual Property System in a Time of Change: European and International Perspectives* (Strasbourg: CEIPI, 2016).

[86] These entities often only limited to those providing services to governments either directly as part of government or indirectly as suppliers, such as nursing homes.

[87] Antony Taubman, "Rethinking TRIPS: 'Adequate Remuneration' for Non-Voluntary Patent Licensing" (2008) 11 Journal of International Economic Law 927.

[88] Australian Productivity Commission, "Compulsory Licensing of Patents: Productivity Commission Inquiry Report" (March 2013), online: Australian Productivity Commission <https://www.pc.gov.au/inquiries/completed/patents/report/patents.pdf>.

[89] Australian Government IP Australia, "Public Consultation: Crown Use of Patents and Designs" (August 2017), online: Australian Government IP Australia, <https://www.ipaustralia.gov.au/sites/default/files/public_consultation_crown_use_of_patents_and_designs.pdf?acsf_files_redirect>; Jane L. NIELSEN, Dianne NICOL, John LIDDICOAT, and Tess WHITTON, "Another Missed Opportunity to Reform Compulsory Licensing and Crown Use in Australia" (2014) 25 Australian Intellectual Property Journal 74.

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Compulsory licensing and government use are exceptions to patent privileges/rights in the sense that some otherwise unlawful practices are implied as non-violations. For these exceptions to be effective in practice, delineation of the boundaries of what is permitted is essential. Otherwise, there is too much uncertainty leading to a lack of action. Repeated practices of issuing compulsory licences for clean technologies are essential to establish a "custom" or general practice,[90] a practice that interprets such licences as WTO compliant.[91] The paradox is that such a practice to generate a new custom is deterred because the mere possibility of violation suffices to launch a dispute at the WTO. Despite the substantial academic debate on the legitimacy of (1) a government's issuing of a compulsory licence for certain clean technologies where the use is for a national emergency or other extremely urgent circumstances[92] or (2) government authorization for use of a patent for public non-commercial purposes, there has never been any application for compulsory licensing or Crown use in clean technology patents.

The lack of clarity and the possibility of being sued has a deterrence effect. One way to navigate this uncertainty is to seek clarification. To make the first step work for clean technologies transfer, proponents call for a "Doha-like" declaration on TRIPS and climate change which would justify the application of non-voluntary licensing through compulsory licensing or government use (Section III.B.2).

(c) Patent exhaustion. IP rights are territorial rights. During TRIPS negotiations, countries did not agree on the exhaustion of IP; that is, the IP owners' loss of the right to control the resale of the protected good. The exhaustion rules in TRIPS strike a balance between the access to and free movement of innovative goods, and the profits of IP rights holders.[93] Essentially, it is not a question of whether IP will exhaust but to what extent selling of an IP-protected product will lead to the loss of rights – international, national, or regional. This scope has different impacts on trade. International exhaustion (the selling of IP-protected goods in one country leads to exhaustion of rights in other parts of the world) allows the parallel import of goods. In contrast, national exhaustion (the selling of IP-protected goods in one country only means that the rights holder loses his/her rights within that nation) entitles the right holders to oppose parallel imports. A regional exhaustion system allows parallel imports within the region while prohibiting parallel imports between a member of the region and other states.

Article 6 of TRIPS allows WTO Members to choose how to address IP exhaustion, as long as the provisions comply with national treatment and most-favoured-nation principles. The Doha Declaration reaffirms the interpretation that WTO Members are free to establish their own exhaustion regimes.[94] As parallel imports have the positive impact of increasing the availability of goods through greater competition, international exhaustion maximizes the benefits to users of new patented technology.[95] In terms of clean technologies, while international exhaustion does not enhance transfer practices directly, it provides an alternative opportunity by improving potential competition so that countries

[90] Drahos, *supra* note 19.

[91] While IP regulation has been a domain of treaty, such "positivist" tradition is likely to change. New problems may be solved by customary law. See Frederick M Abbott, Thomas Cottier and Francis Gurry, *International Intellectual Property in an Integrated World Economy* (Wolters Kluwer Law and Business, 2019) at 16.

[92] TRIPS, art. 31(b).

[93] Enrico BONADIO, "Parallel Imports in a Global Market: Should a Generalised International Exhaustion be the Next Step?" (2011) 33 European Intellectual Property Review 153.

[94] World Trade Organization, "Doha WTO Ministerial 2001: Declaration on the TRIPS Agreement and Public Health" (November 2001), art. 5(d).

[95] Thomas COTTIER, "The Exhaustion of Intellectual Property Rights – A Fresh Look" (2008) 39 IIC International Review of Intellectual Property and Competition Law 755.

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without production capacity may have more affordable products to address climate change and other environmental challenges.

(d) Flexibilities for least developed countries. Article 66 of TRIPS provides two flexibilities to "least developed countries" (LDCs),[96] and these can be applied to clean technologies without differentiating by field of technology. The first is the extension of the transition period in which the LDCs are exempted from implementing TRIPS. The latest extension decision was made in Bali in 2013, with TRIPS extending the transition period to 1 July 2021.[97] If countries take advantage of this transition period, patents need not be a barrier to technology transfer to these LDCs. However, the absorptive capacities of the local communities as well as financial sources become significant issues. As many LDCs had patent protection in their previous history of colonization,[98] they could not take advantage of the transition period in reality.

Secondly, Article 66.2 of TRIPS requires developed countries to provide incentives to enterprises and institutions in their territories to promote and encourage technology transfer to the LDCs.[99] In 2001, the Doha Ministerial Conference required the TRIPS Council to "put in place a mechanism for ensuring the monitoring and full implementation of the Article 66.2 obligations of technology transfer".[100] This was reiterated by the Decision on Implementation of Article 66.2 (IP/C/28) in early 2003, with details on developed country reports. The reporting mechanisms have their limitations; for instance, there are no legal consequences for non-compliance.[101] In addition, reporting to TRIPS Council is not very detailed – developed country members always note that the reports are only *illustrative* of the kind of incentives they provide. Among various sectors of the implementation from 2003 to 2006, environment and water, and energy are among the important fields where incentive programs are reported.[102]

C. Inaction

What would happen if no efforts, either external restrictions or internal balance, are made to promote clean technology diffusion? While there is little legal interest to discuss concerning "inaction" *per se*, it is important to understand the consequences of inaction.

After TRIPS, trade negotiations shifted to bilateral fora in the form of Preferential Trade Agreements (PTAs), often referred to as Free Trade Agreements (FTAs). Most of these agreements include TRIPs-plus provisions.[103] As Drahos points out, the strategy of

[96] See Proposals on behalf of the Least-Developed Countries – Communication from Bangladesh, MTN.GNG/NG11/W/50 (1989).

[97] World Trade Organization, "Bali Ministerial Declaration" (December 2013), para. 1.6. However, many LCDs were instantly persuaded to give this up in exchange for empty promises. See Deere, *supra* note 59.

[98] Peter DRAHOS, *The Global Governance of Knowledge: Patent Offices and Their Clients* (Cambridge University Press, 2010).

[99] It is worth noticing that the obligation in Article 66.2 is not mandating developed country members to transfer technology to LDCs directly or even ensure the transfer of technology happening. Instead, it only obliges developed country members to provide incentives to enterprises and institutions in their territory to promote and encourage technology transfer to LDC. See Jayashree WATAL and Leticia CAMINERO, "Least-developed Countries, Transfer of Technology and the TRIPS Agreement" in Carlos CORREA and Xavier SEUBA, eds., *Intellectual Property And Development: Understanding The Interfaces Liber Amicorum Pedro Roffe* (Springer, 2019), 199.

[100] Doha Ministerial Decision of 14 November 2001, WT/MIN(01)/17 (2001), para. 11.2.

[101] Watal and Caminero, *supra* note 99.

[102] *Ibid*.

[103] Susan K. SELL, "TRIPS Was Never Enough: Vertical Forum Shifting, FTAS, ACTA, and TPP" (2010) 18 Journal of Intellectual Property Law 447.

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forum shifting means that "some negotiations are never really over".[104] These PTAs have enhanced IP protection in the form of extending patentable subject matter and the duration of protection, lowering the threshold for patentability and foreclosing flexibilities. Through this chain effect, IP protection standards in many countries have quietly increased in the last two decades, either as general rules or sector-specific rules such as patent term extensions for pharmaceutical patents. Doing nothing means this chain effect continues, pulled by the giant anchor of the most-favoured-nation (MFN) principle, dragging states into the deep depths of obligation. With increased IP protection, technology diffusion will take place either later or in a more limited fashion. For instance, with the introduction of the patent term compensation in the Trans-Pacific Partnership (TPP)[105] and other preferential trade agreements, pharmaceutical products obtain longer patent duration than would otherwise be the case. This postpones the diffusion of new inventions. Given the progressively higher IP standards resulting from continuous PTA negotiations, any extensions generally applicable to patents will hinder clean technology diffusion and inaction means accepting these rules without questioning their ramifications for the environment, and essentially climate change. The analysis of this pathway in Section III.C will focus on the ramifications of inaction.

III. Three Pathways in Practice

The three theoretical pathways, at a high level of abstraction, identify possible directions to promote clean technology diffusion. Various efforts have been made to undertake each of the pathways in the last decade. This section will assess the exiting experiences and explore why some of the pathways may not be viable. Table 2

A. Imposing External Restrictions

As discussed in Section II.A, external restrictions mean provisions that impose restrictions on IP in multilateral environmental law. In practice, there have been continuous efforts to impose such restrictions. To locate these attempts, we need to first identify the elementary institutions that are involved in the global governance of clean technologies transfer[106] – primarily the multilateral environmental institutions and the international economic institutions in which international IP institutions are determined. The following figure shows the structure of these institutions: Figure 1

Within the multilateral environmental institutions, the most important provision relating to external restriction to IP is Article 4.5 of the 1992 UNFCCC:

> The developed country Parties and other developed Parties included in Annex II 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, to enable them to implement the provisions of the Convention. In this process, the developed country Parties shall support the development and enhancement of endogenous capacities and technologies of developing country Parties.

[104] Drahos, *supra* note 19.

[105] *Trans-Pacific Partnership Agreement* (signed 4 February 2016).

[106] Although the focus to promote better access to clean technology is through the broader concept of technology diffusion as discussed in this paper, the existing mechanisms are all designed for a much narrower activity of technology transfer. Dissemination beyond contract-based technology transfer can be considered infringement and unlawful.

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Table 2: Strategies for promoting clean technologies transfer at various levels

Strategies/Level	National	Bilateral/plurilateral	Multilateral
Imposing external restrictions	· Reaffirming regulatory sovereignty over clean technologies as a response to climate change	· Restrictions on IP in environmental/energy chapters of trade agreements	· Restrict IP in multilateral environmental agreements
Striking internal balance	· Safeguarding TRIPS flexibilities in national law	· Special arrangement for clean technologies in IP chapters in FTAs	· Doha-like Declaration · Mandate TRIPS flexibilities
Possible consequences of inaction	· Increased IP standards to implement PTAs commitment · Regulatory chill due to risk of being sued via ISDS	· TRIPS Plus diminishing flexibility · FTA reaffirms IP protection in clean technologies	· Keep the status quo of IP provisions in TRIPs

Although this provision mandates developed countries to promote clean technology diffusion, there is a gap between this provision and the external restriction on IP – this provision does not explicitly mention IP to achieve the mandate. Following the 1992 UNFCCC,[107] the Kyoto Protocol again addresses technology transfer in Article 10, calling for "cooperating in the promotion of effective modalities for the development, application and diffusion of, and take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies ... in particular to developing countries". With the qualifiers like "take all practicable steps" and "as appropriate", the obligations for promoting technology transfer are diluted. These permissive provisions do not have teeth when they conflict with TRIPS. The Bali Action Plan (2007)[108] reaffirmed the centrality of clean technologies, calling for "enhanced action on technology development and transfer". The Cancun Agreements[109] have created a Technology Mechanism to facilitate technology transfer. Yet again, "delegates [at Cancun] decided to take one of the most contentious issues, intellectual property rights, off the table".[110]

Consequently, with no explicit mention of IP in the UNFCCC, it is difficult to introduce IP as an agenda in subsequent multilateral environmental negotiations, and IP rights holders have taken advantage of the permissive language in environmental treaties. Although the United Nations Development of Economic and Social Affairs (DESA) 2009 World Economic and Social Survey recommends that "the parties to the UNFCCC need to agree on the role of IP in the transfer of technology",[111] progress on this issue is

[107] UNFCCC, *supra* note 8, art. 4.5.

[108] United Nations, "Bali Action Plan 2007, Report of the Conference of the Parties on Its Thirteenth Session, Held in Bali from 3 to 15 December 2007" (March 2008), online: UN <http://unfccc.int/resource/docs/2007/cop13/eng/06a01.pdf> [*Bali Action Plan*].

[109] Decision 1/CP.16, "The Cancun Agreements: Outcome of the work of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention" (2010) [*Cancun Agreements*].

[110] Jennifer MORGAN, "Reflections on the Cancun Agreements" *World Resources Institute* (December 2010), online: World Resources Institute <https://pdf.wri.org/reflections_on_cancun_agreements.pdf>.

[111] United Nations Department of Economic and Social Affairs, "World Economic and Social Survey 2009 Promoting Development, Saving the Planet" (2009), online: UN DESA <https://www.un.org/en/development/desa/policy/wess/wess_archive/2009wess.pdf>.

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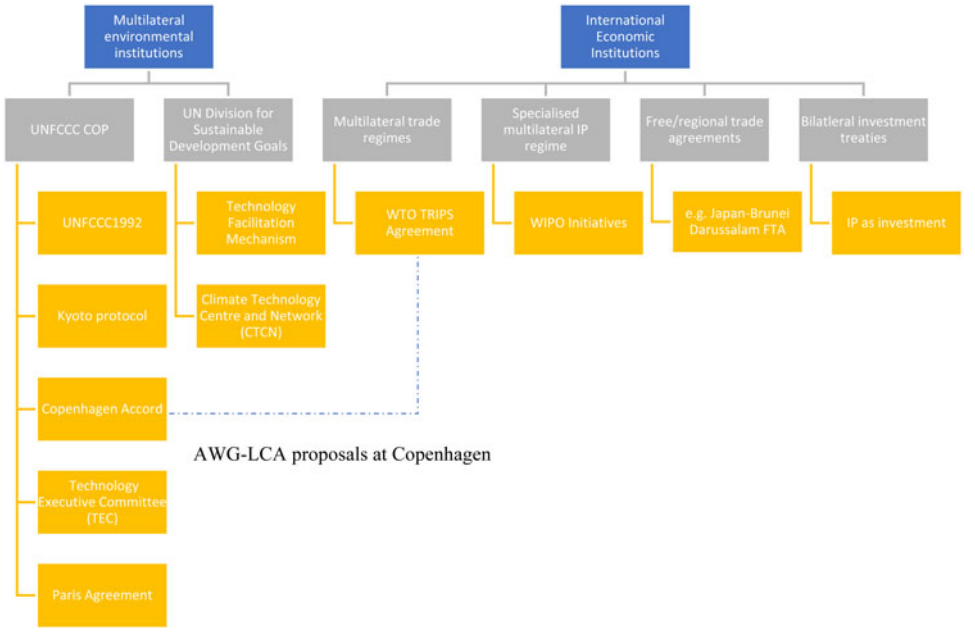

Figure 1: Fragmented International Institutions on Environmental and IP

nonexistent. In the last decade, there have been efforts to impose external restrictions on IP in multilateral environmental agreements, but all have failed. This section uses developing countries' efforts to incorporate restrictions on IP in the Copenhagen Accord in 2009 as an example to help understand the landscape of the negotiations.

1. Efforts to restrict IP in the Copenhagen negotiations

The Copenhagen Accord[112] is a typical example of the efforts of developing countries to incorporate external restrictions to IP in multilateral environmental agreements. UNFCCC COP-15, held at Copenhagen 7–18 December 2009, was the largest gathering in United Nations (UN) history, attracting 125 heads of state and government as well as nearly 40,000 participants.[113] The well-documented negotiation process provides an opportunity to see just how difficult the negotiating realities are when it comes to putting IP on an environmental agenda.

International NGOs were actively involved in submitting proposals at the Copenhagen Accord. The Third World Network (TWN) tabled a submission that elaborated various options for IP restrictions in clean technologies transfer. Identifying IP as a barrier to clean technologies transfer, these proposals to relax IP rights include specific measures at different stages of technology development. They could be implemented by various stakeholders (states, patent offices, and patent holders) at different levels.[114] Concerning patented technologies, the proposal was that contracting members would agree to exclude

[112] *Copenhagen Accord*, United Nations Climate Change Conference 2009 in Copenhagen, UN Doc. FCCC/KP/CMP/2009/L.9 [*Copenhagen Accord*].

[113] Lavanya RAJAMANI, "The Making and Unmaking of the Copenhagen Accord" (2010) 59 International and Comparative Law Quarterly 824.

[114] Third World Network, "Submission for the Update of the 'Assembly Document'", FCCC/AWGLCA/2008/16 (2008).

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environment-friendly technologies from patenting. This exclusion could be mandatory or discretionary, and the scope of exclusion could be worldwide or just in developing countries. It was also proposed that a collective global technology pool would be established to share information about these technologies. Referring to the success of the Doha Declaration, it was proposed that a similar declaration on TRIPS and access to climate-related technology be negotiated. At the national level, the commitment includes implementing exclusions to patenting as well as regulations on compulsory licensing and monitoring terms of voluntary licensing.

The Ad Hoc Working Group on Long-term Cooperative Action (AWG-LCA), established under the Bali Road Map at the United Nations Framework Convention, was responsible for preparing the text for the Copenhagen Accord. IP was proposed to be incorporated in the chapter "Enhanced action on technology development and transfer". In the early versions of the negotiation text, different options regarding IP mechanisms were proposed. Developing countries, including the Group of 77 (G77) and China, attempted to include a clear statement that IP rights constitute a barrier to technology transfer and development and called for the Executive Body to specifically "address issues related to IP rights as they arise" as one of its functions. Several proposals about restricting IP were submitted to the informal drafting group on technology by Bolivia, Bangladesh, and India. Nonetheless, these efforts were successfully opposed by developed countries by simply refusing to mention IP in any outcome concerning technology transfer.[115]

In the preparation for Copenhagen, substantive restrictions on IP were proposed as part of the negotiation text. In the Bonn preparation meeting (June 2009), Annex IV Enhanced Action on Financing, Technology, and Capacity-building incorporated three options on IP, which imposed stringent restrictions. For instance, one proposal was that "all necessary steps shall be immediately taken in all relevant fora to mandatorily exclude from patenting climate-friendly technologies held by Annex II countries which can be used to adapt to or mitigate climate change."[116] As discussed in Section II.B.2, it is difficult within IP law to entirely exclude certain technologies from patenting. Therefore, while this provision offers justification under multilateral environmental law to exclude clean technologies from patenting in all developing countries, it also mandates all necessary steps to be taken in all fora, which means the WTO, as the major IP treaty, which needs to be revised accordingly.

With the Copenhagen meeting approaching, negotiation documents were released in the form of non-papers. In the Barcelona preparation meeting, Non-paper No. 36 enumerated five options regarding IP measures.[117] Some of the options had absorbed positions in the TWN submission, such as abolishing IP for environmentally friendly technologies for developing countries (option 3) and establishing compulsory licensing for these technologies (option 4). Non-paper No. 36 was superseded by Non-paper No. 47. This non-paper was the final text for the Barcelona preparatory meeting in November 2009, in

[115] Martin KHOR, "Climate Change, Technology and IP Rights: Context and Recent Negotiations", South Centre, Research Papers 45, April 2012.

[116] Ad Hoc Working Group on Long-term Cooperative Action, "Revised negotiating text: Note by the secretariat", FCCC/AWGLCA/2009/INF.1 (2009), online: AWG-LCA, <https://unfccc.int/resource/docs/2009/awglca6/eng/inf01.pdf>, para. 188(a) (Alternative to subparagraph (a)).

[117] Ad Hoc Working Group on Long-term Cooperative Action under the Convention, "Non-paper No. 36. Resumed Seventh Session, Barcelona, 2–6 November 2009, Contact Group on Enhanced Action on the Development and Transfer of Technology Draft text" (3 November 2009), online: AWG-LCA <http://unfccc.int/files/kyoto_protocol/application/pdf/technology29091009v03.pdf>. The non-papers are not official documents, but they are really negotiating texts. See also Catherine SAEZ, "IP Rights in A Quiet Tug-of-War at UN Climate Change Negotiations" *Intellectual Property Watch* (6 November 2009), online: Intellectual Property Watch <https://www.ip-watch.org/2009/11/06/ip-rights-in-a-quiet-tug-of-war-at-un-climate-change-negotiations/>.

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which positions on the role of IP in clean technologies transfer diverged again. The agenda went back to two options: one option does not mention IP at all, while the other introduced an overarching non-contravention statement[118] and proposed some moderate restrictions to remove specific barriers for clean technologies transfer arising from IP protection.[119] These restrictions on IP were not as stringent as those proposed in Non-paper No. 36. When negotiations proceeded at the Copenhagen Conference based on Non-paper No. 47, drafts were updated almost daily. Eventually, the Copenhagen Accord adopted the first option, without mentioning IP at all in the final text.[120] The Copenhagen outcome indicates that there is no lack of proposals or solutions to tackle IP-related issues in clean technologies transfer. Instead, there is a lack of political will, in particular from developed countries, to agree to these solutions.

2. Plurilateral and bilateral level implementation

IP is frequently included in bilateral and plurilateral trade agreements to confirm or reinforce TRIPS standards, as a process of global IP "up-ratchet"[121] these rules are usually provided in IP chapters and apply to all technological fields. However, there is a recent trend that sector-specific provisions on IP are incorporated in an FTA's environmental protection or energy chapter. For instance, in the Japan-Brunei FTA,[122] IP was specifically mentioned for environmental protection related to technology transfer in the chapter on energy. Article 93.2 provides that each party shall "encourage favourable conditions for the transfer and diffusion of technologies that contribute to the protection of environment, consistent with the adequate and effective protection of IP rights". This provision imposes no external IP restrictions. Instead, it reaffirms adequate and effective IP protection for clean technologies. Such provisions may lock in countries signing such FTAs, preventing them from accepting any international agreements derogating from intellectual property in clean technologies.

More recently, the Agreement on Climate Change, Trade and Sustainability (ACCTS) initiated by Costa Rica, Fiji, Iceland, New Zealand, and Norway in 2019 could indicate a new trend in trade and environment agreements.[123] Since the purpose of the negotiation is to address interrelated elements of climate change, trade, and sustainable development agendas, the negotiators could address clean technology diffusion more systematically and effectively. As these negotiators may not oppose further restrictions on IP, it is

[118] Ad Hoc Working Group on Long-term Cooperative Action under the Convention ("AWG-LCA"), "Non-paper No. 47. Resumed Seventh Session Barcelona, 2–6 November 2009, Contact Group on Enhanced Action on the Development and Transfer of Technology Draft text" (6 November 2009), online: AWG-LCA <http://unfccc.int/files/meetings/ad_hoc_working_groups/lca/application/pdf/awglcattnp47061109.pdf>. Paragraph 10*bis* non-paper no. 47 provides "any international agreement on intellectual property shall not be interpreted or implemented in a manner that limits or prevents any Party from taking any measures to address adaptation or mitigation of climate change, in particular the development and enhancement of endogenous capacities and technologies of developing countries and transfer of, and access to, environmentally sound technologies and know-how."

[119] *Ibid.*

[120] United Nations Convention on Cliumate Change Conference of the Parties, "Report of the Conference of the Parties on its fifteenth Session, Held in Copenhagen, 7 – 19 December 2009. Decisions Adopted by the Conference of the Parties" (March 2010), online: UNFCCC COP <https://unfccc.int/resource/docs/2009/cop15/eng/11a01.pdf>.

[121] Sell, *supra* note 14.

[122] Agreement between Japan and Brunei Darussalam for an economic partnership, 18 June 2007, U.N.T.S. 2781 (entered into force 31 July 2008).

[123] Costa Rica, Fiji, Iceland, New Zealand, Norway, and Switzerland, "Agreement on Climate Change, Trade and Sustainability" (September 2019), online: New Zealand Foreign Affairs and Trade <https://www.mfat.govt.nz/en/trade/free-trade-agreements/trade-and-climate/agreement-on-climate-change-trade-and-sustainability-accts-negotiations/> [ACCTS].

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promising that some sort of concrete text on flexible arrangements for clean technologies may appear at the bilateral level. Admittedly, while trade volumes among these economies are small, the provisions on restricting IP in promoting clean technology diffusion, either in the IP chapter or in the environmental/energy chapter, would have declarative value and might start a cascade of similar practices in future FTAs. Given the negotiations started only in 2019, no negotiating drafts are yet available and the outcome is yet to be seen.

3. National level restriction: why is it not viable?

TRIPS establishes minimum standards for IP protection, and any derogation from those standards can be considered as a violation and could be subject to a WTO dispute. Patent laws in Europe emerged during the industrial revolution. Historically, states once had the sovereignty to tailor their patent law for domestic policy objectives. During the major patent controversy in the late nineteenth century, the Netherlands repealed its patent legislation from 1896 to 1912, and so did Switzerland from 1850 to 1907.[124] After TRIPS, every WTO Member is obliged to provide internationally uniform standards for IP protection, regardless of the differences in their economic development, industrial structures, and social needs.[125] However, there can still be a counterargument for states to restrict IP in their national law in order to adapt and mitigate climate change, which can be justified by the TRIPS principles.[126] In addition, the principle that "IP should not be interpreted or implemented in a way that limits the purpose of addressing adaptation and mitigation climate change"[127] is a principle that could be used to resolve the conflict between laws, just like Article 16.5 of the CBD. This means that, although such provisions and principles can be incorporated into national laws, they could still be challenged at the WTO. Even if such a dispute settlement were to happen it would still be a better scenario than not having the principle at all. It may put the underpinning conflict between IP and clean technology diffusion under the spotlight, whereby demanders of high IP protection who once intentionally ignored the issue, or negotiators who used veto power at Copenhagen, might not simply ignore them again. In reality, however, no country has promulgated such legislation. Given the repetitive failure of incorporating various restrictions on IP into multilateral environmental law one would question the operability of a treaty pathway.

In addition to the threat of a WTO dispute settlement and unilateral measures from powerful countries, the collective action problem[128] can be one of the interpretations concerning the silence when it comes to restricting IP in national laws. Derogating from IP protection at the national level is always associated with costs, including the potential outflow of existing foreign direct investment to other countries with similar investment conditions, but without IP derogation.

A monopoly in the form of patents on core clean technologies are considered to be an effective way to retain competitive advantage in the renewable energy industry.[129]

[124] Eric SCHIFF, *Industrialization without National Patents: The Netherlands, 1869–1912; Switzerland, 1850–1907* (Princeton University Press, 1971).

[125] Hanns ULLRICH, "The Political Foundations of TRIPS Revisited" in Ullrich, Hilty, Lamping and Drexl, eds., *supra* note 60.

[126] TRIPS, art. 7 and 8. However, it was found that these principles are often ignored by WTO dispute settlement panels. See Susy FRANKEL, "Some consequences of misinterpreting the TRIPS Agreement" (2009) 1 WIPO Journal 1.

[127] See AWG-LCA, *supra* note 118.

[128] Mancur OLSON, *Logic of Collective Action: Public Goods and the Theory of Groups* (Harvard University Press, 1965).

[129] Onno KUIK, Frédéric BRANGER, and Philippe QUIRION, "Competitive Advantage in the Renewable Energy Industry: Evidence from a Gravity Model" (2019) 131 Renewable Energy 472.

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Without adequate IP protection in clean technology related sectors, owners of these technologies may simply avoid entering that market, which would make any national law futile. Therefore, if countries want to implement external restrictions at the national level, they need to form a coalition of a large number of countries to introduce such rules simultaneously and concertedly. Despite the presence of the G77, it is difficult to build such a coalition because of the diversified interests of countries and the shortage of trust. Without such a coalition, the first country introducing these rules would probably face a WTO dispute for a TRIPS violation and the country may not have adequate resources and strategies to win the WTO case. The country would bear the consequences of losing the case alone while sharing the benefit of winning the case with other WTO members. No rational country would be willing to be the first. With no prevailing national practice, it is difficult for countries to justify external restrictions on IP in customary international law.

The collective action dilemma can be overcome if a single country shows leadership. An example is the Australian tobacco plain packaging case. When confronting conflicting mandates of complying with TRIPS and the WHO Framework Convention on Tobacco Control (WHO FCTC),[130] the Australian Tobacco Plain Packaging Act 2011 was enacted to conform to the WHO FCTC by limiting trademark use on tobacco products or their retail packaging. The legislation was challenged by Philip Morris and the case was heard by the High Court of Australia and, later, an investor-state dispute settlement (ISDS) tribunal. A series of disputes were also brought before the WTO dispute settlement body.[131] The Australian government won all these disputes as well as the ISDS case. Many other countries followed suit once there was a reassurance of non-violation. Similar laws were implemented in other countries, including France, Ireland, New Zealand, Norway, the UK, Canada, Georgia, Hungary, Mauritius, Mauritius, Singapore, and Thailand.[132] Another example of the success of small states in WTO compliance bargaining is the US gambling services case[133] where Antigua and Barbuda successfully challenged the US ban on the cross-border internet gambling and betting services despite their lack of resources.[134]

The tobacco plain packaging case and the gambling service cases have broader implications for clean technology diffusion and WTO compliance. On the one hand, the tobacco plain packaging case shows that even developed countries can suffer from too restrictive IP standards. Australia had the technical expertise and willingness to absorb the cost of the action. Nonetheless, the gambling services case shows although power and resources are key to international bargaining leverage, small states such as Antigua could still gain bargaining leverage when employing thoughtful strategies and following the WTO's procedures. On the other hand, despite the encouraging developments, implementing

[130] *WHO Framework Convention on Tobacco Control*, opened for signature 16 June 2003, 2302 U.N.T.S. 166 (entered into force 27 February 2005) [*WHO FCTC*].

[131] Australia – Certain Measures Concerning Trademarks, Geographical Indications and Other Plain Packaging Requirements Applicable to Tobacco Products and Packaging, DS 434 (complaint Ukraine), DS 435 (complaint Honduras), DS 441 (complaint Dominican Republic), DS 458 (complaint Cuba), DS 467 (complaint Indonesia). Australia argues that the measures do not constitute a substantial deprivation of the value, use, or enjoyment of the investment. In the WTO dispute settlement, the panels decided that the plain packaging measures of Australia do not stop the owner of registered tobacco trademarks from preventing unauthorized use of identical or similar tobacco trademarks on identical or similar products or unjustifiably encumber the use of tobacco trademarks in the course of trade, which partly supported the above non-deprivation argument. Australia won all four cases.

[132] Matthew RIMMER, "Plain Packaging of Tobacco Products: Landmark Ruling" (2018) 6 WIPO Magazine 38.

[133] United States – Measures Affecting the Cross-Border Supply of Gambling and Betting Services, DS 285 (complaint Antigua and Barbuda).

[134] Sarita JACKSON, "Small States and Compliance Bargaining in the WTO: An Analysis of the Antigua-US Gambling Services Case" (2012) 25 Cambridge Review of International Affairs 367.

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national level restrictions is not a reliable pathway to promote clean technology diffusion because it is contingent on the uncertainty of WTO dispute settlement outcomes.

The difficulty in imposing external restrictions on IP to promote clean technology diffusion can also be explained by fragmentation in global governance.[135] Fragmentation signifies the diversity, multiplicity, and distribution of regulatory powers among different institutions. Within fragmented institutions, the IP system prevails due to the prescriptiveness[136] of its rules and the well-established implementation mechanisms.

B. Strike an Internal Balance – More Than a Doha-Like Declaration

Although TRIPS makes available various flexibilities (Section II.B), few WTO members have implemented these flexibilities in their national law. This is partly because of the constructive ambiguity in flexibility provisions and their non-mandatory nature.[137] This section examines not only the limited practices of flexibility implementation, it also explores how to tackle institutional problems of bifurcation and lack of clarity to facilitate future implementation of TRIPS flexibilities.

1. The need for clarification

As TRIPS flexibilities either delineate or carve out the exclusivity of IP rights, a clear boundary of flexibilities is needed before they can be implemented. However, none of the flexibilities in TRIPS has a clear boundary. Instead, there are considerable constructive ambiguities in TRIPS flexibility provisions.[138] Ambiguity refers to the use of ambiguous language for sensitive issues to conceal or postpone conflict by allowing alternative understandings. In international trade agreements ambiguities are intentionally used to allow trade partners the capacity and flexibility to cope with certain legitimate concerns without limiting advances in trade liberalization.[139] For instance, there can be multiple interpretations on the grounds for issuing a compulsory licence, specifically what constitutes "national emergency", "extreme urgency", and "public non-commercial use",[140] and whether prior negotiation with the patent owner for a voluntary licence is required except in the case of national emergency or other extreme urgencies. Different definitions and formality requirements may have a significant impact on whether a compulsory licence can ultimately be issued.

Without clarification of what is specifically permitted as a TRIPS flexibility, their implementation risks the accusation of a TRIPS violation because the focus of these post-TRIPS efforts at implementing TRIPS flexibilities at the multilateral level is on reaffirming activities as non-violation of TRIPS. The Paragraph 6 mechanism in the Doha

[135] Frank BIERMANN, Philipp PATTBERG, Harro VAN ASSELT, and Fariborz ZELLI, "The Fragmentation of Global Governance Architectures: A Framework for Analysis" (2009) 9 Global Environmental Politics 14.

[136] Prescriptiveness measures the extent to which law and regulation use mandatory and substantive performance thresholds. See Devin JUDGE-LORD, Constance L. MCDERMOTT, and Benjamin CASHORE, "Do Private Regulations Ratchet Up? How to Distinguish Types of Regulatory Stringency and Patterns of Change" (2020) 33 Organization and Environment 96.

[137] Henning Grosse RUSE-KHAN, "Time for a Paradigm Shift? Exploring Maximum Standards in International Intellectual Property Protection" (2009) 1 Trade, Law and Development 56.

[138] Michael Byers, "Still Agreeing to Disagree: International Security and Constructive Ambiguity" (2020) 8 Journal on the Use of Force and International Law 91; Kyung Bok SON and Tae Jin LEE, "The Trends and Constructive Ambiguity in International Agreements on Intellectual Property and Pharmaceutical Affairs: Implications for Domestic Legislations in Low-and Middle-Income Countries" (2018) 13 Global Public Health 9.

[139] Peter LINDSAY, "The Ambiguity of GATT Article XXI: Subtle Success or Rampant Failure" (2002) 52 Duke Law Journal 1277.

[140] These terms are all used in Article 31 of the TRIPS without properly defined.

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Declaration exemplifies such reaffirmation efforts; it looks as though it aims to clarify conditions to issue compulsory licences for supply to a foreign market.

Article 31(f) of TRIPS requires that production under the compulsory licensing has to predominantly supply a domestic market. This requirement has been amended by Paragraph 6 of the Doha Declaration. After the amendment, the requirement is relaxed so that a country without pharmaceutical manufacturing capability can make use of compulsory licensing so that firms outside of its jurisdiction can supply it.

2. A Doha-like declaration on TRIPS and climate change?

Facing similar, if not more, ambiguities in implementing flexibilities in the area of clean technology diffusion, a Doha-like Declaration on TRIPS and climate change[141] has been proposed to clarify the boundaries in implementing TRIPS flexibilities to achieve access to clean technologies.[142] Following the example of the Doha Declaration, in particular its Paragraph 6 mechanism, there has been a concrete proposal for a Declaration on TRIPS and Environmentally Sound Technologies.[143]

Before subscribing to this proposal, we need to examine how the Paragraph 6 mechanism has been used. The requirements elaborating Paragraph 6 are so onerous that the procedure has only been used once – Rwanda's request for compulsory licensing to import TriAvir, a generic HIV/AIDS drug manufactured in Canada by Apotex, has been the sole case using the Paragraph 6 mechanism.[144] Three other attempts eventually failed.[145] This indicates that Paragraph 6 mechanism is hard to use despite the considerable efforts made in the negotiations to establish such a mechanism. As pointed out by Peter Drahos, one lesson from the Doha Declaration over access to medicines for developing counting in engaging with future negotiations is: "where a coalition of weak bargainers obtains a negotiating gain that requires high levels of rule complexity to implement, it reduces its chances of successfully realizing that gain."[146] To be effective, a Doha-like mechanism needs to be constructed so as to more appropriately meet the needs of users, not rights holders.

More than a decade has passed since a Doha-like proposal for clean technologies was first proposed. The world has changed dramatically since then. Multilateral negotiations within the WTO remain in deadlock and the WTO Appellate Body has been paralyzed. This indicates that the pathway for a Doha-like declaration would bog down in prolonged multilateral negotiations which will not suffice to achieve a speedy response to climate change. Additionally, in our case of restricting IP to promote clean technology diffusion, developing countries are in the same bargaining position as they were for medicines. If a Doha-like declaration is pursued the critical lesson from Doha is to have a concrete implementation mechanism that will achieve the diffusion goals. Nonetheless, it is warned that

[141] This paper refers relevant proposals as "Doha-like declaration on TRIPS and climate change" to avoid confusion about different terminologies used for clean technology and the scope of such technologies.

[142] Frederick M. ABBOTT, "Innovation and Technology Transfer to Address Climate Change: Lessons from the Global Debate on IP and Public Health" *International Centre for Trade and Sustainable Development* (June 2009), online: ICTSD <https://www.files.ethz.ch/isn/104368/2009_06_innovation_and_technology_transfer.pdf>; Carlos M. CORREA, "Intellectual Property Rights under the UNFCCC: without Response to Developing Countries's Concerns" in Joshua SARNOFF ed., *Research Handbook on Intellectual Property and Climate Change* (Edward Elgar, 2016) 74.

[143] UNFCCC, "Notes on sources for FCCC/AWGLCA/2009/INF.1, Parts I and II" at 184.

[144] Christina COTTERT, "The Implications of Rwanda's Paragraph 6 Agreement with Canada for Other Developing Countries" (2008) 5 Loyola University Chicago International Law Review 177.

[145] Tolulope Anthony ADEKOLA, "Has the Doha Paragraph 6 System Reached Its Limits?" (2020) 15 Journal of Intellectual Property Law and Practice 525.

[146] Drahos, *supra* note 19 at 11–12.

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such a declaration will also suffer from the categorization problem in treaty negotiations.[147]

3. Mandating TRIPS flexibilities

Another way to enhance the enforceability of TRIPS flexibilities is by changing them from permissions into mandates. TRIPS only allows the levels of protection to be exceeded, but not derogated. Such bifurcation has long-lasting impacts in the post-TRIPS era – WTO Members are only encouraged to expand IP protection beyond "minimum standards". As a response, some scholars recommend setting maximum standards for TRIPS.[148] One aspect of setting ceilings is mandating TRIPS flexibilities. This can be justified by the fact that the lack of mandates undermines the legitimacy of the implementing flexibilities.[149] The lack of mandated flexibilities also leads to deviation from the principle on the balance of rights contained in Article 7 of TRIPS. A recent example for mandating TRIPS flexibility is the Marrakesh Treaty, which requires the contracting parties to implement copyright limitations and exceptions for persons who are blind, visually impaired, or otherwise print disabled.[150] As the only multilateral IP treaty that sets a ceiling for global IP protection, the Marrakesh Treaty's approach of mandating limitations and exceptions is a useful potential pathway for promoting clean technology diffusion.

While mandating TRIPS flexibilities at the multilateral level can be difficult, developing countries could endeavour to mandate TRIPS flexibilities in bilateral treaties. Unlike GATT, TRIPS does not include any exceptions to its MFN.[151] Consequently, when developing countries agree to more extensive IP protection in FTAs, they have to amend their domestic IP legislation to implement these FTA obligations. Even in common law countries IP is provided for in statutes, so amending domestic legislation is the only way to guarantee that the advantage or benefit, as a result of the change in IP law, is available to other WTO Members. This strategy of exerting pressure through a combination of FTA TRIPS-plus standards and non-exception to MFN has long been used by developed countries to exert pressure on the national law of their FTA partners (developing countries), which further consolidates TRIPs-plus standards.[152]

As South-South FTAs and trade and sustainable development agreements are emerging, mandating flexibilities into FTA IP chapters would be an alternative use of the strategy to clarify and defend flexibilities at the bilateral level. However, in this scenario, flexibilities are benefits not to the IP owners, but to the general public. If implemented, this would lead to the creation or amendment of domestic legislation that specifies these TRIPS flexibilities, and the non-exception to MFN in TRIPS would guarantee national level flexibilities to all WTO members. This would help to develop a jurisprudence of customary international law that would further defend possible allegations of TRIPS violation.

[147] See Section IV.B.1.

[148] Henning Grosse RUSE-KHAN and Annette KUR, "Enough is Enough – The Notion of Binding Ceilings" in Annette KUR, ed., *Intellectual Property Rights in a Fair World Trade System – Proposals for Reform of TRIPS* (Edward Elgar, 2011) 359.

[149] Rochelle C. DREYFUSS, "TRIPS-Round II: Should Users Strike Back?" (2004) 71 The University of Chicago Law Review 21.

[150] *Marrakesh Treaty to Facilitate Access to Published Works for Persons Who Are Blind, Visually Impaired, or Otherwise Print Disabled*, 27 June 2013 ATNIF 15 (entered into force 30 September 2016).

[151] Article 4 of TRIPS provides that with regard to the protection of IP, any advantage, favour, privilege or immunity granted by a member to the nationals of any other country shall be accorded immediately and unconditionally to the nationals of all other members.

[152] TRIPs-Plus refers to "provisions that either exceed the requirements of TRIPS or *eliminate flexibilities* in implementing TRIPs", see Susan K. SELL, "TRIPS-Plus Free Trade Agreements and Access to Medicines" (2007) 28 Liverpool Law Review 41.

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4. National level implementation: reaffirming sovereign interpretation for TRIPS

At the national level, striking internal balances may also face the challenge of collective action. It resembles the problem of resorting to collective action as an instrument to impose external restrictions. However, as flexibilities do not face the problem of competing mandates in international law, the fundamental issue and the first step is about TRIPS interpretation. In a situation of constructive ambiguity, this is not only about how to interpret the ambiguous terms of TRIPS flexibility, but also a clear statement of who has the power to interpret. The Patent Protection Declaration, initiated by the Max Planck Institute for Innovation and Competition, has made efforts to clarify certain terms in the TRIPS concerning patents. The Patent Protection Declaration approaches flexibilities from the perspective of the regulatory sovereignty of states – states retain any regulatory power as long as it is not derogated from by international treaties. Rather than clarifying how a specific provision in TRIPS can be interpreted, this approach affirms who can interpret TRIPS – it proposes that when encountering ambiguity, states retain the power to interpret TRIPS flexibilities in their national law.[153] Therefore, interpreting TRIPS flexibilities is within the remit of national law and does not require consent from others.

Incorporating TRIPS flexibilities into national law requires a state to have access to expertise with sufficient understanding of TRIPS, in particular the underlying debates and possible interpretations of relevant provisions, to design a more acceptable implementation mechanism in terms of TRIPS compliance. It also requires sufficient legal, financial, and media support to respond to questions about WTO compliance. However, as compared to the challenges of a multilateral consensus for a Doha-like declaration or mandating TRIPS flexibilities, the national level implementation of TRIPS flexibilities in clean technologies is something that a WTO member can do now.

C. Is Keeping The Status Quo Possible?

As the development of global IP protection standards follows a path of ratcheting up, one can argue that there is no prospect of "keeping the status quo". TRIPS-plus provisions in bilateral FTAs have continuously reinforced overall IP protection. These types of more extensive IP protection will apply to clean technologies if they are patent protected. Without an exception to the MFN, the benefit or privilege of enhanced protection for IP in an FTA needs to be immediately and unconditionally available to other WTO members. The only way to fulfil such treaty obligations is to amend domestic IP laws to incorporate higher protection standards. This generates further practices to support TRIPS-plus standards.

Despite this structural impediment, the reinforcement of IP protection is not equally distributed across different IP types. Within the patent system, recent negotiations for TRIPS-plus standards, including patent term compensation and patent linkage, have been applied solely to the pharmaceutical industry. For other technologies (including clean technologies), this means that as long as patent rights holders do not lobby their government to expand the scope of such patent standards, it is possible to keep a status quo of patent protection for these technologies. So far, there has been no sector-specific IP expansion in multilateral and bilateral agreements for clean technologies. While the possibility of keeping the status quo is reassuring, it only means that things will not be

[153] Dan L. BURK, Matthias LAMPING, Reto HILTY, Carlos M. CORREA, N. S. GOPALAKRISHNAN, Henning Grosse RUSE-KHAN, Annette KURR, Geertrui VAN OVERWALLE, Jerome H. REICHMAN, and Hans ULLRICH, "Declaration on Patent Protection: Regulatory Sovereignty Under TRIPS" (2014) 45 IIC-International Review of Intellectual Property and Competition Law 679.

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detrimental to clean technology diffusion, but it will not help improve clean technology diffusion.

IV. Discussion

A. An Operable Pathway for IP in Clean Technology Diffusion

Imposing external restrictions and striking internal balances are both active limitations on IP to promote clean technology diffusion. The only difference is whether such restrictions take place within the IP system. International negotiations take place at different fora partly because overlapping and non-hierarchal international regimes provide opportunities for cross-institutional strategies[154] as the issue of clean technology diffusion lies exactly at the intersection of international regimes for IP and the environment.

While developing countries took advantage of the proliferation of actors and mechanisms in global governance and attempted to use forum shifting to direct IP negotiations to a multilateral environmental agreement, as they did in Copenhagen, these efforts failed. At the bilateral level, the Japan-Brunei FTA indicates an opposite trend of reaffirming IP in the environmental protection chapter. Such a statement of absolute IP protection may lock in countries signing these FTAs as the requirement of "adequate and effective IP protection" is likely to prevent them from incorporating external restrictions in the future.

One big lesson from the failure to incorporate IP limitations into the Copenhagen Accord is the position of powerful developed countries – they do not allow any derogation to IP to be written into any international treaties. The CBD provision that IP should not contravene other social values may not be repeated in other issue areas, including clean technology diffusion. Negotiating Doha-like declarations within the TRIPS framework is also not currently possible when the WTO system is paralyzed. Even without the current WTO crisis, text-based multilateral negotiations may still have difficulty being prioritized as an agenda for WTO negotiations. When it indeed becomes an agenda, negotiations may be drawn out. Given the fast evolving TRIPS-plus IP provisions in bilateral and plurilateral trade agreements, emphasizing a Doha-like declaration may also divert attention from safeguarding regulatory sovereignty in these ongoing trade negotiations. It is likely that such treaty pathways, either importing external restrictions or striking internal balances, may not work in the future.

Consequently, national level action seems to be the only operable pathway to promote clean technology diffusion. Admittedly, this is not an unobstructed path. External restrictions on IP to promote clean technology diffusion using environmental protection law may be susceptible to TRIPS violation charges. Due to the collective action problem, no country would be willing to bear the cost of losing a WTO case alone while sharing the benefits of winning with others. There is also a lack of trust for countries to take actions simultaneously and concertedly. Therefore, the starting point is to maximize TRIPS flexibilities in national IP laws. Contemporaneously, capacity building will be needed through networks of technocrats and civil society between this first mover and other countries to seek opportunities for collective action.

To make this happen, WTO Members need to uphold their sovereign regulatory power in TRIPS interpretation. Patent offices, as an important node for patent regulation,[155] should also recalibrate their roles in promoting clean technology diffusion. In the last decade many patent offices have implemented measures on fast-tracking green patent

[154] Laura GOMEZ-MERA, "International Regime Complexity and Regional Governance: Evidence from the Americas" (2015) 21 Global Governance 19.

[155] Drahos, *supra* note 98.

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applications.[156] However, these expedited patent examination measures mainly help to produce more monopoly surrounding clean technologies, which makes diffusion harder not easier. However, as TRIPS has no provision on how a patent office can be run, patent offices can actively incorporate the flexibilities discussed in this paper into their daily practice. With the existing green patent classification, patent offices can also contribute to solving to categorization problem.[157]

B. Implications of COVID-19 to International Clean Technologies Dissemination

This article is being written while the world is still suffering from the COVID-19 global pandemic. This evolving non-traditional threat and its aftermath may have fundamental impacts on decision-making by relevant stakeholders concerning international clean technology diffusion in the years to come. As the impacts are still unfolding, this article will only discuss two issues closely related to international clean technologies dissemination: (1) the implication of access to medicines to access to clean technologies and (2) the desire for self-sufficiency and localizing supply chains.

1. Access to "clean technologies", but what are they?

Access to medicines has long been a point of reference and inspiration for similar debates or mechanisms for clean technologies. During the COVID-19 pandemic, there have been large-scale debates and practices about TRIPS flexibilities in terms of access to new vaccines and other medicines to treat COVID-19. Is it possible to refer to similar practices in access to clean technologies? One major challenge is the definition of clean technologies. While COVID-19 related medicines can be properly defined, clean technologies may never be clearly defined.

This article did not define clean technologies at the beginning. Instead of asking what clean technologies are, the discussion focused on rule making and rule reforming; in particular, who should own and use such technologies. However, what constitutes clean technologies, environmentally friendly technology, or environmentally sound technology[158] are of central importance in implementing regulations. What constitutes clean technologies would become a controversial issue should any negotiations take place.

The scope of clean technologies sets the boundary of subject matter where IP protection needs to be limited. Defining clean technologies is essentially a regulatory categorization which refers to a process where the terms and conditions under which a product is made and distributed are specified under the law.[159] At the national level, regulatory categorization is a multiplayer contest essentially between a state and firms. Firms likely seek to influence the categorization process by signalling affiliation with favourable product categories or creating new categories.[160] At the international level, categorization *per se* would be a central issue in negotiations. The categorization of green goods is not new in international trade negotiations. Relevant negotiations took place at the WTO, but did not reach a definition of green goods even after ten years of negotiation. As pointed out by Cosbey, the political exercise of negotiating a list of green goods serves

[156] Antoine DECHEZLEPRÊTRE and Eric LANE, "Fast-tracking Green Patent Applications" (2013) 3 WIPO Magazine 5; Bingbin LU, "Expedited Patent Examination for Green Inventions: Developing Countries' Policy Choices" (2013) 61 Energy Policy 1529.

[157] See Section Section IV.B.1.

[158] These terms are considered as interchangeable in this article. See footnote 6 for relevant definitions in the literature.

[159] Pinar OZCAN and Kerem GURSES, "Playing Cat and Mouse: Contests over Regulatory Categorization of Dietary Supplements in the United States" (2018) 61 Academy of Management Journal 1789.

[160] *Ibid.*

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particular interests, to accept another's list out of reciprocity may serve the environment poorly. This would ultimately tarnish any green credibility they might gain from signing an agreement.[161]

Although categorizing clean technologies may be technically more difficult than categorizing green goods, the WTO green goods negotiation may shed light on how difficult such negotiations can be. Most green goods already have numeric or alphanumeric code based product classifications (for example, the Harmonised Commodity Description and Coding System). Clean technology categorization not only includes the classification of end products. In addition, process patents[162] may also influence the categorization by including inventions in technological processes for green purposes. This may blur its own boundary as one technological process can be used for dual or multiple purposes – both clean and non-clean. For instance, distributed ledger technology (blockchains) can be used for establishing smart energy grid systems[163] to record electricity generated from renewable energy resources for purposes including calculating carbon emissions, just as they can be used for non-environmental purposes. This illustrates how most of the current and potential clean technologies can be categorized as both clean and non-clean, depending on the purpose served. Should negotiations on the list of clean technology to be transferred under preferable IP protection terms take place, donors may argue for excluding all dual purpose technologies from the list on the ground that these technologies can be further used for non-clean purposes for which donors may not have control at all. They may further propose that clean technologies be narrowly defined. If that happens, the negotiation on the scope of clean technologies may take a long time, and a narrowly defined clean technologies list may undermine concessions gained by limitations on IP rights. This mirrors the Paragraph 6 specification under the Doha Declaration.[164] This is another reason to pursue domestic rulemaking in TRIPS flexibilities instead of undertaking a treaty pathway.

Whether a specific technology is classified as clean technology also depends on the selection criteria and associated assumptions. For instance, mitigation solutions by technologies such as bioenergy production with carbon capture and storage ("BECCS") can be controversial given the relative opacity of the underlying assumptions concerning both the technical and political, real-world feasibility of a massive BECCS roll-out.[165] An irresponsible assessment criterion may lead to the diffusion of speculative technologies with unknown risks. A restriction on IP in this case can be a distraction from the climate transition rather than a solution.

2. Post-COVID implication: self-sufficiency and IP waiver

Since the COVID-19 global pandemic, various countries have responded by emphasizing self-sufficiency. This is due to supply shortages for many strategic resources required to respond to COVID-19. Some shortages have been caused by border closures, temporary

[161] Aaron COSBEY, "The Green Goods Agreement: Neither Green nor Good?" *International Institute for Sustainable Development* (February 2014), online: IISD <https://www.iisd.org/system/files/publications/commentary_green_goods.pdf>.

[162] Article 27.1 of TRIPS provides that patents shall be available for any inventions as products or processes, provided they satisfy the patentability requirements. Article 28.1 (b) specifies the rights conferred to process patents, including using, offering for sale, selling, or importing for these purposes at least the product obtained directly by that process.

[163] Merlinda ANDONI, Valentin ROBU, David FLYNN, Simone ABRAM, Dale GEACH, David JENKINS, Peter MCCALLUM, and Andrew PEACOCK, "Blockchain Technology in the Energy Sector: A Systematic Review of Challenges and Opportunities" (2019) 100 Renewable and Sustainable Energy Reviews 143.

[164] Drahos, *supra* note 19.

[165] Silke BECK and Martin MAHONY, "The IPCC and the new map of science and politics" (2018) 9 Wiley Interdisciplinary Reviews: Climate Change e547.

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lockdowns of manufacturing sites, and export controls in other countries.[166] Although these export controls are sector specific, temporary, and only one of the reasons causing the shortage, they show the vulnerability of global value chains. As part of post-COVID response plans, many governments have started to urge domestic companies to rethink their international outsourcing practices, calling for "national" value chains.[167] The ramifications of the disruption of global supply chains extend beyond the medical sector. For many developed countries, this disruption is not the start but the catalyst of the existing trend of back flowing manufacturing production. The global value chains have long been major channels for technology and knowledge diffusion. The trend of localizing supply chains may restrict foreign investment and leave few opportunities for developing economies to obtain global value chain associate diffusion of knowledge.

To ensure fast, equitable, and affordable access to COVID-19 vaccines, in October 2020, India and South Africa presented a proposal at the WTO for a waiver of IP rights for vaccines, medicines, and other COVID-19 related technologies, such as diagnostic kits, medical masks, ventilators, and other personal protective equipment.[168] Specifically, they proposed that the TRIPS Council should recommend, as early as possible, to the General Council of the WTO a waiver from the implementation, application, and enforcement of major parts of TRIPS concerning prevention, containment, or treatment of COVID-19.[169] The IP waiver was initially only supported by developing countries,[170] but US USTR Ambassador Katherine Tai issued a statement announcing the US government support for the IP waiver in May 2021.[171] The EU, however, submitted a counter proposal to clarify flexibility included in the TRIPS, in particular through compulsory licensing.[172] Following the framework of this article, this debate of IP waiver versus the flexibility debate at the WTO is another case of contestation between imposing external restrictions and striking internal balance.

While scrutiny of the ongoing negotiations concerning IP waivers in respect of COVID-19 related technologies is beyond the scope of this article, there are profound implications for clean technology diffusion. This pandemic indeed stimulates a systematic course correction. The support for the IP waiver is considered a "complete reversal of policy" of the US after decades of strong IP protection position worldwide.[173] The discussions

[166] Dave ELDER, "The Availability of Critical Medicines during Pandemics" (2020) 25 European Pharmaceutical Review 5.

[167] Adnan SERIC, Holger GÖRG, Saskia MÖSLE, and Michael Windisch, "Managing COVID-19: How the Pandemic Disrupts Global Value Chains" *KIEL Institute for the World Economy* (April 2020), online: IFW-KIEL <https://iap.unido.org/articles/how-pandemic-disrupts-global-value-chains>.

[168] Waiver from Certain Provisions of the TRIPS Agreement for the Prevention, Containment and Treatment of Covid-19: Communication from India and South Africa, IP/C/W/669 (2 October 2020), para. 12.

[169] These include Section 1 on copyright and related rights, Section 4 on industrial designs, Section 5 on patents and Section 7 on the protection of undisclosed information.

[170] Co-sponsors include Kenya, Eswatini, Mozambique, Pakistan, Bolivia, Venezuela, Mongolia, Zimbabwe, Egypt, the African Group, the Least Developed Countries Group, the Maldives, Fiji, Namibia, Vanuatu, Indonesia, and Jordan.

[171] Office of the United States Trade Representative, "Statement from Ambassador Katherine Tai on the Covid-19 Trips Waiver" (5 May 2021), online: USTR <https://ustr.gov/about-us/policy-offices/press-office/press-releases/2021/may/statement-ambassador-katherine-tai-covid-19-trips-waiver>. It is worth noticing that the US has not yet co-sponsored the IP/C/W/669 proposal, and its position is to support text-based negotiations only for technologies of vaccines.

[172] Draft General Council Declaration on the TRIPS Agreement and Public Health in the Circumstances of a Pandemic: Communication from the European Union to the Council for TRIPS, IP/C/W/681 (18 June 2021).

[173] Alden ABBOTT, Adam MOSSOFF, Kristen OSENGA, and Zvi ROSEN, "COVID Vaccine IP Waiver: A Pathway to Fewer, Not More, Vaccines" *Regulatory Transparency Project* (28 October 2021), online: RTP <https://regproject.org/paper/covid-vaccine-ip-waiver-a-pathway-to-fewer-not-more-vaccines/>.

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and debates on the IP waiver concerning COVID-19 technologies are no longer confined within the epistemic community of IP law who dismiss it as bad policy and bad precedent.[174] Human rights scholars have highlighted the consequences of global inequity in access to COVID-19 vaccines.[175] Public health professionals have followed this issue closely[176] and argued that the inequity of vaccine access reveals a fundamentally flawed view of global health, and our global economy more broadly.[177] With a campaign for people's vaccines,[178] the involvement of multiple stakeholders in the open discussion of IP waiver has put the legitimacy of IP under the scrutiny of the pronounced objective of saving lives, equitable access, and broadly defined social welfare. Considering transitional justice in climate change has also attracted broad discussion beyond the IP community, any breakthrough in the IP waiver concerning COVID-19 technologies could set a precedent for similar arrangement in the diffusion of clean technologies.

V. Conclusion

This article has examined three pathways for promoting international clean technology diffusion, namely: imposing external restrictions on IP in environmental law; striking internal balancing in using TRIPS flexibilities; and keeping the status quo. These pathways are discussed in theory and practice, as well as at multilateral, bilateral, and national levels. Empirical evidence in this article suggests that treaty pathways, either at the multilateral or bilateral level, may not work. This is due to the power asymmetry in negotiations demonstrated in the Copenhagen case, the current WTO crisis, the inherent constructive ambiguity within TRIPS, and probably a prolonged negotiation process. Following this argument, the popular proposal of a "Doha-like" declaration on TRIPS and climate change may not be desirable. Therefore, emphasis should be put on the national level interpretation and implementation of TRIPS flexibilities.

While it is true that a national approach to a transnational problem is far from optimal, it remains the best approach for the time being. This national approach of implementing TRIPS flexibilities will at least be in "harmony" with existing international norms. Patent offices can play an active and important way in implementing these flexibilities. At the centre of any treaty negotiation in relation to clean technology diffusion is defining boundaries for "clean technologies". This issue is discussed from the perspective of regulatory categorization. This is not just a matter of providing a generally accepted abstract definition of clean technology. These issues of dual use technologies and setting assessment criteria for categorisation of clean technologies, compounded with power asymmetry, may either prolong the treaty negotiation or undermine its outcome. The conclusion of focusing on national level interpretation and implementation of TRIPS flexibilities to support clean technology diffusion recognises a range of broader issues that affect the significance and scope for solutions to IP impediments to contribute constructively to climate emergency. In the context of green new deals in the EU and other parts of

[174] See e.g., Bryan MERCURIO, "The IP Waiver for COVID-19: Bad Policy, Bad Precedent" (2021) 52 IIC International Review of Intellectual Property and Competition Law 983.

[175] Aruna KASHYAP, Kyle KNIGHT, and Margaret WURTH, "COVID-19 Exposes Warped Global Health Power: The System Needs a Course Correction" (2021) 31 Business and Human Rights Journal 1.

[176] John ZAROCOSTAS, "What next for a COVID-19 Intellectual Property Waiver?" (2021) 397 Lancet 1871.

[177] Ingrid T. KATZ, Rebecca WEINTRAUB, Linda-Gail BEKKER, and Allan M. BRANDT, "From Vaccine Nationalism to Vaccine Equity – Finding a Path Forward" (2021) 384 New England Journal of Medicine 1281. Salla SARIOLA, "Intellectual Property Rights Need to Be Subverted to Ensure Global Vaccine Access" (2021) 6 BMJ Global Health e005656.

[178] Gregg GONSALVES and Gavin YAMEY, "The Covid-19 Vaccine Patent Waiver: A Crucial Step towards a 'People's Vaccine'" (2021) 373 The BMJ 1249.

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the world, the focus has been on green industrial policies – policies that can both promote economic advantage and contribute to climate mitigation and adaptation. Enabling development and breakthroughs in clean technologies has been at the forefront of green new deals in many countries. How the tension between IP protection and clean technology diffusion will unfold in these green new deals at both national and international remains to be seen.

There are some implications of the COVID-19 global pandemic for the future of international clean technology diffusion. Similar to the virus, global warming and extreme weather do not respect borders, and a self-sufficient solution will not help address climate change as a global challenge. Countries should be aware of the impact of the self-sufficiency trend and actively seek alternative solutions, such as making constructive efforts on risk management to build the resilience of the global value chains in the post-COVID era. On the other hand, the current debates at the WTO concerning IP waivers for COVID-19 related technologies will set a precedent for a similar arrangement to facilitate clean technology diffusion. In essence, this requires revaluating the legitimacy of IP in the broader picture of transitional justice because clean technologies are critical to address climate change and enable humankind to survive in generations to come. It also urges a rethinking of the North-South winner-loser framing of clean technology diffusion. The consensus in technology diffusion will be easier to reach if developed countries recognize the "all losers" outcome in the case of ecological collapse.

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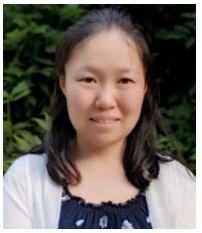

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