BRAKE OR ENGINE? INTELLECTUAL PROPERTY AND THE CLIMATE TRANSITION

Sudhishna Sharma, National University of Study and Research in Law, Ranchi

Introduction

Few disputes in modern patent law are as divided as the one about climate technology. One side sees patents as obstacles to achieving net zero emissions; the other sees them as essential to clean innovation. This piece argues that both views are overstated. Patents are rarely the main obstacle to spreading existing climate-friendly technologies, yet current patent systems are poorly designed to deliver the diffusion that the transition requires.

What is needed is neither a complete overhaul nor simple retention of the status quo, but a calibrated adjustment: a differentiated use of existing TRIPS flexibilities, supported by capacity-building and disclosure duties.

The Normative Promise and the Missing Mechanism

International law has long promised technology transfer. In the Paris Agreement, the parties undertook to strengthen cooperative action on technology development and transfer as part of their climate efforts.[1] The 2030 Agenda links climate action (Goal 13) with innovation (Goal 9) and partnerships (Goal 17), the last of which includes a target on promoting environmentally sound technologies to developing countries on favourable terms.[2]

This promise sits alongside an intellectual property (IP) system that works the other way. The 1994 TRIPS Agreement sets minimum standards and terms of patent protection for inventions in all fields of technology, clean technologies included. It also contains provisions that point towards diffusion: its objectives and principles refer to the transfer and dissemination of technology, and developed countries must provide incentives for technology transfer to least

[1]Paris Agreement (adopted 12 December 2015, entered into force 4 November 2016) (2016) 55 ILM 740, art 10(1)–(2).
[2]UNGA Res 70/1 'Transforming Our World: The 2030 Agenda for Sustainable Development' (25 September 2015) UN Doc A/RES/70/1, Goals 9, 13 and 17 (target 17.7).

developed countries (LDCs).[3] The difficulty is that these provisions are loosely specified and weakly enforced, while exclusive rights are precise and enforceable. A commitment without a mechanism tends to lose to a right with one.

Testing the 'Barrier' Thesis

The intuition that patents inhibit the spread of climate technology is strong, but the empirical evidence is more mixed. Barton's early study of solar photovoltaic, biofuel and wind technologies concluded that patents were not then a major obstacle in developing countries, because competition among patent holders and the availability of alternatives limited their market power.[4]

The evidence on what does drive diffusion has a twist. Dechezleprêtre, Glachant and Ménière, using patent data from 96 countries for 1995–2007, find that lax IP regimes are associated with weaker international diffusion of patented knowledge, as are restrictions on trade and foreign direct investment. They also find, counterintuitively, that local technological capabilities tend to reduce transfers, which they attribute to local inventions substituting for foreign ones.[5] On its face, that study tells against the barrier thesis. But it measures transfer through patent filings, so it says little about price, know-how or whether a technology is actually deployed.

The geography of patenting also matters. Patents are territorial: an invention that has not been patented in a country is generally not legally restricted there. Dechezleprêtre and others find that climate-mitigation inventions are concentrated in three countries (Japan, Germany and the United States, together about 60 per cent), and that international transfers occur mostly between developed countries (73 per cent of exported inventions), with transfers from developed to emerging economies still limited (22 per cent).[6] It is therefore likely that many clean-technology inventions are not patented at all in much of the Global South, where patents may

[3]Agreement on Trade-Related Aspects of Intellectual Property Rights (adopted 15 April 1994, entered into force 1 January 1995) 1869 UNTS 299 (TRIPS), arts 7, 8, 27(1), 33 and 66(2).
[4]John H Barton, *Intellectual Property and Access to Clean Energy Technologies in Developing Countries: An Analysis of Solar Photovoltaic, Biofuel and Wind Technologies* (ICTSD Trade and Sustainable Energy Series Issue Paper No 2, December 2007).
[5]Antoine Dechezleprêtre, Matthieu Glachant and Yann Ménière, 'What Drives the International Transfer of Climate Change Mitigation Technologies? Empirical Evidence from Patent Data' (2013) 54 Environmental and Resource Economics 161.
[6]Antoine Dechezleprêtre and others, 'Invention and Transfer of Climate Change – Mitigation Technologies: A Global Analysis' (2011) 5 Review of Environmental Economics and Policy 109.

not be the binding constraint.

If patents were the only barrier, the problem would be easier to solve. The evidence suggests something harder.

Where Does IP Bite?

The barrier critique nonetheless contains a genuine insight: IP matters most in places that the debate tends to overlook.

First, deploying climate technology depends heavily on tacit knowledge, proprietary information, production expertise and supply-chain integration, none of which a patent disclosure conveys. Ockwell and others have argued that the current accounts of IP and diffusion focus too much on hardware and rights, instead of understanding the capabilities, improvement and adaptation of technology.[7]

Second, the influence of patents varies significantly with technology maturity. The IEA and the EPO report that cost-cutting enabling technologies (batteries, hydrogen. Smart grids and carbon capture) have shown the strongest growth in patenting since 2017, while energy supply technologies accounted for only 17 percent of low carbon inventions in 2019.[8] Patent counts alone do not show who controls a given technology, however.

Third, adaptation technologies such as drought resistant crops pose a different problem. They are needed mainly in low income countries, offer weak commercial returns, and raise questions about plant genetic resources and farmers' rights, that sit uneasily with their patentable status.[9]

Therefore, IP is not a universal barrier but a context - dependent friction. That friction is most damaging where need is greatest and purchasing power is lowest.

The Limits of Voluntarism

The main institutional response has been voluntary. The Eco-Patent Commons pooled

[7]David Ockwell and others, 'Intellectual Property Rights and Low Carbon Technology Transfer: Conflicting Discourses of Diffusion and Development' (2010) 20 Global Environmental Change 729.
[8]International Energy Agency and European Patent Office, *Patents and the Energy Transition: Global Trends in Clean Energy Technology Innovation* (2021).
[9]International Treaty on Plant Genetic Resources for Food and Agriculture (adopted 3 November 2001, entered into force 29 June 2004) 2400 UNTS 303, art 9.

environmentally beneficial patents, but Hall and Helmers found that the pledged patents were of lower value than other patents in their technology classes, and that royalty-free access produced no significant increase in diffusion, as measured by citing patents.[10] Tesla's 2014 pledge not to sue those who use its electric-vehicle patents in good faith attracted wide attention. Yet the pledge is a standstill rather than a licence, covers only activity relating to electric vehicles, is conditional on a 'good faith' standard that Tesla itself defines, and leaves know-how untouched.[11] WIPO GREEN works as a matchmaking platform for technology seekers and providers.[12] It is a useful facilitator but cannot require anyone to license on particular terms.

Voluntary tools share a structural weakness: they work best where the holder already has a reason to share. They therefore tend to under-deliver for the technologies where holders have the strongest reason to withhold.

The Underused Flexibilities

Mandatory mechanisms already exist in the law. Three TRIPS provisions are often run together in this debate, but they do different work and carry different conditions.

Article 27(2): exclusion from patentability. Members may exclude inventions from patentability where preventing their commercial exploitation within the territory is necessary to protect *ordre public* or morality, including to avoid serious prejudice to the environment. The exclusion cannot be made merely because domestic law prohibits the exploitation.[13] This is a screen against harmful technologies. It offers no route to technologies a country wants to use, and so does little for diffusion.

Article 31: compulsory licensing and government use. Article 31 does not list permissible grounds. The Doha Declaration confirmed that each member is free to determine them, although it was adopted in the context of public health.[14] The conditions are demanding.

[10]Bronwyn H Hall and Christian Helmers, 'Innovation and Diffusion of Clean/Green Technology: Can Patent Commons Help?' (2013) 66 Journal of Environmental Economics and Management 33.
[11]Elon Musk, 'All Our Patent Are Belong To You' (Tesla, 12 June 2014); Tesla, 'Patent Pledge' <https://www.tesla.com/legal/additional-resources#patent-pledge> accessed 15 October 2026.
[12]WIPO, 'WIPO GREEN' <https://www3.wipo.int/wipogreen/en/> accessed 3 October 2026.
[13]TRIPS (n 3) art 27(2).
[14]Declaration on the TRIPS Agreement and Public Health (adopted 14 November 2001) WT/MIN(01)/DEC/2, para 5(b)–(c).

Authorisation is considered case by case. The licence must be non-exclusive, non-assignable, supply predominantly the domestic market, carry adequate remuneration, and be open to judicial review. The domestic-market limit is a particular problem for small economies that cannot support local production, because the export mechanism in Article 31*bis* applies only to pharmaceutical products. Whether a climate emergency could invoke the waiver of prior negotiation is untested. And a compulsory licence reaches the patent, not the undisclosed know-how a licensee needs.[15] National laws apply these rules in their own ways: India's Patents Act 1970, for example, provides for compulsory licensing where a patented invention is not available to the public at a reasonably affordable price.[16]

Article 66(2): technology transfer to LDCs. Developed countries must provide incentives to enterprises and institutions in their territories to promote technology transfer to LDCs. The provision is narrower than it is sometimes presented: it benefits LDCs only, requires incentives rather than transfers, and sets no performance standard. A 2003 decision of the Council for TRIPS requires developed members to report annually on the incentives they provide, which makes the provision monitorable but not enforceable. Separately, LDCs benefit from a transition period under Article 66(1), now extended to 1 July 2034.[17]

In practice, reported use of these flexibilities for climate technologies remains, negligible, in contrast with medicines. Climate technologies are seldom treated as emergencies. Governments worry about trade retaliation and the loss of foreign investment. And the procedural conditions, particularly prior negotiation on reasonable commercial terms, are hard to satisfy at scale.

The 2022 WTO Ministerial Decision on the TRIPS Agreement shows what political will can achieve, but its scope should not be overstated. It clarified how eligible members may authorise the use of patents required for vaccine production and supply without the right holder's consent, and it waived the domestic-market limit in Article 31(f) so that vaccines could be exported to other eligible members. It was confined to patents, to eligible developing-country members, and to a period of five years, and any extension to diagnostics and therapeutics was left to a

[15]TRIPS (n 3) arts 31(a), (b), (d)–(f), (h)–(k) and 31bis; Paris Convention for the Protection of Industrial Property (adopted 20 March 1883, as revised) 828 UNTS 305, art 5A(4).
[16]Patents Act 1970 (India), s 84(1).
[17]TRIPS (n 3) art 66(1)–(2); Council for TRIPS, 'Implementation of Article 66.2 of the TRIPS Agreement' (Decision of 19 February 2003) IP/C/28; Council for TRIPS, 'Extension of the Transition Period under Article 66.1 of the TRIPS Agreement for Least Developed Country Members' (Decision of 29 June 2021) IP/C/88.

later decision.[18] The contrast is instructive: the flexibilities exist, but political economy suppresses their use.

IP as Engine and as Instrument of Integrity

None of this is a critique of IP rights as such. Patent protection remains an important incentive for risky research, and patenting in low-carbon energy has kept growing, by an average of 3.3 per cent a year in 2017–19, albeit far below the 12.5 per cent a year of 2000–13.[19]

IP-related regulation also reaches beyond patents. Trademark and certification-mark systems, together with consumer law, shape the credibility of environmental claims. Directive (EU) 2024/825 restricts generic environmental claims and prohibits sustainability labels that are not based on a certification scheme or established by public authorities. Member States had to transpose it by 27 March 2026, and its rules apply from 27 September 2026.[20] These rules protect the credibility of the 'green' signal on which investment and consumer choice depend. Repair and eco-design rules likewise interact with design, copyright and trade-secret law, in ways that can either support or obstruct longer product lifetimes. Properly used, IP can serve both as a reward for innovation and as a guardian of market integrity.

Benefit-sharing is a further instrument, relevant above all to adaptation technologies such as crops. The Convention on Biological Diversity links access to genetic resources to equitable benefit-sharing and addresses access to and transfer of technology. The 2024 WIPO Treaty on Intellectual Property, Genetic Resources and Associated Traditional Knowledge will requires applicants to disclose the country of origin or source of genetic resources, and the Indigenous Peoples or local communities that provided associated traditional knowledge, where the claimed invention is based on them. It enters into force only after 15 ratifications or accessions.[21] The disclosure duty is a transparency measure rather than a benefit-sharing mandate, but it shows the patent system accepting that the grant of exclusivity can be

[18]WTO, Ministerial Decision on the TRIPS Agreement (adopted 17 June 2022) WT/MIN(22)/30.
[19]IEA and EPO (n 8).
[20]Directive (EU) 2024/825 of the European Parliament and of the Council of 28 February 2024 amending Directives 2005/29/EC and 2011/83/EU as regards empowering consumers for the green transition through better protection against unfair practices and through better information [2024] OJ L2024/825.
[21]Convention on Biological Diversity (adopted 5 June 1992, entered into force 29 December 1993) 1760 UNTS 79, arts 15 and 16; WIPO Treaty on Intellectual Property, Genetic Resources and Associated Traditional Knowledge (adopted 24 May 2024) GRATK/DC/7, arts 3 and 17.

accompanied by public-interest obligations.

A Framework for Calibrated Reform

What does principled reform look like in practice? They are offered as a design proposal, not as a description of existing law.

Step 1: profile the technology. Classify each technology by maturity (mature, scaling or nascent) and by concentration of ownership (many or few rights-holders, and whether close substitutes exist). A uniform rule would over-regulate mature, competitive technologies and under-regulate concentrated, essential ones. Classification should rest on technology-specific patent landscape data and be reviewed periodically, so that technologies move down the ladder as they mature.

Step 2: profile the recipient. Assess two things separately. *Technological capacity* covers the domestic engineering and manufacturing base, regulatory capability and the ability to absorb know-how. *Affordability* covers income level, fiscal space and the cost of capital relative to the price of the technology. LDCs and other vulnerable economies, such as small island developing states, will typically score low on both. Middle-income countries with manufacturing capacity need different help, such as local production and joint ventures, than capacity-poor countries, which need assistance and financing.

Step 3: choose the least intrusive response that works. Responses escalate only when a lower rung fails, and the trigger for escalation is documented failure of negotiation on reasonable terms within a fixed period. The table sets out the logic.

Three features make the framework workable. First, it pairs rights with capacity: because diffusion is constrained by know-how as well as patents, licensing terms should include expertise, training and support for local production, and the UNFCCC Technology Mechanism, established under the Paris Agreement framework, offers an existing channel for technical assistance.[22] Second, it makes the flexibilities usable. A time-limited, technology-specific clarification could simplify the procedure for authorising use of defined climate technologies and relax the domestic-market limit for supply to eligible small or least developed markets. The 2022 Decision offers a precedent for the technique, though not for the scope. Because it

[22]Paris Agreement (n 1) art 10(3)–(4).

would modify how Article 31 operates, it would need consensus among WTO members, a high bar, as the long negotiation and the narrow outcome in 2022 show. Third, it is proportionate: the recipient overlay ensures that support is concentrated where capacity and affordability are weakest, and the sunset-and-review principle keeps intervention from outliving the market failure.

Conclusion

The question 'is IP a brake or an engine?' presents a false choice. The weight of evidence indicates that patents are not the universal barrier that critics allege, and that waiving them wholesale would leave tacit know-how, finance and capacity gaps untouched.

The same evidence also indicates that a system built on strong exclusivity and weakly specified transfer commitments does not reliably deliver diffusion where it is most needed, especially for emerging essential technologies and in low-income settings. IP's contribution to sustainable development will therefore depend less on whether rights exist than on whether the law attaches meaningful, conditional and enforceable obligations to them. The most defensible position is calibrated reform: a climate-specific, differentiated application of existing TRIPS flexibilities, supported by capacity-building and disclosure duties, in preference to either the status quo or a general waiver.