

Patent law and Green Technology

The role of patent law mechanisms in the development and diffusion
of “green technologies”

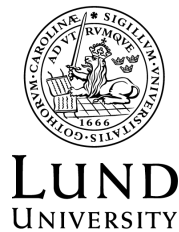
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Abstract

Patent law has been prevalent in climate change discussions, as a factor linking technology, Intellectual Property Rights (IPRs) and the climate crisis. The inventive step, its set threshold and the environmental benefits for the assessment of its current state, are one of the paths where patent law can act as a potential promoter of green technologies. This paper aims to assess how patent law can promote the development and diffusion of "green" and "climate-friendly" technology. More specifically, its viability with regards to enforcement, its short and long-term potential and effectiveness in achieving the aforementioned climate goals, compared to other patent law mechanisms (e.g., fast-tracking initiatives, compulsory licensing, utility patents, and open patent systems).

The conclusion of this thesis rests on the notion that the best possible action plan to be adopted is the formation of a portfolio of strategies. Hence there is a need to consider various IPR mechanisms that assist in furthering the development and diffusion of green patent technologies. Furthermore, although the lowering of the inventive step threshold would require a very active and rigorous revision process from lawmakers, it should not be a factor that rejects the notion in its entirety. Additionally, systems identifying the concept of a "green technology will be of immense importance if the revision is to take place, in order for the patent criterion to not accelerate its already high level of uncertainty. Lastly, it is clear that in order to realise the full potential of patent law, it is necessary to move away from the "one-size-fits-all" approach with regards to IPR mechanisms and rather, adjust patent law to the current environment.

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Abbreviations

CCMTs	Climate Change Mitigation Technologies
CETs	Clean Energy Technologies
ECCP	European Climate Change Program
EPC	European Patent Convention
EPO	European Patent Office
EU	European Union
EU ETS	The European Union Greenhouse Gas Emission Trading Scheme
IPR	Intellectual Property Rights
ICTSD	International Centre for Trade and Sustainable Development
OECD	Organization for Economic Co-operation and Development
TRIPS	The Agreement on Trade-Related Aspects of Intellectual Property Rights
UNCED	The United Nations Conference on Environment and Development
UNEP	The United Nations Environment Program
WIPO	World Intellectual Property Organisation
WTO	World Trade Organisation

1. Introduction

1.1. Background

*“The right policies, infrastructure and technology to enable changes to our lifestyles and behaviour, can result in 40 to 70 percent reduction in greenhouse gas emissions by 2050.”*¹ This is a statement made by Intergovernmental Panel on Climate Change (IPCC) Working Group III Co-Chair, Priyadarshi Shukla in the latest report of the IPCC. The technology sector has been labelled by many academics as the sector that requires heightened focus from government leaders and policymakers due to its potential to tackle the main challenges of climate change, the increasing greenhouse gas emissions (GHG) and the ever-growing increase of the global average temperature.² As stated by EPO Vice President for Legal and International Affairs Raimund Lundz: *“European leadership in clean technologies is crucial for the European economy at the time when the Paris Agreement has entered into force and the European Parliament is considering measures in line with the final deal.”*³ Abiding by the target of the Paris Agreement to maintain the global average temperature below 2.0°C will require inevitable and immediate action in the innovation sector, specifically when it

¹ Intergovernmental Panel on Climate Change, 'WORKING GROUP III CONTRIBUTION TO THE IPCC SIXTH ASSESSMENT REPORT (AR6)' (IPCC 2022) <https://report.ipcc.ch/ar6wg3/pdf/IPCC_AR6_WGIII_FinalDraft_FullReport.pdf> accessed 5 May 2022.

² Guillaume Henry, 'Intellectual Property Rights And Green Technology', *World Intellectual Property Congress* (International Association for the Protection of Intellectual Property (AIPPI) 2010) <<https://www.aippi.fr/upload/Prix%20AIPPI/greentech-ipr-1st-academic-prize-dr.-guillaume-henry.pdf>> accessed 1 March 2022. For further discussion see also Jonathan M.W.W. Chu, 'Developing And Diffusing Green Technologies: The Impact Of Intellectual Property Rights And Their Justification' (2012) 6 *Harvard Journal of Law & Technology* <<https://law2.wlu.edu/deptimages/Journal%20of%20Energy,%20Climate,%20and%20the%20Environment/7-Chu.pdf>> accessed 18 April 2022. and Matthew Rimmer, 'Intellectual Property, Innovation, And The Environment' (2014) Edited By Pater Menell And Sarah Tran - A Review' (*Medium*, 2014) <<https://eprints.qut.edu.au/85304/7/85304.pdf>> accessed 5 April 2022.

³ Event Highlights Europe's Lead In Climate Change Mitigation Technologies' (*European Patent Office*, 2016) <https://www.epo.org/mobile/news-events/news/2016/20161209_de.html> accessed 10 May 2022.

comes to technologies that have now adopted the label of “green” or “climate-friendly” technologies.⁴

It is obvious that the capacity of technology to solve environmental concerns should not be underestimated. Reduced energy consumption per unit of output (energy efficiency) and the introduction of new technologies that lower carbon emissions per unit of energy spent (energy use) are two ways to accomplish the substantial reduction in carbon emissions needed to combat climate change (carbon efficiency).⁵ Another solution to the problem would be to cut emissions by lowering total economic activity while maintaining energy and carbon efficiency.⁶ Nonetheless, this option does not seem viable specifically with regards to developing nations and hence the development and dissemination of technology that allow for increased energy and carbon efficiency seems to be the most optimal solution.⁷

At the COP26 summit, leaders agreed on a pro-active and instant action with regards to the promotion of clean, green and low-carbon technologies.⁸ The European arena offers an environmentally focused mechanism in the European Climate Law, which makes it mandatory for EU institutions and Member States to implement a regulatory framework that allows them to meet their climate goals.⁹ Additionally, in order for Member States to attain carbon neutrality by 2050, they

⁴ Paris Agreement Under the United Nations Framework Convention on Climate Change art. 2(1)(a), *opened for signature* Dec. 12, 2015, T.I.A.S. No. 16-1104 (entered into force Nov. 4, 2016, rejoined by the U.S. Feb. 19, 2021) [hereinafter *Paris Agreement*], see also the Harvard Report

⁵ Bronwyn H. Hall and Christian Helmers, 'Working Paper 16323: The Role Of Patent Protection In (Clean/Green) Technology Transfer' (NATIONAL BUREAU OF ECONOMIC RESEARCH 2010) <<http://www.nber.org/papers/w16323>> accessed 5 May 2022 p.9

⁶ Joshua S. Gans, 'Innovation And Climate Change Policy' (2012) 4 American Economic Journal: Economic Policy <<https://www.aeaweb.org/articles?id=10.1257/pol.4.4.125>> accessed 18 April 2022. pp.125-145; See also Bronwyn H. Hall and Christian Helmers, 'Working Paper 16323: The Role Of Patent Protection In (Clean/Green) Technology Transfer' (NATIONAL BUREAU OF ECONOMIC RESEARCH 2010) <<http://www.nber.org/papers/w16323>> accessed 5 May 2022 p.9

⁷ *ibid.*19

⁸ Roger Harrabin, 'COP26: Leaders Agree Global Plan To Boost Green Technology' <https://www.bbc.co.uk/news/science-environment-59138622> (2021) <<https://www.bbc.co.uk/news/science-environment-59138622>> accessed 2 May 2022.

⁹ Council Regulation (EU) 2021/1119 of June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 OJ L 243/1 (Climate Neutrality Directive)

must adopt “the necessary measures” at the EU and state levels.¹⁰ The term necessary measures, is not defined and is left at the discretion of the individual member state. For example the Effort Sharing Regulation binds each Member State to an annual GHG emissions target for the 2021-2030 period, subject to the principle of fairness, cost-effectiveness and environmental integrity, which allows Member States to take action dependent on their gross domestic product (GDP).¹¹ Nevertheless, considering the status of technology as being one of the leading tools to mitigate climate change, it is reasonable to assume that their role as a “necessary measure” alongside respective IPR mechanisms, should be taken into account by global leaders. That being said, despite the significant increase in sustainability concerns and climate-resilient developments amongst policymakers, in both the domestic and European arena, such as the aforementioned initiative or The Green, Low-Emission and Climate-Resilient Development Strategies (Green LECRDS), it is inevitable that without an effective and unambiguous legal framework - an effective and immediate solution for the climate-crisis will not be found nor enforced.¹²

Furthermore, in international agreements this narrative is present beyond the Stockholm Declaration of 1972, which established the UN Earth Watch system for researching and monitoring environmental issues and problems.¹³ A more recent example of an agreement is the United Nations Framework Convention on Climate Change (UNFCCC), which aims to stabilise GHG emissions and establish that developed countries are to take all practicable steps to promote, facilitate and finance the transfer of and access to environmentally friendly

¹⁰ *ibid.*

¹¹ Council Regulation (EU) 2018/842 of May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013 OJ L 156/26; See also 'Effort Sharing 2021-2030: Targets And Flexibilities' (*European Commission: Climate Action*) <https://ec.europa.eu/clima/eu-action/effort-sharing-member-states-emission-targets/effort-sharing-2021-2030-targets-and-flexibilities_en> accessed 3 May 2022.

¹² UNEP, 'The Role Of Legal Instruments To Support Green Low-Emission And Climate-Resilient Development: A Guidebook On Assessing, Selecting And Implementing Legal Instruments' (UNEP 2013) <<https://www.unep.org/resources/report/role-legal-instruments-support-green-low-emission-and-climate-resilient>> accessed 14 May 2022.

¹³ Pamela Chasek, 'Stockholm And The Birth Of Environmental Diplomacy' (*IISD*, 2022) <<https://www.iisd.org/articles/deep-dive/stockholm-and-birth-environmental-diplomacy>> accessed 7 April 2022.

technologies and know-how to other states.¹⁴ More specifically, focusing on developing countries to enable them to implement their obligations under the UNFCCC.¹⁵ The role of technology is also mentioned in a number of areas that are essential for its focus on sustainable development - such as health and agriculture in the comprehensive action plan of Agenda 21, which also encourages local communities to utilise and share environmentally friendly technologies.¹⁶ Thus, this narrative goes beyond the Stockholm Declaration due to omnipresent nature of environmentally friendly technologies in multiple sectors as well as legal and policy discussions.

Moreover, it is important to stress that technology does not operate in a vacuum as many adjacent factors are equally crucial to consider in the fight for climate change mitigation. One of them is patent law, which has been prominent in climate change discussions as a factor linking technology, Intellectual Property Rights (IPRs) and the climate crisis. IPRs can play a critical and complex role in clean energy innovation and diffusion, whilst poorly designed and enforced IPRs can create diffusion obstacles.¹⁷ Nevertheless, it must also be acknowledged that – similarly to technology – notions of sustainability and climate change do not operate in a vacuum. Therefore, many tools must be considered and employed to combat these problems. Although, there are academics that are sceptical towards the role patent law can play in the climate change fight, there is relevant evidence that the prospective role patents can play in the promotion of green technologies is not to be ignored.¹⁸ For instance, patents may be less important for stimulating green invention in the early phases of research but are critical for green innovation, encouraging commercialisation and diffusion in established energy

¹⁴ 'About The Secretariat' (*United Nations Climate Change*, 2022) <<https://unfccc.int/about-us/about-the-secretariat>> accessed 1 May 2022.

¹⁵ Abbe E.L. Brown, *Intellectual Property, Climate Change And Technology* (Edward Elgar Publishing 2022) <<https://doi.org/10.4337/9781788111119>> accessed 6 March 2022. pp.8-15

¹⁶ *ibid.* 14

¹⁷ Global Climate Network, 'Breaking Through On Technology: Global Climate Network Discussion Paper No.2' (Global Climate Network 2009) <<https://www.icednigeria.org/resources/july-2009-2.pdf>> accessed 6 May 2022.

¹⁸ Ofer Tur-Sinai, 'Patent And Climate Change: A Skeptics View' (2018) 48 *Environmental Law* <<https://www.jstor.org/stable/44633536>> accessed 25 February 2022. pp.211-261

technology areas.¹⁹ The inventive step, its set threshold and the environmental benefits for the assessment of its current state, are one of the paths where patent law can act as a promoter of green technologies. Nonetheless, path dependence is a two-edged sword: government support for specific technologies can either have the intended snowball effect or generate the incorrect path dependencies.²⁰

1.2. Purpose and research question

This thesis aims to investigate how patent law can promote the development and diffusion of "green" and "climate-friendly" technology by examining the patentability criterion of the "inventive step", as well as other patent law mechanisms such as fast-tracking initiatives, compulsory licensing, utility patents, and open patent systems. Hence, the aim of this research will be met by addressing the following research questions:

- a) What role can patent law play in fostering green technology?
- b) Should the patentability criteria of "inventive step" be redefined to prioritise green technologies?
- c) What alternative mechanisms of patent law can be used to promote green technology initiatives?

1.3. Delimitations

This essay will be structured by analysing patent law and patent policy at the international and EU level and thus, will not consider national patent law and its specificities. Furthermore, due to the narrow construction and specificity of the relevant research questions there are no further delimitations that need to be presented to the reader.

1.4. Materials and method

This thesis will adopt and make use of the EU legal method. This approach comprises of a thorough analysis of EU law's pertinent regulations, principals, and

¹⁹ Caoimhe Ring, 'Patent Law And Climate Change: Innovation Policy For A Climate In Crisis' (2021) 35 *Harvard Journal of Law & Technology* <<https://jolt.law.harvard.edu/assets/articlePDFs/v35/Ring-Patent-Law-and-Climate-Change.pdf>> accessed 9 May 2022.

²⁰ Philippe Aghion and others, 'Path Dependence, Innovation And The Economics Of Climate Change', *Handbook on Green Growth* (Edward Elgar Publishing 2019).

conceptual notions. Furthermore, due to the intertwined nature of patent law and economic consequences, this thesis will also engage in legal policy analysis and argumentation. The relevant legal sources used, will mostly entail international conventions, international legal agreements such as the TRIPS Agreement, The Paris Agreement and EU secondary legislation (Directives and Regulations), as well as international case law examples.

In order to reach a holistic and in-depth understanding of the various sources, interpretative tools such as the EPO explanatory notes, reports and guidelines will be considered to allow an in-depth and accurate analysis of the patent system and its patentability criteria. Furthermore, sources such as Agenda 2030, WIPO and EPO policy statements will be of increased relevance as authorities for sustainability goals and notions that require to be intertwined and discussed with regards to Intellectual Property Rights (IPRs) and patent protection. To achieve a fair, and balanced perspective of the role of the “inventive step” in tackling climate change and sustainability challenges, relevant journals, working papers and book chapters will be incorporated into the discussion. Nevertheless, in order to tackle the question from a normative perspective and reach a holistic analysis, it will be necessary to examine both primary and secondary sources in a complex manner. Furthermore, due to the close-knit nature of patent law with economic, technological, and policy factors, the study will also take these factors into account.

1.5. Structure

The structure of the paper will be as following:

(1) The first chapter of the thesis will provide a background overview of the interplay between climate friendly and damaging technologies and patent law. This section will explore the narratives that are pro and against technology as a main tool to be used to solve the contemporary problems of climate change. Additionally, the background will introduce a number of legislative frameworks and initiatives that were created to foster green technology development in the context of IPRs. This will be an efficient introduction and reference point for the

analysis in the later sections of the paper. **(2)** The second chapter will provide an overview of what the terms “climate friendly technology” and “climate damaging technology” entail. This definitional overview is necessary in order to understand the role patents can play in technology development and also in order to have a high level of understanding for the relevant context this research is placed in. Additionally, the second chapter will act as an exploration as well as explanation of the role of patent protection. Hence, this section will explore the criteria of patentability, the general role of patent protection, as well as, the relationship between patent protection and climate change (climate-friendly and climate-damaging technologies). **(3)** Chapter three, will be a more focused and in depth understanding of the patentability criterion of “the inventive step”. It will build up on the above explained criteria of patentability. Again, “the inventive step” and the threshold necessity tied to this patentability criterion will be analysed both in the climate change as well as the greater IPR context. Moreover, chapter 3 will be a direct link to chapter 2 and a necessary step to reach a decision on the significance and potential impact the shift of the threshold of the inventive step could have for the promotion of green technologies. This section will additionally explore the alternative legal mechanisms that can be enforced to reach the result that reformers are seeking from the “inventive step” threshold change. Alternative legal mechanisms and their efficiency compared to the inventive step approach will be analysed by looking mostly at the efficiency of implementation and enforcement as well as the level of significance and influence this would have for climate friendly technologies. Finally, the last section will conclude the purpose and research question stated in the beginning.

2. Patent law and Green technology

2.1. “Green technology”: “climate damaging” and “climate friendly” technologies

“Green technologies” are often identified as an inevitable part of the climate change mitigation process. Chapter 34 of Agenda 21, characterises “green technologies” as “environmentally sound technologies” which “(...) *protect the environment, are less polluting, use all resources in a more sustainable manner, recycle more of their waste and products, and handle residual waste in a more acceptable manner than technologies for which they are substitutes.*”²¹ On the other hand, Henry categorises “green technologies” as technologies which foster the limitation of global warming that occurred as a consequence of heightened greenhouse gas emissions (GHC).²² These include: (1) Energy saving technologies; (2) New sources of energy such as wind, solar, biomass; (3) Technologies that filter and harness CO₂, etc.²³ That being said, the types and sectors within which green technologies operate do not seem to present an obvious limitation as to their extent and scope of operation. Thus, the exploration of the definitional labelling of what will later be holistically labelled as “green technologies” is essential for the understanding of the significance behind the respective need to develop and diffuse them.

The relevance of green technologies has also increased in organisations such as the World Intellectual Property Organisation (WIPO), which in 2013 launched the *WIPO Green* online platform encouraging multiple actors in the climate change

²¹ 'WIPO GREEN Acceleration Projects' (*WIPO GREEN: The Marketplace for Sustainable Technology*, 2021) <<https://www3.wipo.int/wipogreen/en/projects/>> accessed 17 May 2022. See also UN Documents Cooperation Circles, 'Agenda 21: Chapter 43' <<http://www.un-documents.net/a21-34.htm>> accessed 1 May 2022.

²² Henry (n 2) p.5

²³ *ibid.*

technologies sector to connect and collaborate.²⁴ Numerous climate-oriented technologies still remain in the primary stages of development and seek out to patent law to encourage a more efficient approach to their development and diffusion.²⁵ Having said that, the overlap and intertwined nature of “green technology” and Intellectual Property Rights, specifically patent law has been a prevalent part of contemporary discussions focused on finding new and effective approaches to the ever-growing gravity of the climate crisis. Hence, without undermining the critical roles education, policy, research, and behavioural changes play in addressing climate change, there is no doubt that effective change can be made without a productive patent law system and an increased focus on green technology.²⁶ Furthermore, economical aspects should also be considered. A substantial amount of green technology has yet to reach the point where it is economically sufficient. Patent law has the power to reduce the costs by enabling licensing and substantial capital return.²⁷ Hence, patent law can adopt a position of an enabler that fosters accessibility by lowering production and processing costs.

Moreover, in academic literature, technology complying with sustainable standards is often addressed as the above mentioned “green technology”, for the purposes of greater comprehensiveness or simplification. This paper will also adopt a similar stance with regards to the simplification of using a unitary term to label the technologies in question as “green technologies” which are often alternatively labelled as “clean technologies” or “climate related technologies”.²⁸

²⁴ Diana Bentley, 'How Patent Law Supports The Fight Against Climate Change' (*Raconteur*, 2021) <<https://www.raconteur.net/legal/patent-law-climate-change/>> accessed 5 April 2022.

²⁵ Jonathan M.W.W. Chu, 'Developing And Diffusing Green Technologies: The Impact Of Intellectual Property Rights And Their Justification' (2012) 6 *Harvard Journal of Law & Technology* <<https://law2.wlu.edu/deptimages/Journal%20of%20Energy,%20Climate,%20and%20the%20Environment/7-Chu.pdf>> accessed 18 April 2022.

²⁶ *ibid.*

²⁷ *ibid.*, See also Richard Dobbs et al., 'Resource Revolution: Meeting The World'S Energy, Materials, Food, And Water Needs' (McKinsey Global Institute 2011) <<https://www.mckinsey.com/business-functions/sustainability/our-insights/resource-revolution>> accessed 14 May 2022.

²⁸ Ahmed Abdel Latif et. al., 'Policy Brief No.11: Overcoming The Impasse On Intellectual Property And Climate Change At The UNFCCC: A Way Forward' (ICTSD Programme on Innovation, Technology and Intellectual Property 2011).

However, before this generalisation of the concept is adopted, an analysis of the problems of using an umbrella term for the concept will be explored.

It is essential to identify the definitional concept of a "climate friendly" and "climate damaging technology" in the context of patent law and patentability criteria to gain a comprehensive understanding of the prospective impact lowering the threshold of the inventive step could have on climate change mitigation objectives. This exploration is necessary not only for comparative purposes of the treatment of green technologies in the fast-tracking system, which will be explored in later sections, but also as a tool to assess the scope of influence lowering the inventive step threshold can have for climate change purposes. That being said, the problem of not resorting to an approach where these considerations are made with regards to the inventive step and the determination of what constitutes a "climate friendly" or "climate damaging" technology" could from a practical point of view raise the following questions:

1. *Should 1 out of the 2 ("climate friendly"/"climate damaging") technologies take precedence over the other - how could this be justified, given the neutrality of granting patent protection?*
2. *Should the existence of a climate damaging factor in the relevant technology automatically exclude the technology from being considered climate friendly? Moreover, would that only limit or exclude the possibility of labelling a given technology as "climate-friendly"?*
3. *Should there be a "balancing-exercise" that determines the overall impact of the technology i.e., can there be a system of determining whether the technology should be considered more of a "climate-friendly" rather than a "climate-damaging technology" and vice versa?²⁹*

The main aspect that links all these concerns together, is the question of what impact a vague definition and the unitary label "green technology" would have on the rights of patentees and third parties in a situation where "green technology"

²⁹ This is an especially relevant point due to the difficulties of identifying the limits and boundaries a given technology has on the emissions of greenhouse gases.

would be given a lower threshold for satisfying the inventive step criterion or another matter of green technology priority via patent law. More specifically, whether the vague approach to the definition, without detailed focus on the distinction between “climate friendly” and “climate damaging”, and abstract terminology such as “more sustainable manner”, would only act as a procedural and technical advantage with a long-term positive impact, or whether this approach could lead to harmful and damaging consequences for patent protection.³⁰ At first glance, it can be argued that a mere procedural advantage would not require such a high level of definitional certainty - the obvious reason being, the lack of harmful factors and consequences.³¹ However, the alternative advantage carrying a damaging impact such as providing climate friendly technology with more advantageous protection (e.g., extending term for protection or imposing limits on patents by excluding technologies labelled as “climate damaging” from patentability), would naturally indicate a need to set an unequivocal system capable of accurately determining technologies which should be given a procedural advantage.³² The relevant significance the act of lowering the threshold for “green technologies” will have for both “normal technologies” and “green technologies” will be further discussed in Chapter 3. For now, it is essential to understand why green technologies are not an evident concept and need to be examined in greater detail rather than just used as self-explanatory terminology.

A potential solution for avoiding ambiguity when it comes to identifying the relevant technologies would be to put in place a non-exhaustive list of criteria explaining what qualities and characteristics would suffice for a technology to be placed in the “green technology” group. Similarly as can be viewed in the case of the International Patent Classification Committee and its non-exhaustive “IPC

³⁰ Tur-Sinai (n 18) pp.211-261

³¹ *ibid.*

³² *ibid.*

Green Inventory”.³³ Although this inventory operates for the purposes of enabling the searches for patent information relating to green technology or alternatively “environmentally sound technology”, the categorisation into concepts such as (1) Alternative Energy, (2) Energy Conservation, (3) Nuclear Power Generation, (4) Transportation, (5) Waste Management, (6) Agriculture/Forestry, and (7) Administrative, Regulatory or Design Aspects, could be a useful source of inspiration for creating a similar approach to establishing the boundaries around “green technology” with regards to the inventive step and other patent law initiatives.³⁴ This development would avoid resorting to an approach which operates in a “definitional limbo” or a “grey area”, making it uncertain to determine what impact the technologies in question have on climate change.

Having said that, an additional potential negative consequence of grouping “green technologies” under one label is stressed by Tébar and McMillan.³⁵ In their analysis, they argue that “*environmental soundness is a relative and normative concept*”, which makes identifying the impact a given technology has on greenhouse gases or other aspects of climate change difficult and unclear.³⁶ Furthermore, climate change-related technologies cover a wide spectrum of fundamentally different technologies that address differing climate-related issues.³⁷ Thus, various technological sectors have different patenting proclivities and patent efficacy. As highlighted by Rimmer, “(...) *different technologies are appropriate for different countries depending on their location, industrial structure, and stage of development*” - this variability makes the existence of an

³³ ‘IPC Green Inventory’ (*WIPO IP PORTAL*) <<https://www.wipo.int/classifications/ipc/green-inventory/home>> accessed 5 May 2022.

³⁴ *ibid.*

³⁵ Cristina Tébar Less and Steven McMillan, ‘OECD Trade And Environment Working Paper No. 2005-02 Achieving The Successful Transfer Of Environmentally Sound Technologies: Trade- Related Aspects’ (OECD 2022) <<https://www.oecd.org/environment/envtrade/35837552.pdf>> accessed 13 March 2022.

³⁶ *ibid.*, See also Hee-Eun Kim, ‘The Role Of The Patent System In Stimulating Innovation And Technology Transfer For Climate Change: Including Aspects Of Licensing And Competition Law (1st edn, Nomos 2011)’ <<http://www.jstor.org/stable/j.ctv941r23>> accessed 9 March 2022. p.15

³⁷ Matthew Rimmer, ‘Intellectual Property, Innovation, And The Environment (2014) Edited By Pater Menell And Sarah Tran - A Review’ (*Medium*, 2014) <<https://eprints.qut.edu.au/85304/7/85304.pdf>> accessed 5 April 2022.

universal mechanism that specifies the nexus between IPRs and the development and diffusion of green technologies within a country very far-fetched.³⁸

Lawmakers, as well as policymakers, should thus keep in mind, that an updated patent law framework, which incorporates a system allowing for a lower inventive step threshold for green technologies, enables two possible paths to be followed with regard to the treatment of green technology. The first path, can lead to the acceptance of an ambiguous definition of “green technology” due to the conclusion that the consequences of this approach will not allow for a negative impact or inhibition of development in tackling climate change. On the other hand, if the legislatures find that the ambiguity would foster misuse or have a harmful impact on both patentees and third parties then the second path would lead to a more complex and well-researched framework for the identification and labelling of “green technologies”.

³⁸ *ibid.*

2.2. Patent law and sustainability

2.2.1. Patent law: an overview

Although patent law and relevant legislative intervention have been criticised due to the argument that a high number of climate-friendly technologies are in the public domain and are thus not affected by patent law, it is still critical to determine if the current patent system provides enough incentive for green innovation.³⁹ Hence, an additional notion that requires analysis prior to an in-depth assessment of the potential modifications to the inventive step, is the general operation of patent law and its function in the greater context of IPRs as well as climate change.

It is without question that IPRs incentivise the development and diffusion of technology to some extent.⁴⁰ That being said, the conventional reasoning of the patent system adopts the narrative that an extensive patent protection system will facilitate the progress of technological development by fixing relevant research and market development failures.⁴¹ Yet, the role of patents in matters of climate-related technology has often carried a two-fold character amongst scholars. On the one hand, patents role in green technology development has been viewed with great enthusiasm, on the other hand, there is a strong sense of scepticism.⁴² For example, in the renewable energy sector, wind turbine or smart meter patents are often enthusiastically labelled as “stimulators of innovation” and essential

³⁹ Henry (n 2) p.8

⁴⁰ For example The Pure Air Nano-TiO₂ air purification technology, developed by Lion Trunk Technology, provides an example of the relevance of patents to green technology: the company has secured multiple patents for its nano-adhesive technology that breaks down air pollutants creating potentially cleaner air in our working and living environments. For further information see: 'Air Purification Technology: 2019 Bluetech Award Winner' (*WIPO*) <https://www.wipo.int/ip-outreach/en/ipday/2020/case-studies/bcaa_award_2019.html> accessed 25 February 2022. See also: William Dibble, 'Justifying Intellectual Property' (1994) 1 UCL Journal of Law and Jurisprudence; and Mark Mafé and Ann Harley, 'Intellectual Property Can Spark Green Tech Revolution' (*PinsentMason*, 2020) <<https://www.pinsentmasons.com/out-law/analysis/intellectual-property-green-tech>> accessed 9 April 2022.

⁴¹ Jerome H. Reichman, 'Intellectual Property In The Twenty-First Century: Will The Developing Countries Lead Or Follow?' (2009) 46 Houston Law Review <https://scholarship.law.duke.edu/faculty_scholarship/2125/> accessed 5 March 2022.; See also Scott Taylor, 'Where Are The Green Machines?: Using The Patent System To Encourage Green Invention And Technology Transfer' (2011) 23 Georgetown International Environmental Law Review <<https://www.ecolex.org/details/literature/where-are-the-green-machines-using-the-patent-system-to-encourage-green-invention-and-technology-transfer-ana-085978/>> accessed 21 February 2022. pp.577-607

⁴² For sceptics see Tur Sinai (n 18); For enthusiasts see Henry (n 2)

instruments for the renewable energy sector.⁴³ As highlighted in the World Intellectual Property Organisation (WIPO) International Patent Classification (IPC) Inventory, “*Patent law facilitates the dissemination of green technology by way of publication, which should consequently encourage the development of more technology.*”⁴⁴ To the contrary, the more sceptical view is adopted in health-related contexts. More specifically, with regards to access to health, patents have been described as barriers and inhibitors to functional technology transfer and green technology use.⁴⁵ Additionally, patent law is often marked as bearing responsibility for the increase in GHG emissions, due to the rise of industrial development, which is often encouraged by patent law.⁴⁶ Nonetheless, the contemporary debate often gives patent law a double-identity as being both a contributor to climate change as well as a significant solution to the problem. For example, by issuing incentives to recuperate Research and Development (R&D) costs, patents can encourage innovation.⁴⁷ It is important to stress that in circumstances where patents impede and prevent market entry by boosting profits while concurrently encouraging investments in follow-up improvements, the converse is true.⁴⁸

As stated by Brown et. al. “*Just as the grant of a patent might encourage innovation, so it might follow that the denial of a patent might dissuade certain forms of innovation.*”⁴⁹ Yet, the operation of patents is generally viewed as

⁴³ WIPO: Committee on Development and Intellectual Property (CDIP), 'MAPPING OF WIPO ACTIVITIES RELATED TO THE SUSTAINABLE DEVELOPMENT GOALS (SDGS) IMPLEMENTATION' (2016) <https://www.wipo.int/meetings/en/doc_details.jsp?doc_id=331416> accessed 13 April 2022.

⁴⁴ 'IPC Green Inventory' (WIPO IP PORTAL) <<https://www.wipo.int/classifications/ipc/green-inventory/home>> accessed 5 May 2022.

⁴⁵ WIPO: Committee on Development and Intellectual Property (CDIP), 'MAPPING OF WIPO ACTIVITIES RELATED TO THE SUSTAINABLE DEVELOPMENT GOALS (SDGS) IMPLEMENTATION' (2016) <https://www.wipo.int/meetings/en/doc_details.jsp?doc_id=331416> accessed 13 April 2022.

⁴⁶ Tur Sinai (n 18) p.150

⁴⁷ Bodrin and David K. Levine, *Against Intellectual Monopoly* (Cambridge University Press 2008),pp.184-217; See also Pratheeba Vimalnath and others, 'IP Strategies For Green Innovations - An Analysis Of European Inventor Awards' (Centre for Technology Management working paper series 2020) <https://www.repository.cam.ac.uk/bitstream/handle/1810/301781/pratheeba_frank_finalWP_jan2020_v2.pdf?sequence=7> accessed 18 March 2022.

⁴⁸ *ibid.*

⁴⁹ Abbe Browne and others, *Contemporary Intellectual Property: Law And Policy* (5th edn, Oxford University Press 2019), p.371

allowing for an effective incentive mechanism. These incentives are necessary to encourage relevant players to invest in R&D concerned with green technology. This is one of the reasons why patent law is viewed as one of the most relevant IPRs to be utilised in fostering green technology development. This incentive stems from the very nature of patent law, which grants exclusive rights to the patent holder for a specific period of time. During this time, the patent holder owns the exclusive rights to the invention, allowing him to exploit these rights for monetary compensation i.e., through licence agreements. This system provides for incentive especially for small businesses, as it allows to repay for their initial investment. The other point of incentive is the expiry of the exclusive rights period after which all the information regarding the patent is diffused to the public and the technology is allowed to be widely used.⁵⁰ This showcases not only the incentive for further development but also the balanced nature of the patent system. More specifically, the balance of interests between both private actors investing in the development of new technology via the exclusivity period vs societal interest in information dissemination.⁵¹ A counter-argument to the efficacy of the patent law adhering to the label of a fosterer of green technology is that any patent-specific legislative intervention would be irrelevant due to a high degree of technologies already operating in the public domain.⁵² In these scenarios the TRIPS will have very limited influence on the transfer of technologies.⁵³

Currently, there is no standardised European Patent Law in place although, a European unitary patent should be put in force in the second half of 2022.⁵⁴ This

⁵⁰ Alison Bryce, 'Intellectual Property: Key Role Against Climate Change | Law Society Of Scotland' (*Law Society of Scotland*, 2022) <<https://www.lawscot.org.uk/members/journal/issues/vol-65-issue-12/intellectual-property-key-role-against-climate-change/>> accessed 16 May 2022.

⁵¹ *ibid.*; See also Gustavo Ghidini, *Rethinking Intellectual Property* (1st edn, Edgar Elgar Online 2018) <<https://doi.org/10.4337/9781783478019>> accessed 25 March 2022. pp.1-68

⁵² Christian Heinze, 'Patent Law And Climate Change – Do We Need An EU Patent Law Directive On Clean Technology?' (2021) 70 GRUR International <<https://academic.oup.com/grurint/article-abstract/70/6/554/6102829>> accessed 11 March 2022. p.60

⁵³ Simon Walker, 'The TRIPS Agreement, Sustainable Development And The Public Interest Environmental Policy And Law Paper No. 41 IUCN Environmental Law Centre Discussion Paper' (IUCN Environmental Law Centre 2022) <<https://portals.iucn.org/library/sites/library/files/documents/EPLP-041.pdf>> accessed 25 March 2022. p.20

⁵⁴ European Office, 'EPO - When Will Unitary Patents Be Available?' (*Epo.org*, 2022) <<https://www.epo.org/applying/european/unitary/unitary-patent/start.html>> accessed 21 March 2022.

will allow getting patent protection in up to 25 EU Member States by submitting a single request to the EPO, as opposed to the current system which operates on a territorial basis via national patent protection.⁵⁵ It is questionable what impact this unitary patent will have on climate-oriented technologies. Having said that, patent law adopts an international character through various mechanisms in the TRIPS Agreement, which adopts a general aim to promote technological innovation.⁵⁶ However, while the TRIPS agreement is a significant step toward harmonising the international intellectual property regimes, it currently fails to adequately balance public and private interests, particularly with regards to the rich-poor divide.⁵⁷ As stated by The International Union for Conservation (IUCN) in their discussion paper, the TRIPS Agreement lacks substantial concern over environmental concern, despite having great potential to positively impact the climate change and environmental sector.⁵⁸ Additionally, the TRIPS agreement does not provide for an effective and adequate framework on how patent law can be utilised as a tool to combat climate change. In this regard, it fails to contribute to the development of "*innovative, ethical, and sustainable communities.*"⁵⁹ This is because the Agreement establishes a neutral approach when it comes to granting patents. Meaning that irrespective of the domain of the invention, the respective Member of the World Trade Organisation (WTO) should allow for the patent to be granted.⁶⁰

The need to recognise that the WTO and TRIPS Agreement are part of the wider global, social public health crisis affecting developing and least developed countries (LDCs), particularly with regards to securing access to affordable medicines (e.g., HIV/AIDS, malaria tuberculosis) was significantly established in

⁵⁵ *ibid.*

⁵⁶ TRIPS Agreement, Article 7

⁵⁷ Walker (n 53) p.20

⁵⁸ *ibid.* 21

⁵⁹ *ibid.* 21

⁶⁰ International Chamber of Commerce The World Business Organization, 'Trips And The Biodiversity Convention: What Conflict?' (1999) <<https://www.wipo.int/export/sites/www/tk/en/igc/ngo/iccpolycstatement.pdf>> accessed 21 March 2022.

the Declaration on the TRIPS Agreement and Public Health.⁶¹ This declaration marks a positive shift in the international arena by implementing necessary public concerns into an international legal instrument concerned with predominantly intellectual property matters. That being said, it would be desirable that a similar approach would be adopted in the TRIPS Agreement with regard to the environmental sector, which shares the same level of severity as the public health crisis.

The TRIPS Agreement enables the granting of patents “*for any inventions, whether products or processes, in all fields of technology, provided they are new, involve an inventive step and are capable of industrial application*”.⁶² Nonetheless, Article 27.2 of the TRIPS Agreement allows for a general exception to the aforementioned rule, by allowing the relevant WTO Member to refuse the grant of patent protection for an invention which is contrary to *ordre public* or morality.⁶³ It is important to stress that this general exception encompasses inventions that have the potential to be damaging for the environment.⁶⁴ The existence of this exception, complies with Derclaye’s proposition that patent law should be used to promote green technologies and eliminate technologies which foster GHG emissions.⁶⁵ The scope of the Article 27 exclusions has yet to be determined, but this clause could be utilised to guarantee that technical innovation does not come at the expense of larger development goals.⁶⁶ At this stage of use, the criteria for the necessary opposition of the patent grant must be high enough for the refusal of the patent to be excepted. The requirements of Art. 27.2 must be met cumulatively: firstly, the commercial exploitation of the relevant invention

⁶¹ Browne (n 49) p.380

⁶² Article 27 (1) TRIPS Agreement

⁶³ International Chamber of Commerce The World Business Organization, 'Trips And The Biodiversity Convention: What Conflict?' (1999) <<https://www.wipo.int/export/sites/www/tk/en/igc/ngo/iccpolicystatement.pdf>> accessed 21 March 2022.

⁶⁴ *ibid.*

⁶⁵ Estelle Derclaye, 'Patent Law's Role In The Protection Of The Environment: Re-Assessing Patent Law And Its Justifications In The 21st Century - Nottingham Eprints' (*Eprints.nottingham.ac.uk*, 2009) <<http://eprints.nottingham.ac.uk/id/eprint/27696>> accessed 11 March 2022.; See also Matthew Rimmer, 'The Road To Copenhagen: Intellectual Property And Climate Change' (2009) 4 *Journal of Intellectual Property Law & Practice*. p.60

⁶⁶ Walker (n 53)

must be prohibited; secondly, the prohibition must be necessary in order to protect *ordre public* or morality, and finally the exclusion of patentability must not be made merely because the exploitation is prohibited by national law.⁶⁷ Although the TRIPS Agreement does provide a limited example of what satisfies the *ordre public* criterion, this example does not adopt an equivocal character.⁶⁸ Hence, the lack of a “standard” definition of the term *ordre public* emphasises the WTO Members’ flexibility to decide what is most important for the protection of their *ordre public*.⁶⁹ In addition, the WTO does not provide for a dispute settlement on this matter. Thus, the efficiency of Article 27.2. cannot be adequately measured.⁷⁰ Nevertheless, this does not prevent the construction of an objective evaluation of the system. Firstly, while the system in Article 27.2. provides a window of environmental concern; its operation is very flexible from both a definitional and enforcement perspective and does not have the potential to tackle the acute nature of the climate crisis in a reasonable manner. Moreover, it only addresses one side of the problem - mainly prohibition. At this level of crisis, it is necessary to adopt not only negative measures but also positive ones i.e., the promotion of climate-friendly inventions. That being said, the existence of this measure should not be viewed with satisfaction and the international community should resort to actions which are greater in their meaningful scale and impact.

⁶⁷ Jane Busche, Peter-Tobias Stoll and Katrin Arend, *WTO - Trade-Related Aspects Of Intellectual Property Rights* (7th edn, Martinus Nijhoff Publishers 2008) <<http://WTO - Trade-Related Aspects of Intellectual Property Rights, Max Planck Commentaries on World Trade Law, Volume 7> > accessed 20 March 2022. p.489-497

⁶⁸ *ibid.*

⁶⁹ *ibid.*

⁷⁰ Article 27.2. footnote

2.2.2. Patentability criteria:

For the purposes of understanding the context in which the inventive step operates, it is useful to provide an overview of the general patentability requirements. However, given the limited and focused scope of this research, the following section will avoid delving into a complex and detailed analysis of both primary and secondary patentability criteria.

In Europe there are currently three routes by which patents may be obtained:

- (1) The National route: regulated by domestic patent legislation. This route involves applying to the patent office of the state in which protection is sought.
- (2) The European route: regulated by the supranational EPC. This route involves applying to the European Patent Office (EPO) or an alternative EPC receiving office. The applicant is required to designate in which of the currently 38 EPC contracting states patent protection is sought
- (3) The International route: regulated by the Patent Cooperation Treaty (PCT). This route requires application to WIPO or other PCT receiving office. The applicant should pursue their application in the patent offices of the relevant state or region.

While patents granted under the EPC are referred to as ‘European’ patents, they take effect as bundles of national grants regulated by national law, hence, operating on a territorial basis. Only when the unitary EU patent system takes effect, will it be possible to obtain a single grant that considers equal and uniform protection throughout the territories. The general European rule for patentability and its subject matter is found in Article 52(1) of the European Patent Convention (EPC) which states that:

“European patents shall be granted for any inventions, in all fields of technology, provided that they are new, involve an inventive step and are susceptible of industrial application.”

The requirement for invention involves the necessary properties of a subject matter. Additionally, under Article 53 of the EPC, three types of subject matter categories are excluded from the ubiquitous scope of patentability.⁷¹ The requirements of novelty, inventive step, and industrial applicability can be labeled as secondary patentability requirements, which involve accidental properties (properties which can be retained by an invention but are not essential for its existence).⁷² The requirements of novelty and inventive step are often considered the principle factors in the patent examination and granting process, particularly due to the difficulty, expert evidence and onerous process, which comes with establishing the state of art.⁷³ According to the EPO, both “novelty” and “inventiveness” of an invention should be determined based on its technical features. Thus, inventions that make a non-technical contribution to the prior art (i.e. via inventive business or design method) or fail to make contribution to any art (both technical or non-technical) fall outside the EPC’s scope of “inventiveness” and “novelty”.⁷⁴ This is to safeguard patent protection for inventions that both differ from ones that are already available to the public, as well as, sufficiently depart from the state of art in the field to which it relates at the priority date.⁷⁵

The particularities of the “inventive step” will be examined in greater detail in section 3.1. of this thesis. Hitherto, it is important to note, that after satisfying the above mentioned patentability criteria, the patent holder is granted exclusive

⁷¹ Namely: inventions the commercial exploitation of which would be contrary to order public or morality; plant and animal varieties, and essentially biological processes for the production of plants and animals; and methods of surgical, therapeutic, and diagnostic treatment. (Article 53 EPC)

⁷² Justina Pila and Paul Torremans, *European Intellectual Property Law* (2nd edn, Oxford Law Trove 2019) <<https://www.oxfordlawtrove.com/view/10.1093/he/9780198831280.001.0001/he-9780198831280-chapter-6#he-9780198831280-chapter-6>> accessed 20 February 2022. p.155

⁷³ *state of art is a term used in intellectual property law, referring to everything disclosed to the public - including patents and non-patent literature.

Justina Pila and Paul Torremans, *European Intellectual Property Law* (2nd edn, Oxford Law Trove 2019) <<https://www.oxfordlawtrove.com/view/10.1093/he/9780198831280.001.0001/he-9780198831280-chapter-6#he-9780198831280-chapter-6>> accessed 20 February 2022.p.176

⁷⁴ *ibid.* p.171

⁷⁵ *ibid.*

rights to the relevant inventions, which are later usually exploited in a commercial manner via licensing mechanisms or technology transfer solutions.⁷⁶

⁷⁶ Heinze (n 52), p.89

2.2.3. Patent law and the North - South Divide

Generally, IPRs can be considered as multi-purpose mechanisms due to their ability to be used for achieving different purposes and goals. For example, IPRs can be used as a tool to protect the rights of an author from being infringed, to ensure fair competition with regards to various developments made by inventors, or as a way to ensure that sufficient remuneration is given to the respective parties. The justifications for IPRs also comes in many forms via the personality based theory, the reward theory or the incentive based theory.⁷⁷ That being said, the effect of using IPR mechanisms for the above-mentioned purposes does not possess a definite outcome and as a result can make space for regional differential treatment. This is especially the case, when it comes to a potential conflict of interest arising between developing and developed nations.

⁷⁷ For a discussion on the respective theories see: Peter Peter, 'Intellectual Property: General Theories', *Encyclopedia of Law and Economics* (Edward Elgar 2000) <<http://www.sfu.ca/~allen/intellectual.pdf>> accessed 15 May 2022. p.129-188

These clashes of opinion and interest are especially prevalent in the questions involving technology transfer and technology development. With respect to climate change-related technologies, as suggested by the World Bank 2010 World Development Report, “(...) *there is no evidence that overly restrictive IPRs have been a big barrier to transferring renewable energy production capacity to middle-income countries(...) In low-income countries, weak IPRs do not appear to be a barrier to deploying sophisticated climate-smart technologies*”.⁷⁸ Having said that, green technology, intellectual property, and pertinent skills to make use of the technology in their respective countries is conventionally more accommodating for the affluent nature of developed countries.⁷⁹ In contrast, less prosperous developed and least-developed regions often lack the sufficient resources, technological skill and infrastructure to access the technology.⁸⁰

Having said that, it can be argued that developing countries adopt a more radical stance compared to developed ones, when it comes to the operation of patent law and green technology.⁸¹ For example in the 2010 UNFCCC proposal, developing countries proposed a number of mechanisms including patent pooling, revocation of existing patent rights on green technologies, compensation-free compulsory licensing of green technologies, as way to create an effective climate-technology action plan that provides for the need of developing countries.⁸² Arguably, this

⁷⁸ UNEP, 'Diffusion Of Renewable Energy Technologies: Case Study Of Enabling Frameworks In Developing Countries' (UNEP 2012) <<https://issuu.com/evindo/docs/diffusionrenewableenergytechnologies>> accessed 26 March 2022.

⁷⁹ Christian Heinze, 'Patent Law And Climate Change – Do We Need An EU Patent Law Directive On Clean Technology?' (2021) 70 GRUR International <<https://academic.oup.com/grurint/article-abstract/70/6/554/6102829>> accessed 11 March 2022. p.66; See also AD HOC WORKING GROUP ON THE DURBAN PLATFORM FOR ENHANCED ACTION, 'Reflections On The Bangkok Session With A View To Doha And Beyond' (UNFCCC 2012) <<https://unfccc.int/sites/default/files/resource/docs/2012/adp1/eng/4infnot.pdf>> accessed 11 February 2022. p.82

⁸⁰ *ibid.*

⁸¹ See for example WTO, 'EXTRACT FROM MINUTES OF MEETING OF THE COUNCIL FOR TRADE-RELATED ASPECTS OF INTELLECTUAL PROPERTY RIGHTS' (Council for Trade-Related Aspects of Intellectual Property Rights 2013) <https://www.wto.org/english/tratop_e/trips_e/march2013_on_climate_e.pdf> accessed 31 March 2022.

⁸² Bronwyn Hall and Christian Helmers, 'Intellectual Property And Climate Change | VOX, CEPR Policy Portal' (*Voxeu.org*, 2010) <<https://voxeu.org/article/intellectual-property-and-climate-change>> accessed 20 February 2022; See also United Nations, 'Report Of The Ad Hoc Working Group On Long-Term Cooperative Action Under The Convention On Its Eighth Session, Held In Copenhagen From 7 To 15 December 2009' (UNFCCC 2009) <<https://unfccc.int/sites/default/files/resource/docs/2009/awglca8/eng/17.pdf>> accessed 20 March 2022.

stance taken by developing states highlights the weakness of the “one size fits all” approach, which is often acquired in the realms of intellectual property rights.⁸³

Nonetheless, there have been attempts to create an accessible framework for developing countries to engage in green technology developments. The existence of “flexibilities” found in the TRIPS Agreement, which enable governments to moderate pertinent IPR obligations i.e. compulsory licensing via patent rights has also been identified by some governments as a significant path of enabling access to green technology for developing countries.⁸⁴ Furthermore, the initiative to assist developing countries can also be seen in the context of Multilateral Environmental Agreements (MEAs), which aim to tackle the question of technology transfer. The international arena has negotiated MEAs to respond to environmental problems such as biodiversity loss, ozone depletion, climate change, desertification, and trade in hazardous waste.⁸⁵ Many of these MEAs incorporate provisions on technology transfer and for developed countries to facilitate and promote the transfer of technology to developing countries. For example, the *Montreal Protocol* comprises of a number of incentives focused on the promotion of technology innovation and dissemination, creating obligations for developed countries to facilitate the transfer of technology to developing countries under “*fair and most favourable conditions*”.⁸⁶

⁸³ Christophe Geiger and Luc Desaunettes-Barbero, 'The Revitalisation Of The Object And Purpose Of The TRIPS Agreement: The Plain Packaging Reports And The Awakening Of The TRIPS Flexibility Clauses', *Global Intellectual Property Protection and New Constitutionalism* (Oxford University Press 2021) <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3556585> accessed 9 February 2022. 'WTO | Intellectual Property (TRIPS) - TRIPS And Public Health' (*Wto.org*, 2022) <https://www.wto.org/english/tratop_e/trips_e/cchange_e.htm> accessed 16 April 2022.

⁸⁴ *ibid.*

⁸⁵ 'About The Montreal Protocol' (*UN Environment Programme*, 2022) <<https://www.unep.org/ozonaction/who-we-are/about-montreal-protocol>> accessed 14 April 2022.

⁸⁶ 'About The Montreal Protocol' (*UN Environment Programme*, 2022) <<https://www.unep.org/ozonaction/who-we-are/about-montreal-protocol>> accessed 14 April 2022. See also Bryan Green, 'Lessons From The Montreal Protocol: Guidance For The Next International Climate Change Agreement' (2009) 39 *Environmental Law* <<https://www.jstor.org/stable/43266831>> accessed 9 March 2022.

To avoid speaking of the potential positive development of patent law in a vacuum that does not account for relevant sustainability concerns such as socio-economic status or access to knowledge, it is necessary to reduce the knowledge and accessibility gap between developed and developing countries with regard to climate-related technology. As stressed at the World Intellectual Property Congress, “(...) *the green revolution will have only a slight effect if it is limited to a few countries(...)*”, making the issue global rather than territorial.⁸⁷ As a result, while global access to green technology is required to make progress in mitigating and limiting the effects of climate change, patent law is limited in how it addresses sustainability concerns in developing countries.⁸⁸ Hence, making it a priority to change the established approach focused mostly on the position of developed countries.

⁸⁷ Henry (n 2) p.5

⁸⁸ Heinze (n 52) p.65

3. Inventive step and green technology

3.1. The inventive step: a solution for “green technology”

3.2. Inventive step: An overview

“The inventive step”, in some cases known as the criterion of “non-obviousness” has been often labelled as the “ultimate condition of patentability” and the “most important of the basic patent requirements”.⁸⁹ From a general point of view, the inventive step requirement's main intention is to prevent exclusive rights from forming barriers to normal and routine development.⁹⁰ In *Synthon* the requirement of an “inventive step” was given the label of a “movable feast” due to its utilisation being field-specific and subject to the specific technical features of each case.⁹¹ As a result, the inventive step has come to be seen as the most difficult hurdle that a patent applicant must overcome, and it is also the most common reason for a patent being denied. One of the reasons for the complexity and criticism of the existing operation of the inventive step identification is the disagreement that arises in its examination. The de-centralised decision making in European patent law results in the different courts arriving to different conclusions whilst applying the same principles of law.⁹² The EPO has tried to reduce the above-mentioned discrepancies by adopting the the problem solution approach. This approach is evaluated based on whether the solution presented to the problem in the patent application is obvious or not to the person skilled in the

⁸⁹ World Economic Forum, 'White Paper: Artificial Intelligence Collides With Patent Law' (Center for the Fourth Industrial Revolution 2018) <https://www3.weforum.org/docs/WEF_48540_WP_End_of_Innovation_Protecting_Patent_Law.pdf> accessed 15 March 2022. p.12

⁹⁰ European Patent Office, '3.4 Inventive Step - European Patent Guide, European Patent Guide, Chapter 3 – Patentability' (*Epo.org*, 2022) <https://www.epo.org/applying/european/Guide-for-applicants/html/ega_c3_4.html> accessed 14 March 2022.

⁹¹ Stanley LAI, 'The Future Of Inventive Step In Patent Law' [2012] *The Singapore Academy of Law Journal* <<https://journalonline.academypublishing.org.sg/Journals/Singapore-Academy-of-Law-Journal-Special-Issue/e-Archive/ctl/eFirstSALPDFJournalView/mid/513/ArticleId/363/Citation/JournalsOnlinePDF>> accessed 27 March 2022. p.602

⁹²Pila and Paul Torremans (n 72) p.177

art.⁹³ However, although this process bares advantages due to the increase in efficiency and cost-reduction, the approach can often lead to the granting of invalid patents due to the non-obvious nature of prior art.⁹⁴

Furthermore, to meet the inventive step requirement, the patent applicant must show that the invention is significantly different from what is already known, and that the solution is not obvious to a person skilled in the technical field.⁹⁵ What is particularly important, especially in the context of green technologies, is that new ways of merging existing processes or products may not result in patent protection eligibility.⁹⁶ On the other hand, in contrast to the step of “novelty”, discussed in Chapter 2, when examining the inventive step multiple sources of prior art may be applied.⁹⁷ As stated by Lord Reid in a UK case:

*“when dealing with obviousness, unlike novelty, it is permissible to make a “mosaic” out of the relevant documents, but it must be a mosaic which can be put together by an unimaginative man with no inventive capacity.”*⁹⁸

Due to the unsettled nature of identifying the inventive step, it is reasonable to assume that a need for guidance with regards to the examination is necessary. Moreover, it is interesting to consider the criteria, particularly in light of future guidelines that could be imposed for a lower threshold with regards to green technologies. Nevertheless, although guidance is offered in the respective

⁹³ European Patent Office, '3.4 Inventive Step - European Patent Guide, European Patent Guide, Chapter 3 – Patentability' (*Epo.org*, 2022) <https://www.epo.org/applying/european/Guide-for-applicants/html/ega_c3_4.html> accessed 14 March 2022.

⁹⁴ Justina Pila and Paul Torremans, *European Intellectual Property Law* (2nd edn, Oxford Law Trove 2019) <<https://www.oxfordlawtrove.com/view/10.1093/he/9780198831280.001.0001/he-9780198831280-chapter-6#he-9780198831280-chapter-6>> accessed 20 February 2022. p.177

⁹⁵ European Patent Office, '3.4 Inventive Step - European Patent Guide, European Patent Guide, Chapter 3 – Patentability' (*Epo.org*, 2022) <https://www.epo.org/applying/european/Guide-for-applicants/html/ega_c3_4.html> accessed 14 March 2022; See also 'Requirement For Patents' (*Prv.se*, 2022) <<https://www.prv.se/en/comprehensive-patent-guide/before-application/requirements-for-patents/>> accessed 16 February 2022.

⁹⁶ 'Requirement For Patents' (*Prv.se*, 2022) <<https://www.prv.se/en/comprehensive-patent-guide/before-application/requirements-for-patents/>> accessed 16 February 2022.

⁹⁷ European Patent Office, '3.4 Inventive Step - European Patent Guide, European Patent Guide, Chapter 3 – Patentability' (*Epo.org*, 2022) <https://www.epo.org/applying/european/Guide-for-applicants/html/ega_c3_4.html> accessed 14 March 2022;

⁹⁸ *Technograph Printed Circuits Ltd v Mills & Rockley (Electronics) Ltd* (“*Technograph*”)

jurisdictions of the IP5 Offices (EPO, JPO, KIPO, CNIPO (formerly SIPO), USPTO), in terms of the inventive step patentability criterion, several distinct meanings are adhered by the pertinent patent offices.⁹⁹ For example, according to the European Patent Office (EPO) the term “obvious” refers to:

*“that which does not go beyond the normal progress of technology but merely follows plainly or logically from the prior art, i.e. something which does not involve the exercise of any skill or ability beyond that to be expected of the person skilled in the art...”*¹⁰⁰

Interestingly, the Chinese State Intellectual Property Office (CNIPA) produces a complex guiding framework for the inventive step, stating that:

*“Whether or not an invention involves an inventive step shall be evaluated on the basis of the knowledge and capability of the person skilled in the art. The person skilled in the art refers to a fictional person who is presumed to be aware of all the common technical knowledge and have access to all technologies existing before the filing date or the priority date in the technical field to which the invention pertains, and have capacity to apply all the routine experimental means before the date. However, he is not presumed to have creativity. If the technical problem to be solved impels that person to seek technical means in other technical field, he should also be presumed to have access to the relevant prior art, common technical knowledge, and routine experimental means in the other technical field before the filing date or the priority date. The purpose of establishing such a concept is to unify the standard of examination and to avoid subjectivity as far as possible.”*¹⁰¹

⁹⁹ ICC, 'Inventive Step Criterion For Patenting 450/1094' (International Chamber of Commerce) <<https://www.iccwbo.be/wp-content/uploads/2012/03/20150608-ICC-Inventive-Step-Criterion-for-Patenting.pdf>> accessed 5 February 2022.

¹⁰⁰ European Office, 'Part G, Chapter VII – Inventive Step - Guidelines For Examination' (*Epo.org*, 2022) <https://www.epo.org/law-practice/legal-texts/html/guidelines/e/g_vii.htm> accessed 19 March 2022.

¹⁰¹ CNIPA (was SIPO) Guidelines, Part II, Chapter 4, item 2.4

That being said, although individual patent offices offer guidelines for the assessment of the inventive step requirement it is questionable whether the se guidelines foster the limitation of ambiguity. At large, it is obvious that the inventive step examination is prone to generating uncertainty and limited predictability at both national and international level, especially in cases where the patent applicant seeks protection in multiple jurisdictions. In addition, lowering the inventive step could be difficulty establish, especially from a practical implementation perspective. The existing discrepancies highlights the factors that should be considered before deciding to re-adjust the inventive step criterion, which is already a point of ambiguity. Nonetheless, a unified patent system could potentially limit this scope of uncertainty and discretion.

3.3. Inventive step and the efficiency on green technology promotion

As highlighted above, a proposed incentive concerning the patentability criteria, more specifically the inventive step, is the idea that the threshold to establish the inventive step should be lowered for climate-friendly technologies.¹⁰² Heinz, argues that lowering the inventive step has two main negative consequences.¹⁰³ The first consequence being the the definitional ambiguity of “green technology” and more specifically “climate friendly” and “climate damaging technologies”; the second one arising from the potential issue of the treacherous appearance of weak patents.¹⁰⁴ Although, Heinze does not provide the specificities of the consequences this would bear, the probable explanation would be the inevitable increase of legal uncertainty.

As can be seen from the previous section, the satisfaction of the patentability requirements of the inventive step is a lot more likely when it comes to radically novel inventions.¹⁰⁵ The problem that is often encountered in relation to green

¹⁰² Heinze (n 52) p.558

¹⁰³ *ibid.*

¹⁰⁴ *ibid.*

¹⁰⁵ Justine Pila, 'Adapting The Ordre Public And Morality Exclusion Of European Patent Law To Accommodate Emerging Technologies' (2020) 38 *Nature Biotechnology* <<https://www.nature.com/articles/s41587-020-0504-5>> accessed 25 May 2022. pp.555-557

technologies and their patentability examination, is the fact that these technologies often entail a combination or as referred to above a “mosaic” of pre-existing technologies/prior art. This can make it harder to meet the criteria for inventive step which would lead to the immediate rejection of this fundamental hurdle.

A relevant case that highlights this issue and overcoming it, is a US case involving Renewable energy sources Swift Turbines Ltd. (swift), an energy products and solutions company, developed a wind turbine that significantly reduces operational noise.¹⁰⁶ The US Patent & Trademark Office considered Swift’s patent claim as a mosaic of known elements and thus rejected it as obvious over two prior art patents, one of which disclosed a rotor, blades and a diffuser and another that taught an aerofoil diffuser.¹⁰⁷ According to the patent examiner, it would have been obvious to combine the aerofoil diffuser with the rotor blades and diffuser to obtain a reduced noise level.¹⁰⁸ Swift successfully overcame this rejection by highlighting deficiencies in the cited prior art as well as by using a number of non-obviousness arguments. In the opinion of the patent examiner, the merging of the aerofoil diffuser with the rotor blades and diffuser for the purposes of achieving a lower noise level was an obvious choice.¹⁰⁹ Nonetheless, Swift was able to overcome this rejection by pointing out flaws in the acknowledged prior art as well as as stating a variety of non-obviousness arguments.¹¹⁰

Another way in which some practitioners have chose to overcome the difficulties of green technologies having parts pre-existing in the public domain, is the establishment of a new category of inventions labelled as: “inventions which have

¹⁰⁶ Note: operational noise has often been a major barrier to turbine adoption in densely populated areas + reference case

¹⁰⁷ 'Swift Overcomes Obviousness Rejection' (*Green Patent Blog*, 2009) <<http://greenpatentblog.com/2009/07/19/swift-overcomes-obviousness-rejections-to-obtain-small-wind-turbine-patent/>> accessed 26 February 2022. See also ICC, 'Inventive Step Criterion For Patenting 450/1094' (International Chamber of Commerce) <<https://www.iccwbo.be/wp-content/uploads/2012/03/20150608-ICC-Inventive-Step-Criterion-for-Patenting.pdf>> accessed 5 February 2022.

¹⁰⁸ *ibid.*

¹⁰⁹ *ibid.*

¹¹⁰ *ibid.*

a second effect on the environment.”¹¹¹ The justification for this new category rests mostly on the argument of new functionality. In other words, for an invention to be patentable the method must fulfil a new function or acquire a new application of the method in a sector not related to its prior use.¹¹² Hence, “inventions which have a second environment” would be granted a patent by reducing the focus green technologies having to fulfil a new function, and rather focus on their contribution to a new sector i.e. the environment. In other words, it would be a case of lowering the patentability bar by applying the requirement of innovative activity more liberally.

That being said, after examining the particularities of the inventive step criterion, it is evident that lowering the inventive step would necessitate a highly thorough revision effort on the part of lawmakers. However, this should not encourage notions that adopt a stagnant approach towards the current state of patent law. Despite the fact that the existence of a "mosaic" of prior art is a recurrent difficulty in the area of green technology, legal approaches such as the introduction of a new category of "inventions with a second effect on the environment” could be further developed and implemented as a way to effectively engage patent law in the climate-crisis, as well as, re-model the inventive step to accommodate for these needs.

¹¹¹ Henry (n 2) p.14; K Luzzato, *Patents Can Help The Environment: But It's Not Easy* (Gale Group 2008). p. 9.

¹¹² *ibid.*

3.4. Green technology and alternative IPR enforcement mechanisms

3.4.1. Fast - tracking mechanisms:

2009 marked a shift in the relationship between patent law and green technology. More specifically, as a result of the UNFCCC conference in Copenhagen, the UK commenced a system of fast-tracking green technologies, placing them “in-front” of “normal technologies” in the examination process, as a way to foster their development and diffusion.¹¹³ Depending on the patent office, the duration of when the process of application for a patent is first submitted until it is granted is reduced by 42% - 75% in this accelerated procedure.¹¹⁴ Currently, there are 6 countries that have adopted similar fast-tracking mechanisms, including Australia, Canada, Israel, Japan, Korea, and the US.¹¹⁵ It is important to identify the general link that ties these fast-tracking initiatives with the discussions around the reform of the inventive step before going into a more complex examination of these two concepts.

The most evident link that can be identified is that both initiatives are concerned with the role patent law can play in advancing the position of green technologies. This connection should not be underestimated due to the fact that previous attempts of development (the fast-tracking procedure) can act as an inspirational framework for novel development processes (the inventive step development).

Hence, although the means to achieve the common goal of promoting the diffusion of patent law are in this case different, many questions that are being addressed are the same. As will be described in more detail below, the fast-tracking mechanism is concerned with targeting the registration stage of patent granting (green patents are given a right of priority in the examination, as opposed to the inventive step development, which aims to tackle the question of the

¹¹³ Antoine Dechezleprêtre, 'CEP Discussion Paper No 1197: Fast-Tracking 'Green' Patent Applications: An Empirical Analysis' (Centre for Economic Performance 2013) <<https://cep.lse.ac.uk/pubs/download/dp1197.pdf>> accessed 11 April 2022. p.8

¹¹⁴ *ibid.* 8

¹¹⁵ *ibid.* 9

eligibility stage of granting a patent). The fast-tracking systems essentially enable the reduction of the examination period before granting a patent, for the purpose of fostering the technology that is environmentally sound. This process has the goal of increasing the diffusion of green technology and the specific technical knowledge that comes with it.¹¹⁶ Moreover, the question of what can be considered a “green technology” in this context is interesting to examine, due to the common concern of definitional ambiguity that it shares with lowering the inventive step reform. In other words, it is of great importance to analyse the weight that the fast-tracking system has placed into identifying what does and does not constitute a “green technology” for the purposes of comparison.

As mentioned above, there are currently 7 countries that have put in place systems of fast-tracking green patents, each with individual requirements for sustaining the fast-tracking process.¹¹⁷ For example as the pioneer of the initiative, the UK only requires the relevant applicants to submit a formal letter listing the specific grounds based on why the invention in question satisfies the criterion of being “environmentally friendly.”¹¹⁸ The simplistic manner in which the fast-tracking patent grant is conceded is further proved by the Intellectual Property Office (IPO) by not requiring proof for “environmental friendliness”, rather it simply rejects inventions that are found to be “clearly inappropriate.”¹¹⁹ The Korean fast-tracking system is different with its more stringent labelling of green technologies. More specifically, the technologies that are accepted to undergo the fast-tracking procedure are singled-out depending on whether they have been accredited by the Korean government or referred to in specific governmental environmental laws.¹²⁰ The Japanese fast-tracking system similarly adopts a more rigorous and specified approach to what is considered to fall under the green technology umbrella.

¹¹⁶ *ibid.*

¹¹⁷ *ibid.*

¹¹⁸ *ibid.*

¹¹⁹ *ibid.*

¹²⁰ *ibid.*

Interestingly, China and its State Intellectual Property Office (CNIPA) has also launched a fast-tracking scheme for green technologies, which includes prioritised examination of mechanisms such as resource conservation and low-carbon emission inventions.¹²¹

It has been observed that the reduction of the patent grant for green technologies does not come with detrimental effects on the patent granting system.¹²² More specifically issues such as “patent clusters” or negative effect on “normal patents” has not been observed as a consequence of the operation of the fast-tracking process. Hence, it appears to be the case that one can afford to have less onerous criteria for satisfying what constitutes a green technology in the fast-tracking system due to the lack of negative repercussions. It is more likely that in the case of the “inventive step” this system would not work due to both the significance the inventive step has as a patentability criterion, as well as it being a direct intervention with a legal framework, rather than just being a matter of procedural prioritisation. Both the fast-tracking system and the inventive step system must deal with the question of what constitutes a “green technology”. The fast-tracking system chose to deal with the matter in a very simplistic way, meaning that the threshold of what constitutes a green technology is very low and does not require hefty proof of positive environmental impact.

The question is whether this should be adopted in the case of the inventive step as well. Based on empirical evidence it has been proved that the fast-tracking mechanism has not had the effect of out-crowding the “normal patents”, it is questionable whether this would be the case for the inventive step procedure. It has been stressed that the increase in accessibility of patent protection in the green technology arena could result in harmful market interference and the rise of weak patent grants or the general operation of patent grants.¹²³

¹²¹ Heinze (n 52), p.81; See Also Peter Leung, 'Your Guide To China'S IP Players' (*Managing Intellectual Property*, 2012) <<https://www.managingip.com/article/b1kc1xrzw1mnpk/your-guide-to-chinas-ip-players>> accessed 16 February 2022.

¹²² *ibid.*

¹²³ *ibid.*

Yet, the fast-tracking system seems to be an efficient way to use patent law as a means to accelerate the diffusion and promotion of green technologies. In comparison to the re-definition of the inventive step, it operates in a way that avoids the narrative of a possible weakening of the patent by making it easier to fulfil the criteria. The fast-tracking system simply gives way to examining the patent application sooner than “normal patents” without re-structuring the legal framework of the current patent system.

Nonetheless, it is significant to assess what the impact of this speeded-up granting of patents has for the purposes of green technology development innovation. Startup companies in the green technology sector are one of the players that are most likely to have enthusiasm and benefits from this mechanism due to accelerated ability to sell and raise necessary capital as well the chance to license in a more hastened manner.¹²⁴ From a more general perspective, the most straightforward benefit of the fast-tracking granting of patents is the accelerated diffusion of technology. However, as has been observed by the Centre for Economic Performance (CEP) in an econometric study addressing the economic and legal consequences of fast-tracking systems, the accelerated approach to patent granting is not exclusively beneficial but also generates disadvantages for patent owners and the green technology sector.¹²⁵ The issue with fast-tracking patents can be curated into the four following points:

- (1) It is not always in the interest of the applicant due to the existence of an incentive to keep the final content of the patent for as long as possible
- (2) Long examination periods delay costs and an accelerated search means that research into prior art is more costly
- (3) Longer process can lead to longer adjustment periods

¹²⁴ Dechezleprêtre n.106

¹²⁵ *ibid*

(4) Important information can be revealed to R&D competitors, which will decrease incentives to innovate.¹²⁶

Despite the above-mentioned criticisms, it can be argued that due to the urgency of the climate crisis the short-term benefits of the fast-tracking system are evidently valuable. In this sense, it seems like a viable option for progress. The main question that should be asked is whether it is a better solution for promoting green technologies due to its limited possibility of negative side effects. Again, the argument of a portfolio of solutions should be highlighted here and with regards to the acute nature of the climate crisis, it is reasonable to follow the line of argumentation that it should not be a question of which of the two approaches of patent law is a better solution. Essentially, the question remains whether the patent system remains technologically “neutral” or runs the risk of greater fragmentation when faced with multiple demands for the differentiated treatment of specific sectors and technologies.

3.4.2. Semi-open and open patent strategies:

Compulsory licensing falls into the scope of semi-open patent strategies and allows a third party to have access to a technology protected by a patent monopoly without the approval of the patent owner and thus transforms the monopoly of the owner into a mere right to receive remuneration.¹²⁷ Hence, the attractive element that is offered by compulsory licensing with regards to the development and diffusion of green technology is the increase in accessibility, ability to increase the transfer of knowledge, and its overall positive effect on the promotion of innovation.¹²⁸

However, although compulsory licensing appears to be a theoretically viable alternative mechanism for driving green technology innovation, evidence of its usage in fields such as access to medicine, notably vaccine development, suggests

¹²⁶ *ibid.*

¹²⁷ Pratheeba Vimalnath and others, 'IP Strategies For Green Innovations - An Analysis Of European Inventor Awards' (Centre for Technology Management working paper series 2020) <https://www.repository.cam.ac.uk/bitstream/handle/1810/301781/pratheeba_frank_finalWP_jan2020_v2.pdf?sequence=7> accessed 18 March 2022. p.7

¹²⁸ *ibid.* 8

that the method and approach are ineffective.¹²⁹ A clean technology patent, unlike a pharmaceutical patent, where disclosure of a chemical formula may be sufficient to manufacture the product, may not provide enough information to market the invention.¹³⁰ For example, a solar photovoltaic cell, may be protected by many patents or trade secrets.¹³¹ Therefore, the true efficiency benefit of the cell may never be realised without the ability to precisely build those layers, a compulsory licence may be insufficient for meaningful transfer of the clean technology, as it would only expose a limited part of the information.¹³² Hence, although compulsory licensing is a good solution to provide access for third parties as well as sufficient remuneration for the patent holder, the specific use in the green technology context does come with limitations, specifically concerning R&D and full-knowledge access, that fail to deliver a holistic solution for green technology development and diffusion.

Another patent strategy can be labelled as the fully open patent strategy, this option usually involves the existence of a “patent pledge”, which is publicly announced by patent owning entities.¹³³ The fully open patent system grants the unrestricted and restricted public to out-licence active patents without the burden of contractual obligations or any form of financial compensation.¹³⁴ For example the Tesla patent pledge states that no lawsuit will be initiated “*against any party for infringing a Tesla Patent through activity relating to electric vehicles or related equipment for so long as such party is acting in good faith*”. Similarly, the

¹²⁹ *ibid.* 8

¹³⁰ *ibid.* 7

¹³¹ Mark Consilvio, 'The Role Of Patents In The International Framework Of Clean Technology Transfer: A Discussion Of Barriers And Solutions' (2012) 3 Intellectual Property Brief <<https://digitalcommons.wcl.american.edu/cgi/viewcontent.cgi?referer=https://www.google.com/&httpsredir=1&article=1030&context=ipbrief>> accessed 11 February 2022. pp.7-16

¹³² *ibid.*

¹³³ Jonas Fabian Ehrnsperger and Frank Tietze, 'Patent Pledges, Open IP, Or Patent Pools? Developing Taxonomies In The Thicket Of Terminologies' [2019] PLoS ONE <<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0221411>> accessed 15 March 2022. See also ¹³³ Pratheeba Vimalnath and others, 'IP Strategies For Green Innovations - An Analysis Of European Inventor Awards' (Centre for Technology Management working paper series 2020) <https://www.repository.cam.ac.uk/bitstream/handle/1810/301781/pratheeba_frank_finalWP_jan2020_v2.pdf?sequence=7> accessed 18 March 2022. p.1

¹³⁴ *ibid.*

ECO-patent commons (formed in 2008), pledged their patents in the green sector with the purpose of providing royalty-free access to patents covering 94 ecological inventions, but it was disbanded in 2019 due to its inefficiency.

However, patent pledges have adopted the label of a “smart lawyering technique” by some academics due to definitional ambiguities and vague limits for copying, that come with terms such as “good faith”, “financial stake”, “knock off”.¹³⁵ Hence, although at first glance patent pledges might indicate an altruistic approach to research and development, their construction allows for the patent owners to retain a necessary degree of power to avoid abuse of third parties as well as significant monetary gains. Having said that, although “patent pledges” are not built on pure non-profit standards, even the limited extent to which they operate can contribute to green technology development and diffusion and thus, should not be dismissed due the monetary gain of the patent holders. Rather, similar initiatives should be adopted by companies operating in the green technology sector in order to accelerate the patent pool of knowledge and allow for smaller companies to fill the gaps in their research and knowledge departments.

3.4.4. Petty Patent system

Another alternative mechanism that should be considered as a possible option, or rather an additional mechanism that can assist in the development and diffusion of green technologies, is the IPR device utilised by several countries referred to as the “petty” patent or the “utility” patent. Petty patents are similar to regular patents in that they provide exclusive IPRs, but possess a shorter duration of protection, less stringent patentability standards, and little to no inspection prior to issue. Some experts believe that a patent system like this would be a good answer to the green technology innovation problem, particularly with regards to developing and least developing nations.¹³⁶ It has been suggested that WIPO,

¹³⁵ *ibid.*

¹³⁶ Scott Taylor, 'Where Are The Green Machines?: Using The Patent System To Encourage Green Invention And Technology Transfer' (2011) 23 *Georgetown International Environmental Law Review* <<https://www.ecolex.org/details/literature/where-are-the-green-machines-using-the-patent-system-to-encourage-green-invention-and-technology-transfer-ana-085978/>> accessed 21 February 2022. pp.600

EPO, and other international regional patent organisations are best suited to promote and develop such a system, as they are tasked with aiding the IP technical assistance needs of the developing world.¹³⁷ Enabling WIPO to handle the process of granting petty patents would prove to be of immense benefit due to the centralised PCT application rather than a bundle of separate national applications.¹³⁸ More importantly, centralisation would allow for the unification of the criteria by which patents are classified as "green," as multiple definitions have emerged across multiple patent offices.¹³⁹ This would prove immensely significant due to the current uncertainty of the green technology classification.

Moreover, the system of utility patents recognises the minor inventions through safeguarding such ideas and by granting an exclusive right, which as a result allows the rights holder to restrict others from commercially using the protected invention without his approval throughout a limited temporal period. The essential point that makes utility models relevant for the discussion in the context of the inventive step is the fact that utility models are in need of less restrictive requirements. More specifically, the "inventive step" requirement may be set to a lower standard than in a "classic" patent. This is a crucial point of discussion in the context of green technologies because its operation reflects a functioning system adopting a lower inventive step standard.

Utility patents granted for green technologies could thus overcome the heftiness of the prior art concern and although not providing the same standard of benefits, as is the case for "classic patents", their existence does provide for an increase in knowledge diffusion. On the other hand, disregarding the lowering of the inventive step with regards to "classic patents" due to the simpler bureaucratic nature of utility patents does not come without fault. This is particularly apparent when considering the justifications that come with intellectual property rights, discussed in Chapter 1. Having said that, Petty patents would potentially attract

¹³⁷ *ibid.*

¹³⁸ *ibid.*

¹³⁹ *ibid.*

inventors due to their access to knowledge benefit. However, they could have the potential to hinder the incentive for R & D due to the less attractive or less beneficial existence of exclusive rights i.e. shorter protection period, lower monetary compensation.

4. Summary and conclusions

As can be seen from the preceding discussion, it cannot be said that patent law plays a limited role in incentivising the development and dissemination of green technologies. Despite the fact that this study examines both academic sceptics and supporters of using patent law to promote green technology, it is clear that patent law's relevance to multiple stages of the invention process, as well as its legal framework, allow it to be used for a variety of green technology promotion strategies. Aspects such as Article 27.2. TRIPS are already being used as a means of preventing climate-damaging technology to be incentivised in the patent law context. However, such limited steps do not provide a sufficient legal response to the severity of the climate crisis. Hence, as a result of assessing the role of patent law in the development of green technology, the conclusion reached is that a portfolio of actions, including the lowering of the inventive step, should be implemented by lawmakers in the near future. Furthermore, it is clear that in order to realise the full potential of patent law, it is necessary to move away from the "one-size-fits-all" approach with regards to IPR mechanisms (which is often tailored to the needs and interests of developed countries) and instead also focus on a holistic approach that is tailored to the needs and interests of both developed and developing countries.

In addition, the subject of revising the patentability criterion of the "inventive step" in order to prioritise green technology, necessitated a complex response, due to the requirement's lack of clarity and the existence of discrepancies in terms of its identification in both national and international patent systems. That being said, although the lowering of the inventive step threshold would require a very active and rigorous revision process from lawmakers it should not be a factor that rejects the notion in its entirety. Although the existence of a "mosaic" of prior art is a common problem in the context of green technologies legal approaches such as the a creation of a new category of "inventions which have a second effect on

the environment” have been proven efficient in the context of the international arena. Moreover, identifying the concept of a “green technology will be of immense importance if the revision is to take place, in order for the patent criterion to not accelerate its already high level of uncertainty.

Due to the argumentation that the best possible action plan to be adopted is the formation of a portfolio of strategies there is a need to consider alternative IPR mechanism that assist in furthering the development and diffusion of green patent technologies. Fast tracking proves to be a well functioning strategy, however, its limited impact is not sufficient enough for the acute nature of the climate crisis. Similarly, compulsory licensing and open-patent strategies also provide for beneficial outcomes, especially when it comes to the access to knowledge and stimulation of research and development. From a general perspective, although this approach might be geared for the monetary benefits of patent holders, its positive impact on green technology development should not be underestimated. Lastly, the operation of petty patent systems in the realms of green technology provides an interesting alternative to the lowering of the inventive step in classic patents. It is a viable option for a transition period and also acts as a significant fosterer of research and development.

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