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*Avinash Kumar has completed his Ph.D. in International Investment Law from the Dept. of Law & Governance, Central University of South Bihar. His research work is on "International Investment Agreement and State's right to regulate Foreign Investment." He qualified UGC-NET and has been selected for the prestigious ICSSR Doctoral Fellowship. He is an alumnus of the Faculty of Law, University of Delhi. Formerly he has been elected as Students Union President of Law Centre-1, University of Delhi. Moreover, he completed his LL.M. from the University of Delhi (2014-16), dissertation on "Cross-border Merger & Acquisition"; LL.B. from the University of Delhi (2011-14), and B.A. (Hons.) from Maharaja Agrasen College, University of Delhi. He has also obtained P.G. Diploma in IPR from the Indian Society of International Law, New Delhi. He has qualified UGC – NET examination and has been awarded ICSSR – Doctoral Fellowship. He has published six-plus articles and presented 9 plus papers in national and international seminars/conferences. He participated in several workshops on research methodology and teaching and learning.*

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# **INTELLECTUAL PROPERTY RIGHTS AND CLIMATE CHANGE: A STUDY IN GREEN PATENTS**

AUTHORED BY - SANIGHDHA

## **Abstract**

*Intellectual property rights (IPR, henceforth) are the treasure of knowledge and are a sign of the growth in human intellect, in one way than another, to deal with the problems of the world. IPR include the patents, trademarks, copyrights, designs, and the geographical indications that help in identifying an innovation or an already existing property, that needs to be preserved. Intellectual property has certain rights associated to it, these rights are known as the intellectual property rights and henceforth, are given to the persons who are the owners of these properties. This helps them in securing their rights and as well as using it cautiously for the future generations. However, today, if we see, that the issue of climate change is taking up the whole stage of the world. This particular issue does not only concern the present generation but also the upcoming future generations. Therefore, getting green patents that means, to get patented products that are a sign of green climate or green intellectual property are in demand today. These are also looked up to with immense respect because the companies, the industries, they value environmentally conscious citizens and working professionals today. Thus, the present research deals with the intellectual property rights and the climate change, in relation to issuance of green patents and how this is helpful in conserving energy, furthering the sustainable development goals, and making a much greater effort at combatting climate change.*

### **Keywords:**

*Climate change; Intellectual property rights; Green patents; Sustainable development goals, Energy.*

## **I. INTRODUCTION: INTELLECTUAL PROPERTY RIGHTS AND CLIMATE CHANGE**

According to the Georgetown Law, intellectual property law is defined as, “the law that deals with rules and regulations to protect and enforce rights of the creators and owners of inventions, writing, music, designs, and other works, known as the intellectual property. There are several

areas of intellectual property including copyright, trademarks, patents, and trade secrets.<sup>1</sup>” The same source also explains trademark, patent, and copyright law as well in the following words. Copyright law is defined as the, “law that protects the rights of creators in their works in fine arts, publishing, entertainment, and computer software. The laws protect the owner of the work if others copy, present, or display the owners work without permission.<sup>2</sup>” On the other hand, trademark law is enunciated as the, “the law that protects a word, phrase, symbol, or design that is used by an entity to identify its product or service. Examples are Dunkin Donuts orange and pink sausage style lettering, Apple’s apple logo, and Adidas three stripes. Trademark owners can prevent others from using their marks, or marks which are confusingly similar so that consumers would not be able to identify the source. Federal and state laws govern trademarks but the Lanham Act is the primary source of trademark protection. These laws protect against infringement and dilution.<sup>3</sup>” Apart from this, the patent law in the ways that it is defined, “the law that grants protection for new inventions which can be products, processes or designs and provides a mechanism for protection of the invention. The patent law promotes the sharing of new developments with others to foster innovation. The patent owner has the right to protect others from producing, using, distributing, or importing the protected item. Essentially the patent is a property right that can be licensed, sold, mortgaged, or assigned.<sup>4</sup>” Whereas, trade secrets are, “business practices, formulas, designs, or processes used in a business, designed specifically to provide a competitive advantage to a business. These trade secrets would not be otherwise known to an outsider of the business. An example of this is the formula for Coca Cola. Trade secrets are protected without registration and appropriate steps should be taken by the owner to maintain confidentiality.<sup>5</sup>” On the other hand, climate change is a serious issue that is grappling the whole society today. Recently, there have been calls to declare climate change a worldwide emergency.<sup>6</sup> Climate Change is defined by United Nations as, “Climate change refers to long-term shifts in temperatures

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<sup>1</sup> Georgetown Law, ‘Intellectual Property Law’ (Georgetown Law) <[<sup>2</sup> \*Ibid\*](https://www.law.georgetown.edu/your-life-career/career-exploration-professional-development/for-jd-students/explore-legal-careers/practice-areas/intellectual-property-law/#:~:text=Intellectual%20Property%20law%20deals%20with,%2C%20patents%2C%20and%20trade%20secrets.> accessed 3 June 2024</a></p></div><div data-bbox=)

<sup>3</sup> *Ibid*

<sup>4</sup> *Ibid*

<sup>5</sup> *Ibid*

<sup>6</sup> United Nations- Department of Public Information, *Charter of the United Nations And The International Court of Justice* (2015); United Nations Department of Public Information , *Universal Declaration of Human Rights* (2018); United Nations Framework of Convention on Climate Change (2023); The United Nations Department of Public Information; David Wallace Wells, *The Unthinkable Earth* (2019); Naomi Klein , *This Changes Everything : Capitalism v Climate Change* (2014); Bill Gates, *How to Avoid a Climate Disaster : The Solutions we have and the breakthrough we Need* (2021); ‘Climate Change’ (*World Health Organisation*) < [Page | 6](https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health#:~:text=Key%20facts,highly%20susceptible%20to%20climate%20change.> accessed 3 June 2024</a></p></div><div data-bbox=)

and weather patterns. Such shifts can be natural, due to changes in the sun’s activity or large volcanic eruptions. But since the 1800s, human activities have been the main driver of climate change, primarily due to the burning of fossil fuels like coal, oil, and gas. Burning fossil fuels generates greenhouse gas emissions that act like a blanket wrapped around the Earth, trapping the sun’s heat, and raising temperatures. The main greenhouse gases that are causing climate change include carbon dioxide and methane. These come from using gasoline for driving a car or coal for heating a building, for example. Clearing land and cutting down forests can also release carbon dioxide. Agriculture, oil, and gas operations are major sources of methane emissions. Energy, industry, transport, buildings, agriculture, and land use are among the main sectors causing greenhouse gases.<sup>7</sup>”

Climate change presents a fundamental threat to human health. It affects the physical environment as well as all aspects of both natural and human systems – including social and economic conditions and the functioning of health systems. It is therefore a threat multiplier, undermining and potentially reversing decades of health progress. As climatic conditions change, more frequent and intensifying weather and climate events are observed, including storms, extreme heat, floods, droughts, and wildfires. These weather and climate hazards affect health both directly and indirectly, increasing the risk of deaths, noncommunicable diseases, the emergence and spread of infectious diseases, and health emergencies. Climate change is also having an impact on our health workforce and infrastructure, reducing capacity to provide universal health coverage (UHC). More fundamentally, climate shocks and growing stresses such as changing temperature and precipitation patterns, drought, floods, and rising sea levels degrade the environmental and social determinants of physical and mental health. All aspects of health are affected by climate change, from clean air, water and soil to food systems and livelihoods. Further delay in tackling climate change will increase health risks, undermine decades of improvements in global health, and contravene our collective commitments to ensure the human right to health for all.<sup>8</sup> Both the intellectual property rights and the green environment laws are intricately related to each other, which has resulted in beautifully woven pattern of intricate law that deals with both the intellectual property and the climate change patterns that the world is looking at.

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<sup>7</sup> ‘Climate Change’ (*United Nations*) <<https://www.un.org/en/climatechange/what-is-climate-change>> accessed 3 June 2024

<sup>8</sup> ‘Climate Change’ (World Health Organisation) <<https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health#:~:text=Key%20facts,highly%20susceptible%20to%20climate%20change.>> accessed 3 June 2024; ‘Facts About Climate Emergency’ (*United Nations Environment Program*) <<https://www.unep.org/facts-about-climate-emergency>> accessed 3 June 2024

## II. GREEN PATENTS AND GREEN CODES: EMERGENCE OF GREEN IPR AMIDST CLIMATE CHANGE

Intellectual property rights are core to the advancement and development of technology as they are conceptualized in the form of proprietary rights, which may further be transferred, licensed, assigned and protected against infringement. **Article 7** of the Agreement on **Trade-Related Aspects of Intellectual Property Rights** (TRIPS) acknowledges this role of intellectual property rights: *"The protection and enforcement of intellectual property rights should contribute to the promotion of technological innovation and to the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge and in a manner conducive to social and economic welfare, and to a balance of rights and obligations."* It is imperative to note that one of the primary reasons of granting monopoly rights under the IP system was to encourage and promote technological innovation and environmental benefits. There arose the **need to develop and protect green technology by way of Green IP**. The term '**Green Intellectual Property**' refers to the protection of innovations in the field of green technology. It is a concept where innovations which are helpful to environment in one or the other way are legally protected. Subsequently, there was advent of green technologies which tend to protect the environment by reducing the plausible hazards caused to the environment due to increasing globalization, urbanization, and human intervention. Therefore, it is need of the hour to take an initiative for providing a fast-track procedure for protection of Green Intellectual Property. Additionally, an effective Green IP system coupled with government initiatives and commercialized approaches may provide for the most efficient framework for green technologies.<sup>9</sup> *Since 2009, many patent offices, mainly in industrialized countries, have put in place schemes to fast track 'green' patent applications. These include the UK IP office, the United States Patent and Trademark Office (USPTO), the Korean Patent Office, the Australian IP Office, the Japan Patent Office, and the Canadian IP Office. In April 2012, the Brazilian National Institute of Industrial Property (INPI) announced a pilot program to accelerate green patent applications. The objective is to encourage innovation in green technologies by bringing new products to the marketplace more quickly.*<sup>10</sup>

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<sup>9</sup> 'Green IP' (A Way Forward to Sustainability, Mondaq) < <https://www.mondaq.com/india/trade-secrets/938054/green-ip--a-way-forward-to-sustainability>>accessed 5 June 2024

<sup>10</sup> *Ibid*

**According to OECD<sup>11</sup> (Organisation of Economic Cooperation and Development) and Statistics Netherlands<sup>12</sup>, green patents are defined as,** “green patents are patents for technology concerning waste, wind power, geothermal energy, solar energy, tidal energy, and biomass, submitted by Dutch applicants to the European Patent Office. The selection of patents in these technology areas is based on the international patent classification code.<sup>13</sup>” Green innovation (GI) refers to the innovation in technology applied to minimize wastage, global warming, use of water, air pollution, use of coal, oil, electricity, and conserving energy.<sup>14</sup> Green, environmental and eco-innovation are used as synonymous terms.<sup>15</sup> But how can green innovation be measured? Green innovation measurement includes three primary indicators: R&D expenditure (input), number of green patents (output) and green total-factor productivity (performance).<sup>16</sup> The patent indicator better reflects the technology innovation achievement performed by the firms compared to the other indicators.<sup>17</sup> Back in 1996, Lanjouw and Mody (1996) first introduced patent data to study green technology innovation.<sup>18</sup> Since then, patent data in green technologies (GTs) is considered a good proxy for green innovation.<sup>19</sup> The methods to classify and identify patents in green technologies are diversified and essentially based on four criteria: classification based on the codes (e.g. IPC - International Patent Classification and CPC - Cooperative Patent Classification); keywords; combination of both search techniques; manual selection. In our study we adopt the classification of patents based solely on the codes. Several international organizations such as the European Patent Office (EPO), World Intellectual Property Organization (WIPO) and the Organisation for Economic Co-operation and Development (OECD) have focused many of their studies on the role of patents in the development and dissemination of

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<sup>11</sup> About the OECD’ (*OECD*) < <https://www.oecd.org/about/>>accessed 5 June 2024

<sup>12</sup> (Centraal Bureau Voor De Statistiek) <https://www.cbs.nl/en-gb/>< <https://www.cbs.nl/en-gb/>>accessed 5 June 2024

<sup>13</sup> ‘Green Patents’ (*Centraal Bureau Voor De Statistiek*) < <https://www.cbs.nl/en-gb/society/nature-and-environment/green-growth/economic-opportunities/green-patents>>accessed 5 June 2024

<sup>14</sup> ‘How Does Green Technology Innovations affect Carbon Emissions, A Spatial Econometric Analysis of China’s Provincial Data’ (*Frontiers in Environment Science*) <<https://www.frontiersin.org/articles/10.3389/fenvs.2021.813811/full>>accessed 5 June 2024

<sup>15</sup> ‘An Introduction to eco-Innovation’ (Big bang Partnership) < <https://bigbangpartnership.co.uk/introduction-to-eco-innovation/#:~:text=Eco%2Dinnovation%20synonyms,Green%20innovation>>accessed 5 June 2024; ‘Green Innovation’ (*Springer Link*) <[https://link.springer.com/referenceworkentry/10.1007/978-1-4614-6616-1\\_200021-1](https://link.springer.com/referenceworkentry/10.1007/978-1-4614-6616-1_200021-1)>accessed 5 June 2024

<sup>16</sup> Resources, Conservation and Recycling Advances’ (ELSEVIER) < <https://www.sciencedirect.com/science/article/pii/S2667378923000044>>accessed 5 June 2024

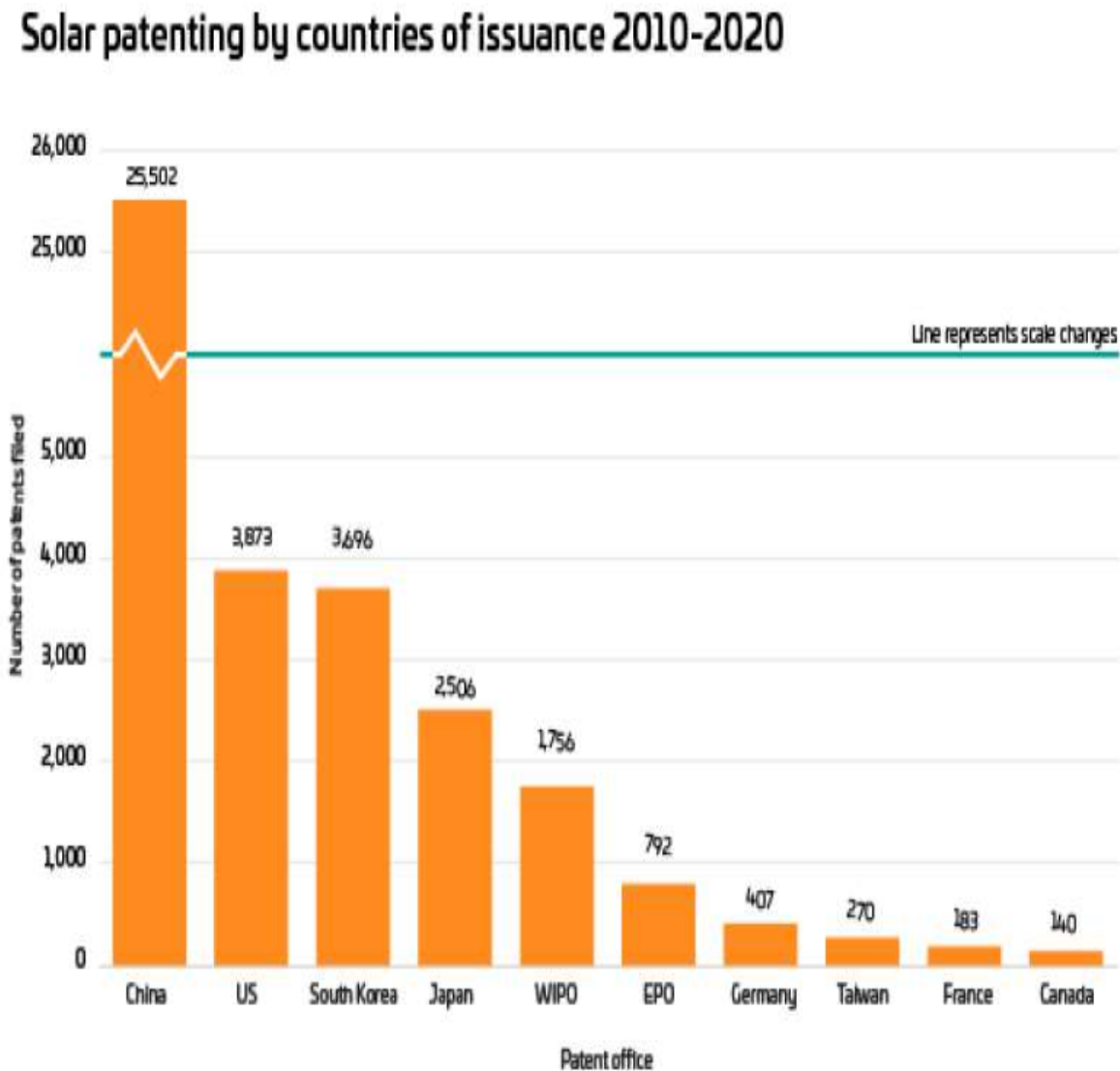
<sup>17</sup> Ibid; Ankit Singh and Yogendra Srivastava, *Patent Law, Green Technology, and Innovation* (2022); Dylan O. Adams, *Patents Demystified: An Insider’s Guide to Protecting Patents and Innovations* (2015); Richard Stim, *Nolo’s Patents for Beginners* (2001); P. Narayana, *Patent Law* (1998); Henry J.A. Charmasson, *Patents, Copyrights and Trademarks* (2004); *Patent Searching: Tools and Techniques* (2007)

<sup>18</sup> Resources, Conservation and Recycling Advances’ (ELSEVIER) < <https://www.sciencedirect.com/science/article/pii/S2667378923000044>>accessed 5 June 2024

<sup>19</sup> *Ibid*

sustainable technologies, using patent databases.<sup>20</sup> Following, data is presented with regard to green patent applications that have been filed and accepted all over the world and in India, indicating the level of innovation and knowledge in this respective area.

**FIGURE 1: SOLAR PATENTING BY COUNTRIES 2010-2020**

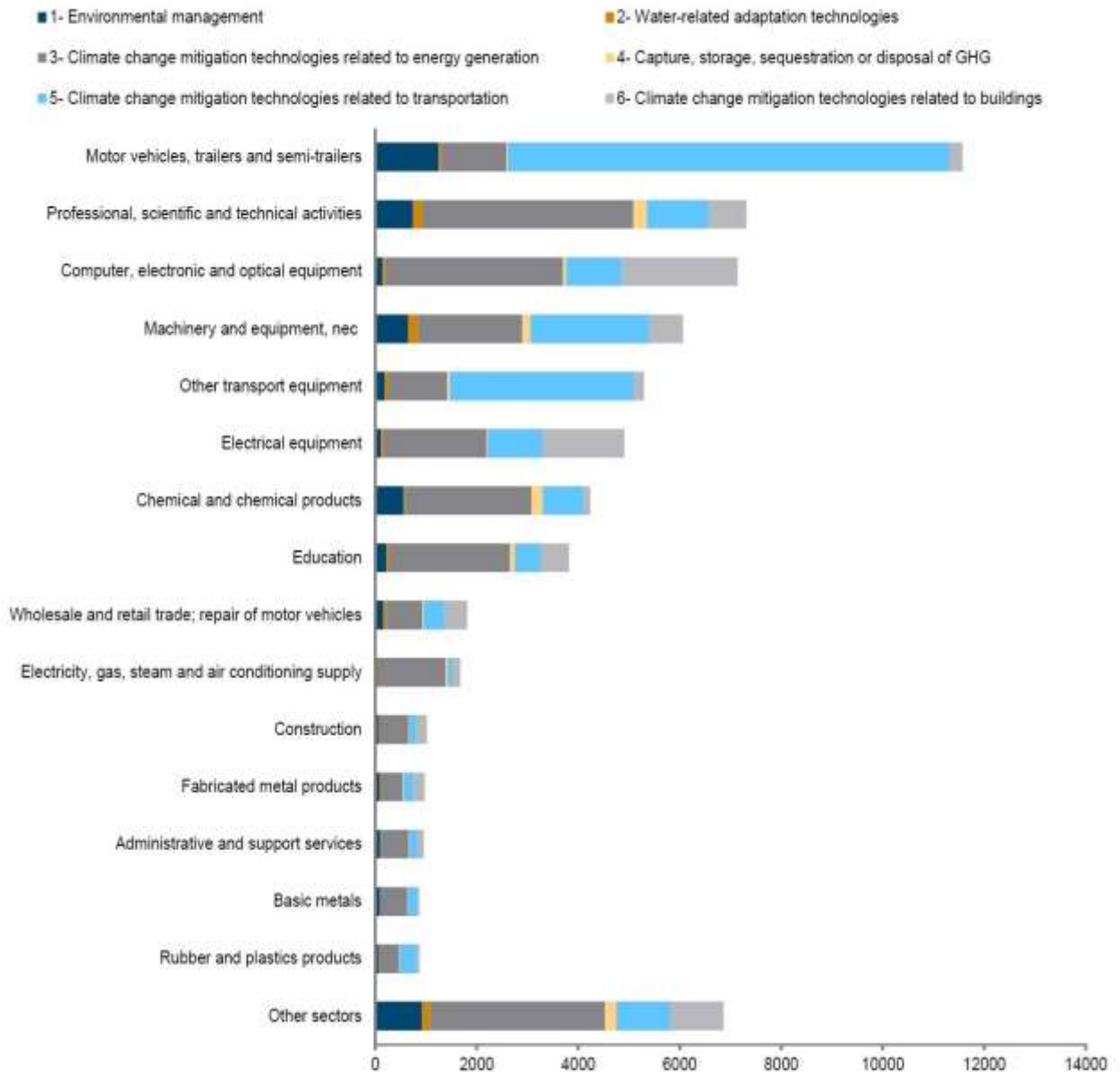


(Source: <https://www.managingip.com/article/2a5cyvd153v4r4eefm328/earth-day-2021-analysis-of-green-technology-patent-trend>)

<sup>20</sup> 'Resources, Conservation and Recycling Advances'(ELSEVIER) <<https://www.sciencedirect.com/science/article/pii/S2667378923000044>>accessed 5 June 2024

**FIGURE 2: TOTAL NUMBER OF PATENTS GRANTED BY SECTOR AND ENVIRONMENT TECHNOLOGY 2015-18**

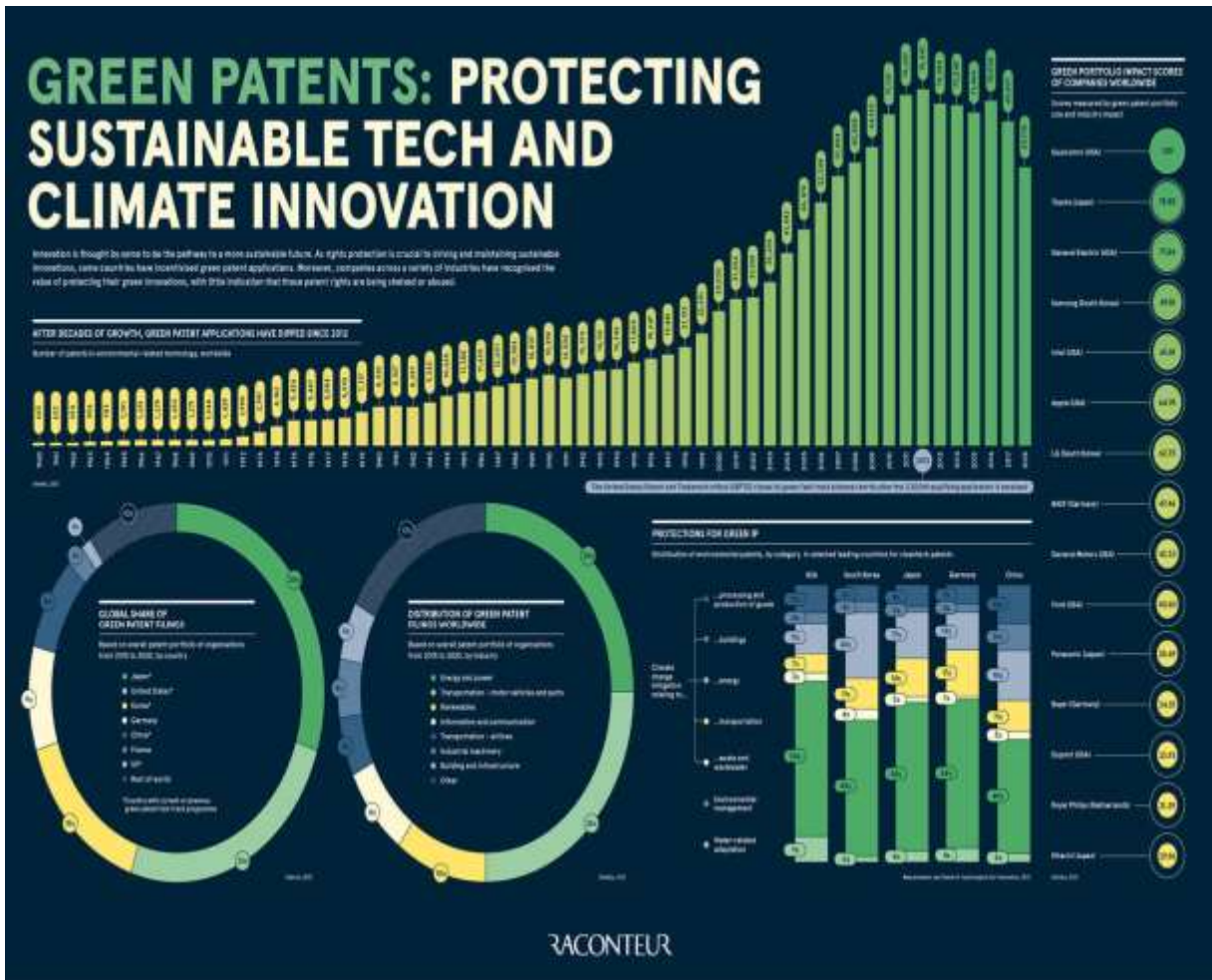
**Figure 6 / Total annual number of patents granted, by sector and type of environmental technology, averaged over period 2015-2018**



Source: Amadeus, authors' calculations, downloaded March 2022.

(Source: <https://wiiw.ac.at/patents-as-green-technology-barometers-trends-and-disparities-n-615.html>)

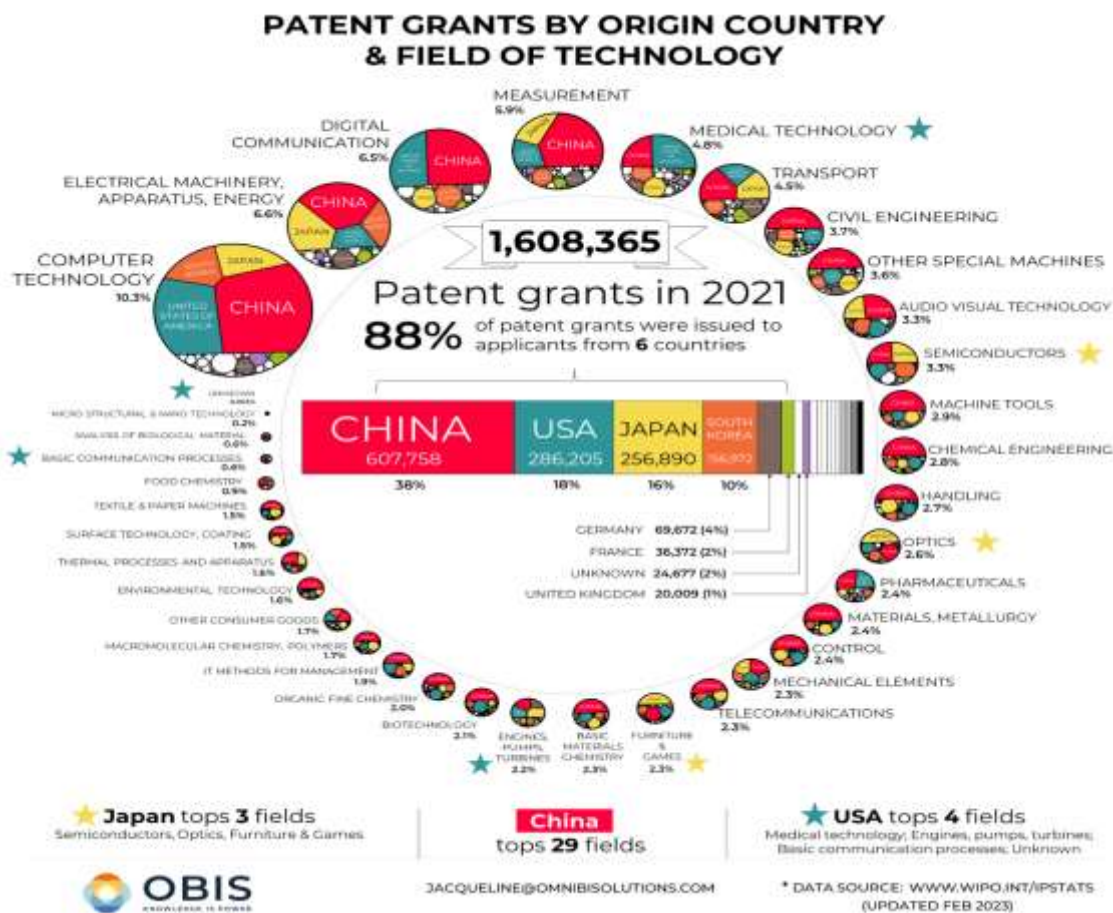
**FIGURE 3: GREEN PATENTS: PROTECTING SUSTAINABLE TECHNOLOGY AND GREEN INNOVATIONS**



(Source: <https://www.raconteur.net/infographics/green-patents-protecting-sustainable-tech-and-climate-innovation>)

The afore mentioned figure is a testament to the number of green patents that have been filed by various nations and the amount of carbon footprint that they can save by walking on the path of environment protection. Green patents not only protect sustainable technology but also foster climate innovation. They bring a harmonious balance between the many perils of technology and the need to save the environment from the same. The growth of economy is a must if a nation has to survive but simultaneously the preservation of the environment is also a must if the humanity has to survive.

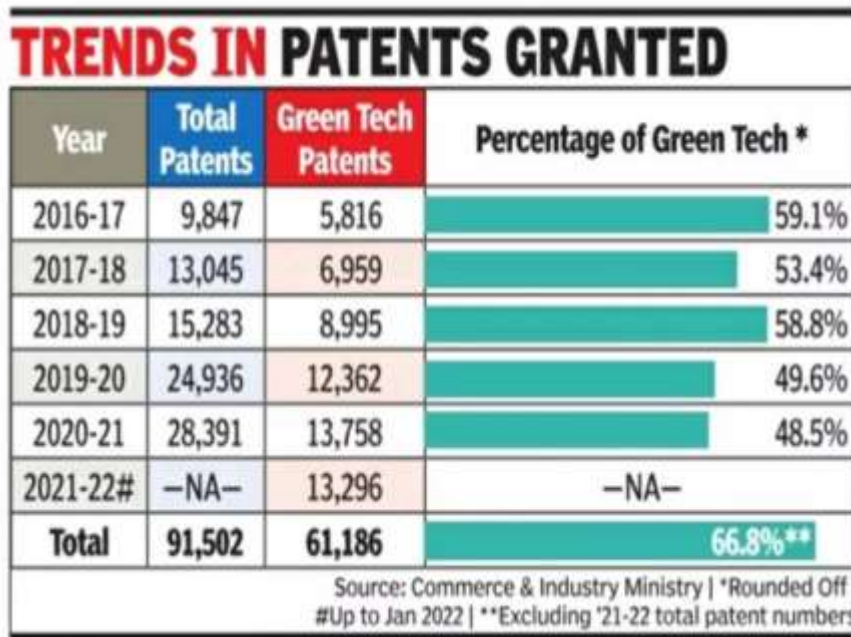
**FIGURE4: PATENTS GRANTED TO COUNTRIES AND THE FIELD OF TECHNOLOGY IN WHICH THEY WERE GRANTED**



(Source: [https://www.visualcapitalist.com/cp/countries-new-patents/#google\\_vignette](https://www.visualcapitalist.com/cp/countries-new-patents/#google_vignette))

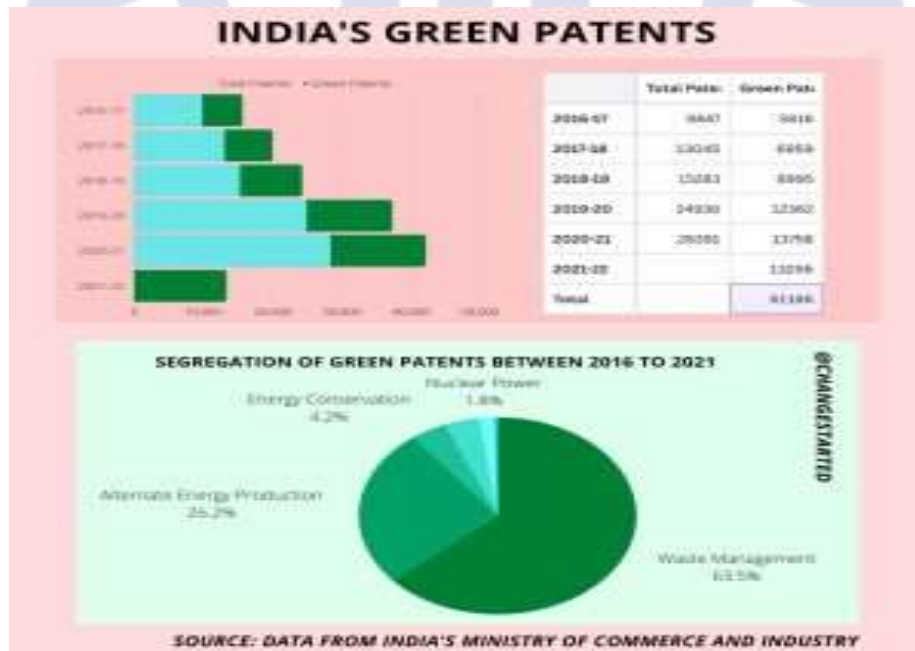
From these figures, it can be seen that the number of green patents that have been applied are numerous and have increased by the year. Most number of patents have been filed in Far Eastern and Scandinavian Nations and the highest number has been filed in the field of transportation and scientific sectors, which are the areas whereby these patents are needed as well. These sectors demand heightened levels of commitment to environment, as they are the biggest emitters of greenhouse gases. The demand of green patents has also been increased by the companies and the corporate industries because these are now counted in the environmental responsibility of these companies, which highlights well in their balance sheets, annual general meetings and in front of the shareholders who seek to invest in these companies. This data is also counted in the corporate social responsibility which has also become environmentally-inclined in the past years. In India, as well there is a growing trend of filing for green patents in numerous fields. The data given below, supports the fact mentioned above.

**FIGURE 4: TRENDS IN PATENTS GRANTED IN INDIA**



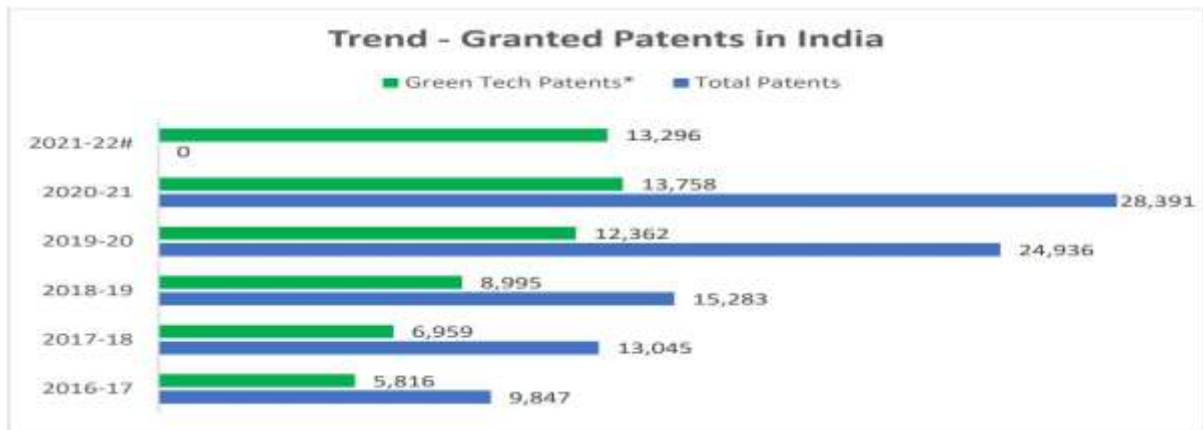
(Source: <https://timesofindia.indiatimes.com/india/every-2nd-patent-granted-since-2016-relates-to-green-tech-most-linked-to-waste-alternative-energy/articleshow/89420047.cms>)

**FIGURE 5: GREEN INNOVATIONS AND GREEN PATENTS IN INDIA**



(Source: <https://changestarted.com/green-innovation-and-green-patents-in-india/>)

**FIGURE 6: ACCELERATING THE FUTURE: THE RISE OF GREEN TECHNOLOGY AND GREEN PATENTS**



(Source: [https://www.google.com/search?q=green+patents+data+india&scs\\_esv= mosaic](https://www.google.com/search?q=green+patents+data+india&scs_esv= mosaic))

**FIGURE 7: INDIA'S GREEN PLEDGE**

# INDIA'S GREEN PLEDGE

### Solar energy

- Increased from 3.7 MW in 2005 to about 4060 MW in 2015.
- Enhance solar power capacity to 100 GW by 2022.
- Kochi Airport is the World's first airport to fully run on solar power.

### Wind energy

- 5th largest wind power producer in the world.
- Wind energy accounts for 23.76 GW (65.2%) of the renewable installed capacity.
- Aims to achieve a target of 60 GW of wind power by 2022.

### INDCs

- Currently running one of the largest renewable capacity expansion programs in the world.
- Will achieve 40% cumulative electric power installed capacity from non fossil fuel resources by 2030.
- Targets to lower the emissions intensity of its GDP by 33% to 35% by 2030 below 2005 levels.

### Clean Coal policies

- Nearly 61% of installed power capacity are coal-based.
- All new large coal-based generating stations have been mandated to use the highly efficient supercritical technology.

### Forest Cover

- Increased from 23.4% in 2005 to 24% in 2013.
- An additional carbon sink of 2.5 to 3 billion tonne of Carbon Dioxide equivalent, created by 2030.
- Long term goal: 33% of geographical area under forest cover.

### Biomass

- More than 70% of the population depends on it.
- Current installed capacity is 4.4 GW.
- Aims to increase biomass installed capacity to 10 GW by 2022.

(Source: <https://www.gatewayhouse.in/cop21-indias-green-pledge/>)

The aforementioned figures point out to the commitment of India's citizenry as well as the governance to deal with the issues that are plaguing the nation itself and the world, in terms of environment and other related ecological issues. This is a big step in the field of green technology and the harmonious balance that has to be strived between environment and economic development.

### **III. PERVASIVENESS OF GREEN PATENTING IN INDIA AND THE WORLD: FROM AGRICULTURE TO TELECOMMUNICATIONS**

WIPO (World Intellectual Property Organisation) Green, a global platform by WIPO, serves as an online marketplace for promoting green technology exchange, connecting key players in innovation and diffusion. It initiated the green pilot program in 2009, which expedites green patent applications ahead of general ones. WIPO GREEN Acceleration Projects have fostered innovation in areas such as renewable energy, waste management, and sustainable agriculture to address global environmental challenges in countries both developed and developing, coupled with release of the Green Technology Book for guidance and Intellectual property Management Clinic for road mapping. One interesting aspect is WIPO Green's recognition of the Indian Bhungroo technology, developed by Biplab Ketan Paul and Trupti Jain, in the Green Technology Book. This technology revolutionizes agriculture by storing excess rainwater underground, combating floods and droughts, empowering women farmers, and fostering sustainable development in rural communities. Similarly, the Green Channel program was introduced in 2009, accelerating patent processing for environmentally beneficial inventions. Japan recently joined WIPO Green, collaborating to boost green technology utilization. In Japan, partnering with WIPO came easily and it introduced the Green Transformation Technologies Inventory (GXTI) to categorize and search for patents related to green transformation efforts. Aligned with TCFD recommendations, GXTI aims to showcase companies' contributions to addressing climate change and transitioning from fossil fuels to clean energy.<sup>21</sup>

Green patents play several roles in promoting sustainable innovation: by providing legal protection and exclusivity to inventors in a more expedited manner, green patents encourage investment in research and development of sustainable technologies. The increased incentive, in turn, stimulates the search for new solutions and drives progress towards a greener economy.

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<sup>21</sup> 'Green is the New Black' (*The IP Press*) <<https://www.theippress.com/2024/03/26/green-is-the-new-black-exploring-green-technology-patents-as-corporate-initiatives-for-environmental-innovation/>> accessed 5 June 2024

Furthermore, a faster protection process facilitates technology transfer, facilitating the licensing and sharing of sustainable technologies, enabling wider and faster adoption of these innovations, promoting the global dissemination of best environmental practices, and helping address environmental challenges on a global scale. Additionally, companies holding green patents are often seen as leaders in sustainability and corporate responsibility, attracting investments and conscientious customers, thereby encouraging other companies to follow suit and invest in sustainable solutions. This directly contributes to increased investment in sustainability. In summary, green patents drive the growth of the green economy as a whole, creating jobs and business opportunities in sectors such as renewable energy, sustainable transportation, organic agriculture, and clean technologies.<sup>22</sup> The most important place where green patents have shown a rise is the field of agriculture. Agriculture, by far is the most important field whereby the carbon and methane emissions are the highest due to excessive use of fertilizers and other products. However, slow growth rate in agriculture and agricultural techniques has always led to it being foreshadowed by other fields of technology and growth. But now a days, agricultural growth has increased manifold and so has the filing of patents in this field to showcase responsible practices of farming.

Green agriculture is at the crossroads of the three dimensions of sustainability – economic, environmental, and social – and contributes to achieving several Sustainable Development Goals. Green agriculture involves the **good management of natural resources, biodiversity and ecosystem services** while building **sustainable and resilient agroecosystems** capable of tackling current and future challenges. It is an important element for transforming local food systems by reducing the toll on natural resources, avoiding environmental degradation through high recycling rates and low use of external inputs while reducing poverty, increasing livelihoods and ensuring nutritional needs through sustainable policies and practices.<sup>23</sup> Green patenting in agriculture is essential because it not only helps in good yield, sustainability and supply chain distribution

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<sup>22</sup> 'Green Patents: Sustainable Innovation Driving the Future' (*Lexology*) <<https://www.lexology.com/library/detail.aspx?g=11a17f76-f6ab-4cb9-8feb-9718a42801fa>> accessed 5 June 2024; Ankit Singh and Yogendra Srivastava, *Patent Law, Green Technology, and Innovation* (2022); Dylan O. Adams, *Patents Demystified: An Insider's Guide to Protecting Patents and Innovations* (2015); Richard Stim, *Nolo's Patents for Beginners* (2001); P. Narayana, *Patent Law* (1998); Henry J.A. Charmasson, *Patents, Copyrights and Trademarks* (2004); *Patent Searching: Tools and Techniques* (2007)

<sup>23</sup> Regional Technical Platform on Green Agriculture, (*Food and Agricultural Organisation of United Nations*) <<https://www.fao.org/platforms/green-agriculture/about/en#:~:text=Green%20agriculture%20involves%20the%20good,tackling%20current%20and%20future%20challenges>> accessed 5 June 2024; Masanobu Fukuoka, *The One Stroke Revolution: Introduction to Natural Farming* (1975); Vaclav Smil, *How the World Really Works* (2022); Masanobu Fukuoka, *The Natural way of Farming: Theory and Practice of Green Farming* (1975); Ottrai Vaikol Purattchi, *Handbook of Agriculture: Facts and Figures for Farmers, Students and All Interested in Farming* (2009); Gabe Brown, *Dirt to Soil: One Farmer's Journey into Regenerative Agriculture* (2018)

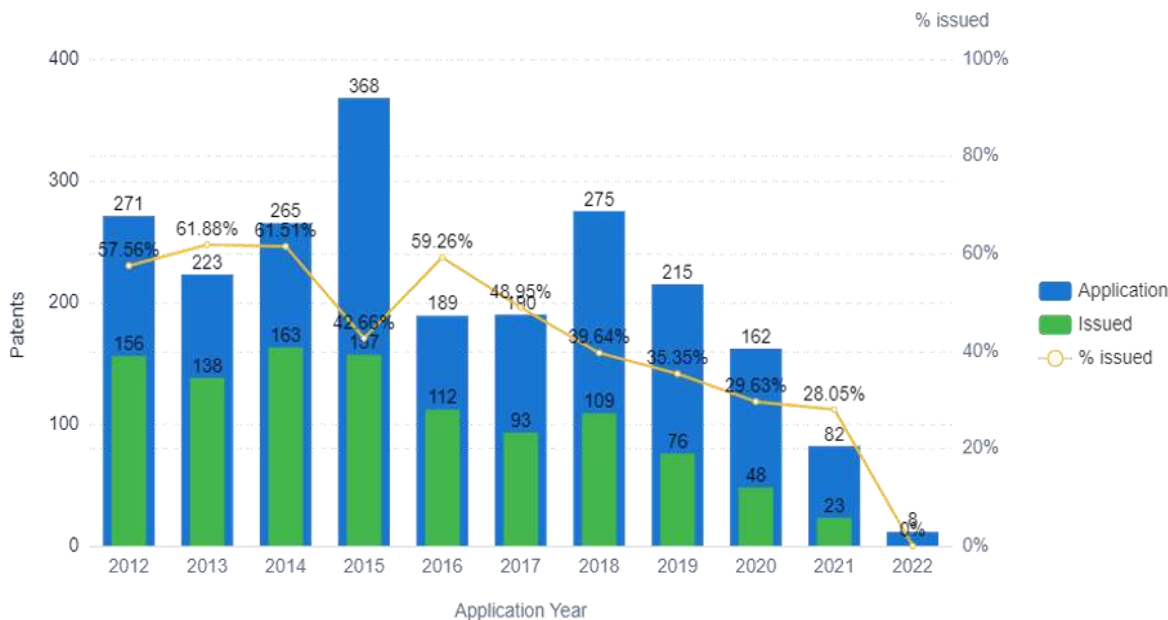
mechanisms, processing to principles of output and input. There have been growing trends in the filing and grant of green patents in the field of agriculture which have also been successful in aiding the issue of sustainable development on a larger scale. This process has helped in furthering the principles of green technology and green development.

**FIGURE 8: GREEN AGRICULTURE AND METHODOLOGICAL PRACTICES**



(Source: <https://www.adventip.com/blog/nebraska-agtech-patent-landscape>)

**FIGURE 9: GROWTH AND GRANT OF GREEN PATENTS**



(Source: <https://www.adventip.com/blog/nebraska-agtech-patent-landscape>)

IPR in agriculture are used to protect goods or services produced in agricultural sector and mainly deals with patents, plant breeder’s right, trademarks, geographical indications, and trade secrets. India Patent Act 1970 and subsequent amendments to it provided patents for agricultural tools and

machinery or the processes of development of agricultural chemicals. Till the beginning of 2005, only method inventions relating to substances prepared by chemical processes were patentable. Then Government of India passed the Protection of Plant Varieties and Farmers' Rights (PPV&FR, hereinafter) Act in 2001. It became the world's only IPR legislation on plant varieties that recognised and protected the rights of both breeders as well as farmers maintaining traditional landraces. The PPV&FR Authority set up under the Act started functioning from 2005. The PPV&FR Act entitles farmers to save, use, sow, re-sow, exchange, share or sell their produce, including seed from a protected variety, as long as they do not resort to branding or packaging of the variety for commercial purposes. At the same time, breeders have exclusive rights for the commercial production, sale, marketing, distribution, and export of their protected varieties. Further, any plant breeder or researcher can use a registered variety for conducting experiment and research, or as an initial source of genetic material (parent) for the purpose of developing another variety. This is acceptable so long as the protected variety is not used as parent repeatedly for the production of commercial seed, which requires the prior authorisation of the original breeder/farmer.<sup>24</sup> Agricultural innovations include developing healthier, safer, and more nutritious food for humans and animals (for example, genetically modified seeds, new breeding techniques). In the agricultural sector, innovation drives productivity. However, there are grey areas in the Act which helps the unscrupulous to steal the varieties and develop substandard seeds which results in crop failure for the farmers. Agriculture has made some remarkable advances in recent decades, especially in the transfer of beneficial traits into many crops that would otherwise face extinction due to diseases, droughts, and pests. With the help of resistant seed varieties, crops can provide greater yields while at the same time requiring fewer chemical fertilizers. It is particularly valuable for farmers in developing countries such as India.<sup>25</sup> A significant contribution can be made to poverty reduction, malnutrition, food security, and disease control through the use of this part of agricultural innovation. Farmers, researchers, private businesses, advisors, non-governmental organizations (NGOs), consumers, and many others are involved in guiding, supporting, creating, transferring, or adopting agricultural innovations, and also advising and informing farmers and the public about them. The importance of intellectual property protection for agricultural innovation has grown over the last few decades in India. Even though investing in innovation is one of the primary drivers of economic growth, governments are constrained when it comes to funding innovative projects, including agricultural research and development. Crop innovation

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<sup>24</sup> 'IPR, Innovation and Agriculture' (*Federation of Seed Industry of India*) <[<sup>25</sup> \*Ibid.\*](https://fsii.in/ipr-innovation-agriculture/#:~:text=India%20Patent%20Act%201970%20and,of%20development%20of%20agricultural%20chemicals.>accessed 5 June 2024</a></p></div><div data-bbox=)

involves five stages – discovery, proof of concept, early development, advanced development, and pre-launch which It can take between 10-15 years to develop commercially viable seeds. Hence, patent protection and regulatory compliance allow investors to make long-term investments in innovation. Consequently, IP rights have received increasing attention for supporting agricultural development, including foreign direct investment (FDI), technology transfer, trade, access to genetic resources and protection of traditional knowledge. In addition, intellectual property rights, primarily patents, have enabled plant genomics research to grow. Researchers are using advanced genomics to identify, map, and understand the gene expression of crops and their relationship to agriculturally significant traits. IP rights play a key role in enabling companies to attract investors and generate the returns necessary to recoup development costs and invest in further R&D (research and development).<sup>26</sup> Lack of IP rights discourage innovators to invest such huge sum of money to a technology. A balance between protecting the IP rights of breeders and allowing the technology flow to benefit the farmers and the whole ecosystem has to be implemented. This can only happen when there are strict actions taken for unscrupulous activities that can harm not only the technology but farmers who are vulnerable to a crop failure. This is great setback for the genuine market players who started with the vision of empowering the farmers with a breakthrough product but ends up losing trust and a return on investment.<sup>27</sup>

Likewise, there is filing of green patents in the field of telecommunications and also in the field of transportation and communications. Business houses have also striven to grow more and more in the field of green technology. Modern businesses have both external and internal pressures motivating decision makers to adopt and develop green technologies. At the same time, industry-wide green trends are also swaying customer expectations and market demands for responsible

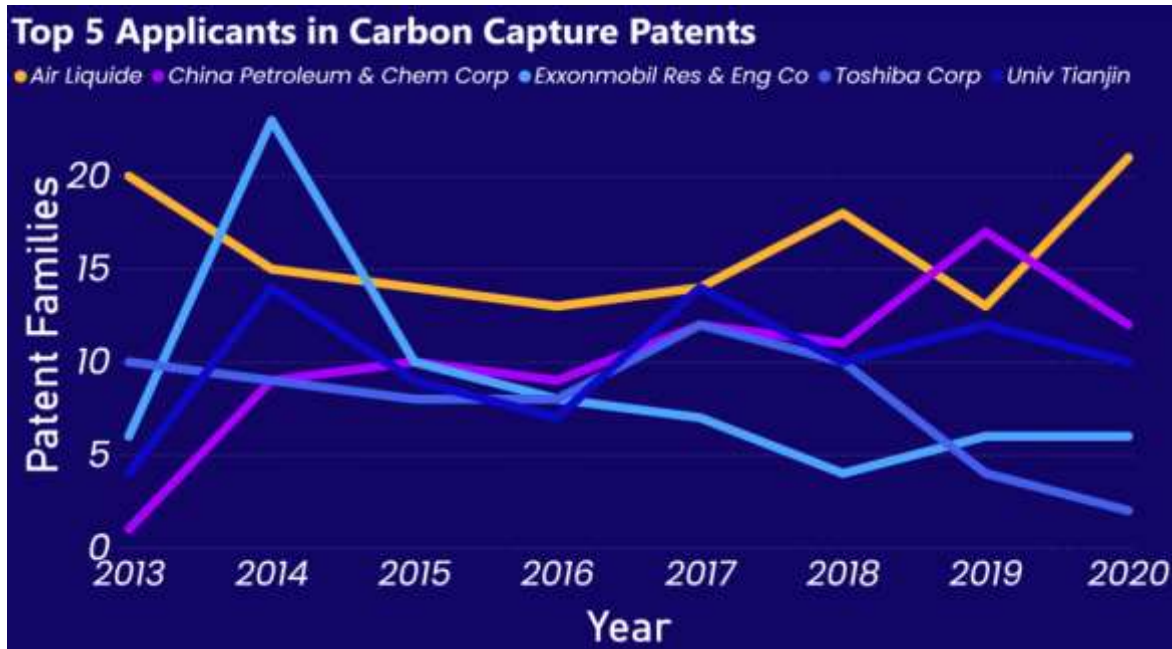
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<sup>26</sup> IPR, Innovation and Agriculture’ (*Federation of Seed Industry of India*) <<https://fsii.in/ipr-innovation-agriculture/#:~:text=India%20Patent%20Act%201970%20and,of%20development%20of%20agricultural%20chemicals.>> accessed 5 June 2024; ‘The Presence of Patents in the Agriculture Sector’ (Global Patent Filing) <<https://www.globalpatentfiling.com/blog/presence-patents-agriculture-sector>> accessed 5 June 2024; ‘Patents’ (Tamil Nadu Agricultural University) <[https://agritech.tnau.ac.in/patents/patents\\_patents.html](https://agritech.tnau.ac.in/patents/patents_patents.html)> accessed 5 June 2024; ‘Patenting Activities in Agriculture from India’ <[http://www.nbpg.ernet.in/pgs-503/020\\_agril\\_patenting\\_india.pdf](http://www.nbpg.ernet.in/pgs-503/020_agril_patenting_india.pdf)> accessed 5 June 2024; ‘Agricultural Marketing Services’ (US Department of Agriculture) <<https://www.ams.usda.gov/rules-regulations/seed-liaison/patent-resources>> accessed 5 June 2024; ‘Patenting Agriculture’ (Science and Technology) <<https://issues.org/barton/>> accessed 5 June 2024; ‘Needles in Haystack: Patents that inspire agricultural innovation’ (McKinsey and Company) <<https://www.mckinsey.com/industries/agriculture/our-insights/needle-in-a-haystack-patents-that-inspire-agricultural-innovation>> accessed 5 June 2024; ‘Intellectual Property Rights and Some Issues’ (Policy Briefs) <<https://krishi.icar.gov.in/jspui/bitstream/123456789/697/1/pb4.pdf>> accessed 5 June 2024; ‘Plant Patents’ (European Patent Office) <<https://www.epo.org/en/news-events/press-centre/fact-sheet/447625>> accessed 5 June 2024

<sup>27</sup> *Ibid.*

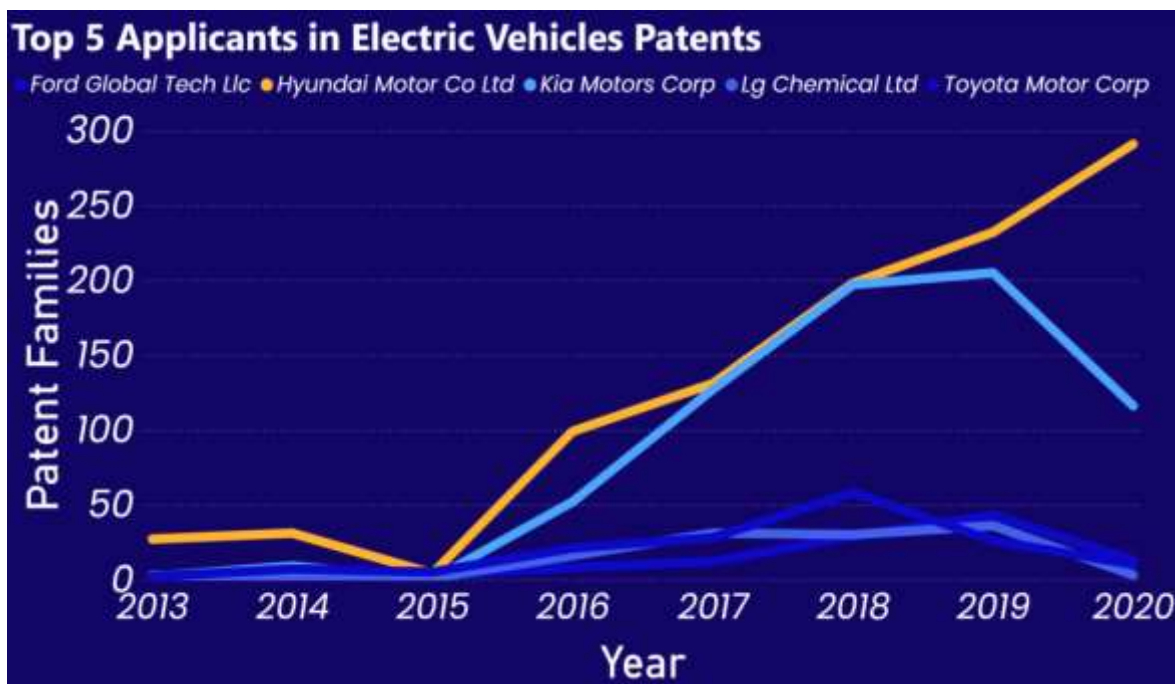
ecological practices in B2C (Business to Consumer) and B2B (Business to Business) organizations alike<sup>28</sup>.

**FIGURE 10: GREEN PATENTING IN THE ELECTRONICS' BUSINESS**



(Source: <https://iamip.com/green-technology-on-the-rise-exploring-patents-trends-over-the-recent-years/>)

**FIGURE 11: GREEN PATENTING IN EV BUSINESS**



(Source: <https://iamip.com/green-technology-on-the-rise-exploring-patents-trends-over-the-recent-years/>)

<sup>28</sup> 'How Investing in Green Technology saves Money of the Businesses,' (DIGI- Connect with Confidence) < <https://www.digi.com/blog/post/investing-in-green-technology>>accessed 5 June 2024

From the above observations and analysis of the data presented and conclusions drawn, it must be understood that patents have actually come a long way into the future, especially in terms of their role in the sustainable development environment whereby more and more patents have made their mark and have succeeded in bringing a more positive change in the green milieu of the otherwise monochrome IPR market.

#### **IV. CONCLUSION AND WAY FORWARD**

As a matter of fact, from the above discussion, it is quite clear that green IP or green intellectual properties must be furthered in their agenda and given a lot of promotional advantage on the national and international arena, so that majority of the business ventures and economical sectors can contribute to the goals of sustainable development. It is as clear as day light that in order to conserve the depleting natural resources which are not in abundance, pro-active approach, and initiatives by the Governments in collaboration with private sector is need of the hour. As a consequence, several nations have come together and had taken initiatives by making huge and effective investments in R&D of green technological innovations Listed herein below are a few initiatives for enhancement and protection of Green IP.<sup>29</sup>

1. **IPC Green Inventory:** Launched on 16.09.2010, is an initiative taken by WIPO. It is an online platform linked to the International Patent Classification (IPC) system that facilitates searches for patent information relating to environmentally sound technologies (ESTs)<sup>30</sup>.
2. **Clean Energy Research Centre:** Initiated by US-China in 2009 to facilitate joint research and development of clean energy technologies by specialized teams of researchers, scientists, and engineers from both the countries. A US-China Renewable Energy Forum has also been established to facilitate cooperation on IP matters related to clean energy.<sup>31</sup>
3. **Joint Clean Energy Research and Development Centre (JCERDC):** An initiative launched by US-India in 2009 for advancement of Clean Energy and address global energy and environmental sustainability challenges.<sup>32</sup>
4. **Green Technology Pilot Programme:** Created by United States Patent and Trademark Office (USPTO) in 2009 to accelerate the examination of patent applications related to

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<sup>29</sup> 'Green IP' (A Way Forward to Sustainability, Mondaq) < <https://www.mondaq.com/india/trade-secrets/938054/green-ip--a-way-forward-to-sustainability>>accessed 5 June 2024

<sup>30</sup> *Ibid*

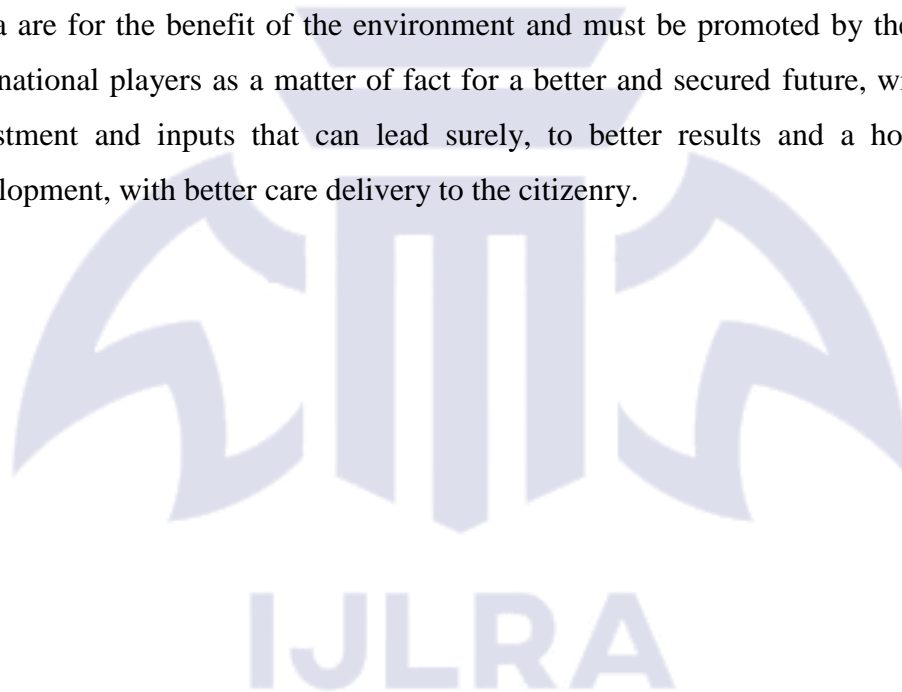
<sup>31</sup> *Ibid*

<sup>32</sup> *Ibid*

energy conservation, environment protection, green technologies, and reduction in carbon emission.<sup>33</sup>

5. The Eco-Patent Commons: Launch of an innovative green community, in February 2008, by large multinational firms such as Sony, IBM, Nokia etc., in collaboration with the World Business Council for Sustainable Development (WBCSD). This community aims to share knowledge and patents related to the environment, energy saving, pollution prevention, recycling, or water conservation. Each participating organization as well as any third party has free access to this community and no registration or notice is required to access the protected technologies.<sup>34</sup>

Conclusively, it is to be noted that all the technologies in the green intellectual property arena are for the benefit of the environment and must be promoted by the national and international players as a matter of fact for a better and secured future, with heightened investment and inputs that can lead surely, to better results and a holistic national development, with better care delivery to the citizenry.



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<sup>33</sup> *Ibid*

<sup>34</sup> *Ibid*