

DOES INTELLECTUAL PROPERTY SUPPORT CLEAN ENERGY?*

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To combat climate change, we need to use clean energy that is built on special technology, and this technology is protected by intellectual property rules, but the question is whether intellectual property rules can develop clean energy technology and do these rules participate in the diffusion of this technology all over the world? This paper assumes that we can answer this question in the affirmative. In this study, we will discuss in particular the following questions: (1) why do we need clean energy? (2) does intellectual property support clean energy? and (3) what is the relationship between clean energy, IP and climate change? This paper will use an inductive and analytical model in seeking to answer these questions. It is important to understand the relationship between intellectual property and clean energy taking into consideration the aim of using clean energy.

1. Theoretical context

There is a strong relationship between clean energy technology and intellectual property rules, but this relationship might be different according to stakeholders and financial investors. On the other hand, intellectual property can have a huge effect on global warming by giving full protection to clean energy technologies, however, the integration between increasing investment in clean energy technology and supporting its use and spread on a large scale at the level of states to fight global warming, still requires the further formulation of effective instruments in this area.

2. Hypothesis and methodology

The hypothesis of this research is that intellectual property rules support clean energy technology at the level of investment and production of clean energy. On the other hand, intellectual property rules might hinder the use of clean energy on a larger scale, especially in poor and less developed countries, but they are also the main guarantee to an increase in the level of research and innovation in this technology. An analytical approach will be used to analyze the relationship between intellectual property rules and stakeholders, beside analyzing the statistical result and connecting it with the frame of the main question of the research.

3. Conceptual framework

The international community nowadays is turning its attention increasingly to climate change, and this leads to the important question of whether intellectual property is a real obstacle for some countries in seeking technologies of clean energy to reduce carbon emissions or mitigate climate change. To answer this question, we need to develop a

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conceptual framework consistent with the relationship that brings these elements together: intellectual property, climate change and clean energy. Intellectual property rights permit the creators, or owners, of patents, trademarks or copyrighted works to benefit from their own work or investment in a creation (WIPO 2017, 3). These rights have been mentioned clearly in the Universal Declaration of Human Rights, which provides for the right to benefit from the protection of moral and material interests resulting from inter alia authorship of scientific, literary or artistic productions and energies based on inventions². The term clean energy is used to describe sustainable energy generation technologies such as photovoltaic, wind turbines, bioreactors, etc.³ The United Nations Framework Convention on Climate Change defined the meaning of climate change as: "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods".⁴ Every year human activity dumps roughly 8 billion metric tons of carbon into the atmosphere, 6.5 billion tons from fossil fuels and 1.5 billion from deforestation (Alrikabi 2014, 61).

4. The relation between IP, clean energy and climate change

We can figure out the possibility of mitigating global emissions by working on and implementing renewable energy technology that can mitigate its share of global emissions (Downey 2012, 89). The way ahead is marked by acquiring and adapting renewable energy technology from other countries (Downey 2012, 90). It is a forgone matter that the effects of climate change have been increasing ever since the industrial revolution (Maslin 2014, 6), but if climate change is going to be addressed successfully, clean technology must be adopted globally (Reichman 2008, 4). However, the annual Tracking Clean Energy Progress report 2017 shows that the transformation towards a clean energy system doesn't align with current international policy goals (*OECD-IEA, 2017: 2*). Many technology areas suffer from a lack of policy support, and this impedes their scaled-up deployment. Energy efficiency, bioenergy and carbon capture and storage (CCS) are notable examples of where significant potential for technological progress remains, but strong policy signals will be required to trigger the appropriate investments. The United Nations Framework Convention on Climate Change lists the transfer of clean energy technology among measures that can "control, reduce, or prevent" greenhouse gas emissions, and many of the Parties to the Convention who are leading the way in clean energy investment have come to recognize renewable energy as an important part of clean energy.

² Article 27 of the Universal Declaration of Human Rights

³ https://en.wikipedia.org/wiki/Environmental_technology#Renewable_energy

⁴ The key international agreements on climate change are the original United Nations Framework Convention on Climate Change (UNFCCC) (signed in 1992 and entered into force in 1994) and the Kyoto Protocol (signed in 1997 and entered into force in 2005), so far the most important implementation of the UNFCCC, see Barton, 2007: 2.

5. Importance of clean energy to climate change

Climate change is highly linked with other environmental issues from which we cannot separate it (Alhayali et al. 2017, 98). The effects of climate change were once considered unthinkable and now are sought to be avoided. Climate change, also called "global warming" is the most serious and most complex environmental issue ever to be confronted by the international community. The intensive use of traditional energy, which relies on fossil fuels, petroleum and its derivatives, coal and natural gas, causes serious damage to the environment and life, causing global warming, acid rain and many environmental disasters and climate change. This was one of the reasons that led to the search for clean energy sources which can generate energy without adversely affecting human health and the environment. This is achieved by relying on renewable sources of energy that are generated naturally and sustainably without causing any kind of harmful waste. International efforts to reduce reliance on fossil fuels and cut carbon emissions by focusing on renewables have continued to grow. China, for example, set emissions limits in 2017 for power companies' use of fossil fuels, as part of efforts to slow down their consumption of coal, gas and oil (Ross 2018). The United Nations Framework Convention on Climate Change⁵ lists the transfer of clean energy technology among measures that can "control, reduce, or prevent" greenhouse gas emissions, and many of the Parties to the Convention who are leading the way in clean energy investment have come to recognize the importance of clean energy. In recent years, some of the largest investors in clean energy have made forms of renewable energy the vast majority of their investment portfolios. The main advantage of using renewable resources is that they are available throughout the year. Through a one-time investment we can draw energy for many decades without affecting the environment (Alrikabi 2014, 61). In the case of Massachusetts et al. (petitioners) vs. Environmental Protection Agency the Supreme Court of the United States considered motor-vehicle emissions targets as a piecemeal approach to climate change that would conflict with the comprehensive approach involving additional support for technological innovation.⁶

6. Intellectual property vs. clean energy

This question is correlated with the assumption that intellectual property affects the trend of clean energy industries as well as affecting the diffusion & implementation of clean energy, especially in developing countries. Hence, we need to clarify what the protectionism of clean energy technology means and then the effect of intellectual property on the transfer of clean energy technology.

⁵ The UN Framework Convention on Climate Change (UNFCCC) is an intergovernmental treaty developed to address the problem of climate change. The Convention, which sets out an agreed framework for dealing with the issue, was negotiated from February 1991 to May 1992 and opened for signature at the June 1992 UN Conference on Environment and Development (UNCED) — also known as the Rio Earth Summit. The UNFCCC entered into force on 21 March 1994, ninety days after the 50th country's ratification had been received. By December 2007, it had been ratified by 192 countries.

⁶ Massachusetts v. Environmental Protection Agency, 127 S.Ct. 1438 (2007) 549 U.S. 497 No. 05-1120. decided on April 2, 2007. <https://www.courtlistener.com/opinion/145749/massachusetts-v-epa/>

6.1 Protectionism of clean energy's technology

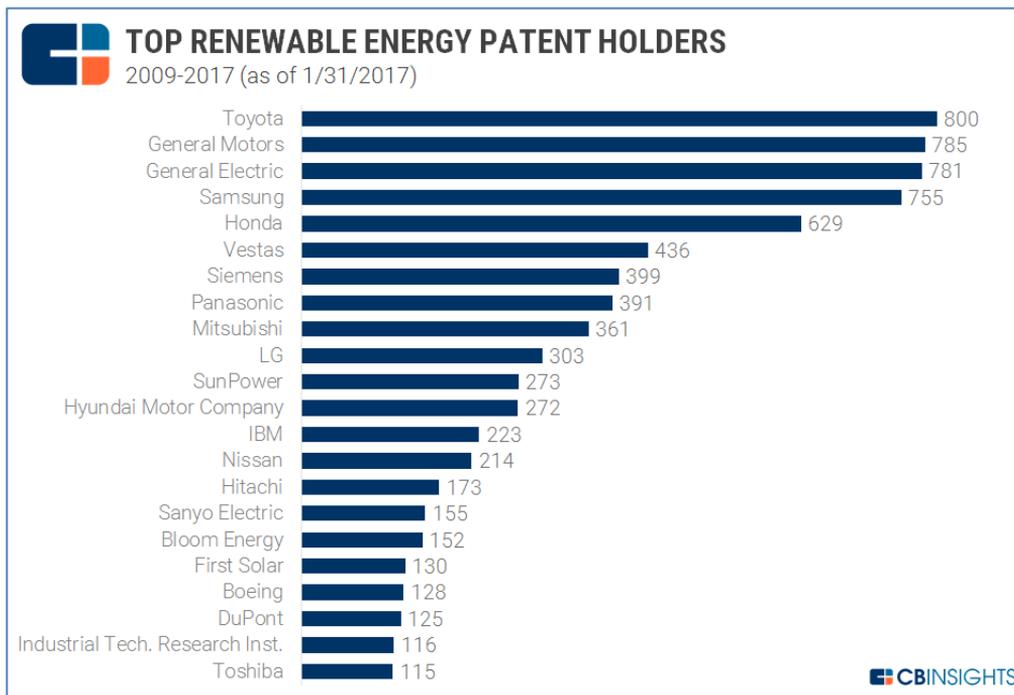
Could the protectionism of clean energy technology lead to a more monopolistic industry? Some argue the oligopolistic environment associated with clean energy technology that is protected by intellectual property rules may limit the spread or use of this technology, whether on a local, sectoral or company level and this limitation might even extend to third world countries, even though it is a fact that IP plays a crucial rule in the lucrative clean energy sector. However, it is not doubtable that without the protection given by intellectual property this sector will collapse. Furthermore, this protectionism became of more importance due to the competitive situation of clean energy companies. As such, patent infringements will cost the competitors a lot of money: for instance, in the case GE vs Mitsubishi Heavy Industries in 2010, the court awarded GE approximately \$170 million in damages for infringement of the patent no. 705 related to wind turbines in the U.S by Mitsubishi Heavy Industries, the fifth largest wind turbine manufacturer (Villalta 2017).

6.2 Patenting of clean energy technologies

A patent is a partial indicator of invention and is used to measure countries' ability of innovation and to identify emerging technologies that can be marketed. Generally, patents mean inventiveness and more patents suggest more innovation is happening, which means better market opportunity (Cornwall 2017). Some argue that the investment and innovation together would reveal new supplies of renewable energy (Saha et al. 2017, 3). Over time, growth in patents issued in clean tech fields outpaced patents overall and outpaced high-tech fields including pharmaceuticals or biotechnology (Ciccatelli 2018). According to a specific survey conducted by the Brookings Institution, the number of patents issued related to clean energy increased from 15,970 in 2009 to about 35,000 in 2014 and 2015 and to 32,000 in 2016 (Cornwall 2017). The results of the study reveal that more than 14,800 renewable energy patents were filed worldwide in 2017 – a 43 per cent rise on the 10,500 in the previous year and also found that patents related to clean energy have almost doubled over the last five years, up from 7700 in 2013. And more than half (56 per cent) of the total green energy patents filed last year were for solar power (Ross 2018). On the other hand, companies in China filed 76 per cent (11,300) of the renewable energy patents in 2017, the most of any country, while the US, in second place, filed 10 per cent (1500). China is currently the biggest manufacturer of solar panel technology and invested more than \$44bn in clean energy projects in 2017 according to the Institute for Energy Economics and Financial Analysis. In third place was Australia, followed by India, Canada, Russia, the UK, South Korea, Malaysia and the Philippines (Ross 2018). The rising profitability of green energy has prompted many companies to invest in developing and filing patents as innovation races ahead. As a result, more companies globally are now increasingly incentivized to invest in research and development. Clean energy products are increasingly being patented—and—some businesses may be racing to patent products, to avoid potential difficulties if obtaining patents in EU countries becomes more difficult than is currently the case (Ross 2018).

Figure 1

Top renewable energy patent holders 2009 –2017⁷



Source: CB insights on <https://www.cbinsights.com/research/renewable-energy-patents-trends-corporates/>

6.3 Clean energy technology transferring

Intellectual property protection generally plays a quite different role in the renewable energy industry than it does in another sector involved with intellectual property, such as the pharmaceutical sector.⁸ The role of intellectual property rights is highly complicated in relation to this issue. The international diffusion of clean energy technologies has been a cornerstone since the adoption of the United Framework Convention on Climate Change (UNFCCC). However, the impact that intellectual property rights may have on clean energy technology transfer is highly unclear⁹. We need to take into consideration that technology transfer is central to addressing climate

⁷ Figure 1 shows that most patents are owned by companies within developed or emerging economies. This Figure does not show patents owned by developing countries. The following can be concluded: clean energy technology needs an appropriate infrastructure where it can flourish while third world countries lack the ability to provide this.

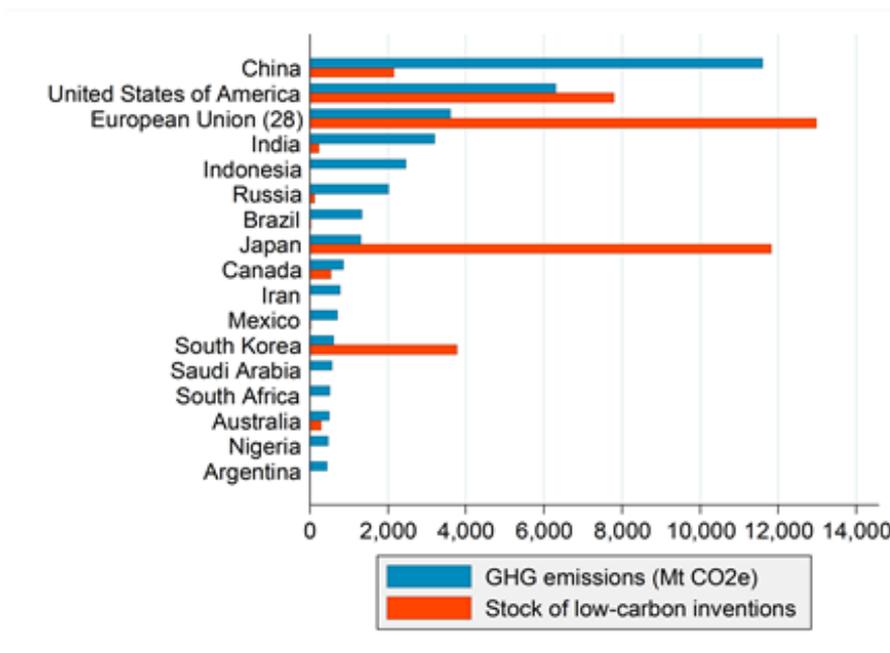
⁸In general, in the pharmaceutical sector, an individual patent may have a very substantial impact, for a specific drug may not have any substitutes. In such circumstances, the patent holder is in a very strong market position and may be able to charge a price well above production cost. In contrast, in the renewable sectors, the basic approaches to solving the specific technological problems have long been off-patent.

⁹ The disagreement over the effect of IPRs on low-carbon technology transfer is at least partly explained by the absence of empirical evidence on the subject: besides, the Paris Agreement did not make any mention of intellectual property rights (IPRs).

change (Correa 2011, 39); the development and transfer of technologies required for adaptation and mitigation constitute one of the major challenges faced by the international community while the commitments made in the Paris Agreement require all countries to adopt clean energy technologies in all their sectors.

Figure 2

GHG emissions and low-carbon inventions



Source: the European Patent Office’s Global Patent Statistical Database.

Strengthening intellectual property rights protection has a statistically significant positive effect on the transfer of most low-carbon technologies (Dussaux et al. 2017, 6). On the one hand, developed countries see a strong IPRs regime as a necessary condition for technology transfer. On the other hand, some developing countries consider that strong IPRs protection may hinder technology transfer. As a reflection on this lack of consensus, what is the empirical evidence? Clean energy transfer mostly takes place in two ways: one of them is presented by international trade in capital goods that are used to reduce emissions (e.g. wind turbines, energy efficient furnaces, electric vehicles)(Dussaux et al. 2017, 6), and foreign direct investment (FDI)¹⁰ by multinational enterprises that own low-carbon technologies. The vast majority of clean energy technologies are still invented in developed countries. In this regard, developed

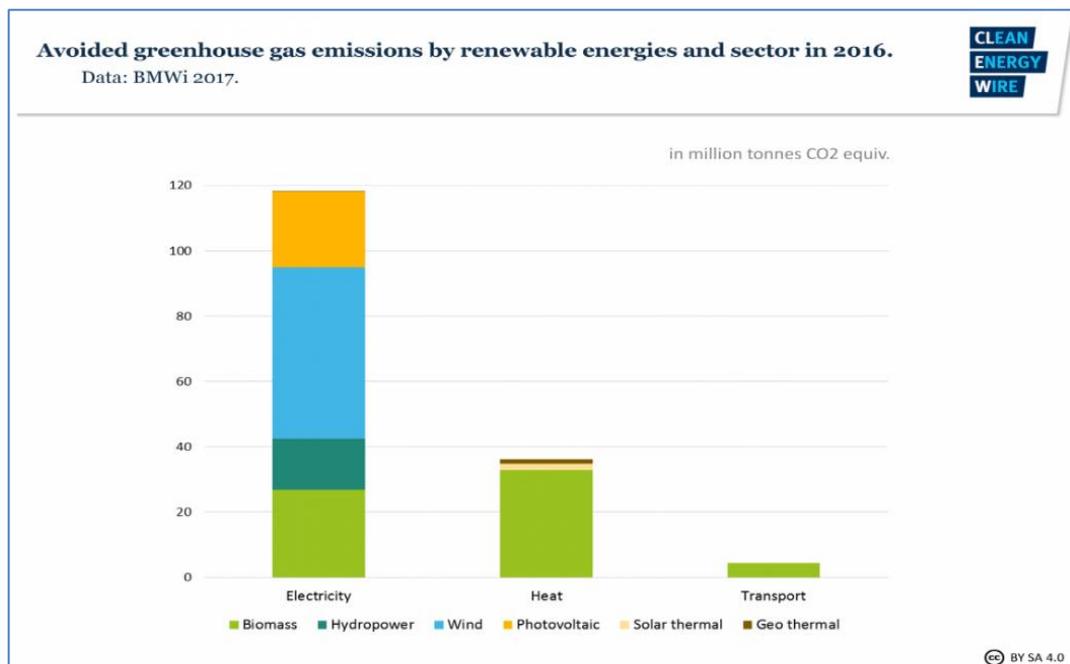
¹⁰ Foreign direct investment (FDI) is an investment made by a firm or individual in one country into business interests located in another country. Generally, FDI takes place when an investor establishes foreign business operations or acquires foreign business assets, including establishing ownership or controlling interest in a foreign company. Read more: Foreign Direct Investment (FDI) <https://www.investopedia.com/terms/f/fdi.asp#ixzz5UmscGhA3>

countries were far ahead and they still take the lead in the field of clean energy (UNIDO, et al, 2014: 156). For example, Japan, USA, Germany, South Korea, and France together account for 75% of the low-carbon inventions patented globally from 2005 to 2015.¹¹

Figure 2 illustrates the important need for transfer from developed countries to developing countries by comparing the greenhouse gas (GHG) emissions in 2012 with the number of low-carbon inventions developed in each country until the end of 2014. It is clear from Figure 1 that there are huge discrepancies between countries’ GHG emissions and their capacities to innovate in mitigation technologies. While Europe, Japan, the USA and South Korea have large innovative capacities compared to their GHG emissions, the opposite is true for emerging economies such as China, India, Indonesia, Russia, and Brazil.

Figure 3

Avoided greenhouse gas emission by renewable energies and sector in 2016



Source: clean energy wire.http://: www.cleanenergywire.org/

This Figure demonstrates the positive relationship between low gas rates and the steady use of clean energy technology and this supports the importance of clean energy technology in providing a safe and pollution-free environment.

¹¹ Wide access to clean technologies is crucial to meet the Paris Agreement goal of limiting the increase in global temperatures to well below 2 degrees Celsius. This requires considerable technology transfers from North to South as 90 per cent of the increase in global carbon emissions until 2050 is expected to occur in the developing world.

Conclusions

IPRs constitute an incentive to promote innovation and facilitate the international transfer of technology by offering protection against a loss of control of information. The changes in IPR protection have large effects on the transfer of technology to developing countries; besides, IPRs increase and encourage investment in clean energy technology and there is a trend that argues that a strong IPR is never a barrier to the transfer of clean energy technologies. It was also noticed that there is a close relationship between IP rules and climate, this relationship is demonstrated by technologies that rely on clean or renewable energy and are protected by intellectual property rules. There is a strong relationship between clean energy technology and infrastructure creation in developing countries. In the end, we make the following suggestions:

- 1) States, whether in the World Trade Organization or the United Nations Framework Convention on Climate Change (UNFCCC), should be willing to participate in constructive discussions on intellectual property rights and the transfer of low-carbon energy technologies.
- 2) States have to recognize in their domestic legislation that a clean environment is a fundamental human right.

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