



Review

Corporatization of the climate? Innovation, intellectual property rights, and patents for climate change mitigation



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ABSTRACT

Patents constitute an important economic mechanism incentivising the development of technologies. Given the immediacy of the need for global access to effective emission cutting technologies, the role of patents requires further consideration in the general climate change mitigation discourse. This paper aims to address this issue, presenting arguments on the role of the patent system from general intellectual property literature, as well as insights from specialized technological fields. The authors find that although patents provide a strong economic incentive for innovation, they limit the further commercialization of mitigation technologies based on previously patented materials and thus hinder global access to mitigation solutions. Development of mitigation technologies, specifically of renewable energies and carbon capture storage, requires predominantly an improvement of existing technologies. Therefore, patents are seen to restrict development and are perceived as an obstacle to climate change mitigation. In order to achieve the targets set by COP21, the transfer of patented technologies is a necessity. However, patents are found to act as one factor that can severely restrict the dissemination of technologies globally. Given these findings, the merits of open-source/copy-left systems of intellectual property deserve further study, especially with regard to their applicability to climate change mitigation solutions.

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¹ Technology Transfer in this context refers to the international transfer of technology rather than the diffusion of technologies within national contexts. Nonetheless the latter is also deemed to be an important aspect of further research.

1. Introduction

Climate change presents the international community with considerable challenges. The International Panel on Climate Change (IPCC) clearly reasons that in order to avoid the adverse effects

of climate change, technologies must be developed that can contribute to mitigating anthropogenic greenhouse gas emissions [1]. So far international efforts to mitigate emissions, so as to stay within the recommended warming threshold of 2 °C, have come short of targets. However, the resounding outcomes of the United Nations Framework Convention on Climate Change's (UNFCCC) 21st Conference of Parties (COP21), held in Paris last year, have set in motion a clear political precedent for swift action. Some progress can be observed in the development of technologies and processes aiming to reduce emission rates. However, the global scientific community is wary of the fact that global emissions continue to rise, making the reduction of atmospheric concentrations of greenhouse gases increasingly difficult [2]. For this reason, mechanisms facilitating technological advance and subsequent access to mitigation technologies should be reviewed in their ability to support climate change mitigation efforts in order to stay within the agreed "well below" 2° boundary.

Incentives for innovation are strongly influenced by economic mechanisms such as the protection of intellectual property (IP) to create a "marketplace for ideas" [3]. Patents, as a form of IP protection, constitute a mechanism that aims to facilitate innovation and the commercialisation of technologies, including those that can be seen as imperative to climate change mitigation efforts. There exists a large body of literature reviewing the outcomes of patent system on innovation more generally. More specifically there are an increasing amount of studies that review the outcomes of the patent system on the social benefits derived from medicines. However, given the salience of the topic, existing literature remains relatively silent on the role of patents in facilitating not only the development but also the transfer of climate change mitigation technologies. Although there are important papers that identify concerns within specialized technological fields, there is a discernible need for a more general review of these concerns, and the wider implications they have for the mitigation of climate change.

This paper reviews that literature which critically reflects on the topic of patents and climate change mitigation technologies. It reflects on the role of the patent system as a facilitating mechanism for technological development and considers several potential limitations, in particular with respect to its ability to generate innovation, facilitate the use of technological development as well as enable the transfer of technologies both nationally and internationally. The debate on the role of patents in facilitating innovation and the transfer of technologies is illustrated by examining existing barriers to technological development in the context of climate change mitigation. Finally the paper elaborates briefly on possible alternatives to the patent system. The paper serves as an introduction to critical arguments on patents and climate change mitigation technologies, and aims to stimulate further discussions in this field.

2. The importance of technology and innovation in mitigation

"Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and oceans have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased"

[4]

In 2013 the IPCC released their 5th assessment report (AR5) of the Earth's climate concluding that: the increasing rate of greenhouse gas emissions caused by human activity continues to interfere with the global climate system, resulting in potentially adverse effects for human populations [4]. Greenhouse gas emissions – primarily carbon dioxide – whilst also occurring through natural processes, have risen significantly through human activi-

ties such as: deforestation and fossil resource extraction for power generation and industrial production [5]. Consequently, the mitigation of and adaptation to the effects of climate change must become a priority for global policy making, implying important social and industrial transformations [6].

Whilst adaptation refers to taking measures to lessen the adverse impact of climate change, mitigation efforts concentrate on decreasing the rate of global warming by reducing greenhouse gas emissions [7]. The IPCC presents various emissions scenarios and their potential consequences [4], clearly showing that without a reduction of global emissions, the potential consequences of climate change will become increasingly difficult to adapt to. Therefore, in order to retain the ability to adequately tackle the impacts of climate change, mitigation efforts must remain a priority for research and policy.

Technological innovation will play a significant role in achieving the IPCC's advocated target to phase out fossil fuels completely by 2100 [2]. Already substantial advances in mitigation technologies such as renewable energy and the energy efficiency of industrial processes provide examples of the possibilities for effective mitigation [8]. Current technological abilities, if implemented on a broad scale, would already suffice to reach the IPCC recommendations for emission reductions [8]. However, these technologies still come with high costs and other considerable implementation challenges, implying the need for additional Research and Development (R&D) to lower the costs and implementation barriers of existing mitigation technologies and processes [1].

Climate change mitigation technologies cover an increasingly wide array of options ranging from increasing the energy efficiency of current production processes to using captured carbon dioxide to fertilize algae for biomass production. Within these options, however, four distinct groups can be differentiated: energy efficiency improvements, carbon capture storage (CCS), nuclear energy (NE), and renewable energy (RE) [9]. In addition to these groups, the transformation of energy use, such as the development of hybrid and electric automobiles and other transportation means, can also contribute to an overall mitigation technology portfolio [10].

Given the high-risk and international security implications of NE, technological development in this field is already regulated by specialized mechanisms under various international treaties and other governance structures [11]. Moreover, because of the potential environmental and human health consequences as well as the waste problems associated with NE, its inclusion within a portfolio of mitigation technologies is controversial. It therefore is neglected in the discussion of this paper. Also developments in the energy efficiency of production processes, whilst contributing to climate change mitigation, cover too broad a field to allow analysis of any particular depth in this study. Such technologies are found in various industries and therefore may vary greatly in the mechanisms used to incentivize and regulate innovation [8].

The paper refers predominantly to the examples of RE and CCS to relate arguments made to specific technological fields. However, the debate addressed in this paper is broader, applying to mitigation technologies in general. It is not the intent of the authors to provide a definitive and in depth analysis of the impacts of the patent system on any one particular technology, but rather to use examples from the two technologies mentioned to illustrate some of the concerns identified in their research and development.

2.1. Illustrated example

CCS involves the capture of carbon dioxide (CO₂) from emissions sources such as natural gas processing plants or power plants, its transportation to a storage site, and its subsequent storage within geologic formations. Whilst some small power plants have been fitted with capture technologies, they have yet to be applied to

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