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European Patent Legislation: A tool or obstacle for the dissemination of Environmentally Sound Technologies?

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Abstract

On May 18th in Abu Dhabi, UAE, IRENA[1] released a report declaring that Djibouti can meet 100% of energy demand through renewable energy sources by 2020.[2] Today, 55% of the population lives without access to electricity, 60% is unemployed, and the country depends greatly on imports of energy sources, inter alia fossil fuels and electrical power, which contribute to the continued rising levels of greenhouse gas emissions. Approximately 65% of the country's electricity needs are imported. While these conditions may appear discouraging, and clearly pose economic, infrastructural and legal challenges, RRAs[3] estimate that the transition from existing energy sources to attaining the target would be provided predominantly from geothermal, wind, and solar resources, which are forms of environmentally sound technologies (ESTs). Adnan Z. Amin, Director General of IRENA, affirms that "The development of local renewable resources would provide an answer for Djibouti's energy access, energy security and employment needs" and that "The falling costs of renewable energy offers an opportunity for Djibouti to rethink its energy strategy, develop policies and build institutions that would create jobs, bring power to those currently without and deliver more reliable electricity services, all through clean, sustainable energy.[4]" Thusly, in other words, IRENA advocates the use of environmentally friendly solutions to contemporary problems, thus corroborating similar proclamations made by international actors inter alia the EU[5], UNFCCC[6], UNEP[7], WIPO[8] , etc., which have all drawn attention to the prominent environmental concerns of today, and the imperative necessity to introduce ESTs to a substantial extent.

The dissemination of ESTs, however, depends on numerous factors, one of the most significant being ruling law. While the international community offers numerous legal

[1] The International Renewable Energy Agency
[2] IRENA, Press releases, http://www.irena.org/News/Description.aspx?NType=A&mnu=cat&PriMenuID=16&CatID=84&News_ID=406
[3] Renewables Readiness Assessments
[4] IRENA, Press releases, http://www.irena.org/News/Description.aspx?NType=A&mnu=cat&PriMenuID=16&CatID=84&News_ID=406
[5] European Union
[6] United Nations Framework Convention on Climate Change
[7] United Nations Environment Programme
[8] World Intellectual Property Organization

frameworks, treaties and agreements, the focus of this investigation will be the European Patent Legislation.

Contents

Abbreviations & Acronyms

Abbreviation	Explanation
AIPPI	International Association for the Protection of Intellectual Property
AR4	Fourth Assessment Report of the IPCC
BOAI	Budapest Open Access Initiative
CIPO	Canadian Intellectual Property Office
COP	UNFCCC Conference of Parties
EPO	European Patent Office in Munich
EPC	European Patent Convention
ESTs	Environmentally Sound Technologies
EU	European Union
FDI	Foreign Direct Investment
GATS	General Agreement on Trade in Services
GATT	General Agreement on Tariffs and Trade
GHG	Green House Gas
IARC	International Agency for Research on Cancer
ICT	Information and Communication Technologies
ICTSD	International Centre for Trade and Sustainable Development
IP	Intellectual Property

IP5	The five IP Offices EPO, JPO, KIPO, SIPO and USPTO
IPCC	Intergovernmental Panel on Climate Change
IRENA	International Renewable Energy Agency
IPRs	Intellectual Property Rights
JPO	Japanese Patent Office
KIPO	Korean Intellectual Property Office
LDC	Least Developed Countries
MNC	Multinational Corporation
MNEs	Multinational enterprises
NGO	Non-governmental organization
OECD	Organization for Economic Cooperation and Development
R&D	Research and Development
RRAs	Renewables Readiness Assessments
SIPO	Chinese Patent Office
TEU	Treaty on European Union
TFEU	Treaty on the Functioning of the European Union
TOSC	Technical and Operational Support Committee
TRIPS	Agreement on Trade Related Aspects of Intellectual Property Rights
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change

USPTO	United States Patent and Trademark Office
WHO	World Health Organization
WIPO	World Intellectual Property Organization
WTO	World Trade Organization

1. Introduction

1.1 Background

On October 17th 2013 IARC[9] officially declared air pollution as cancerogenic to humans.[10] IARC estimated that in 2010 no less than 223000 deaths occurred as a result of lung cancer directly obtained from air pollution. Apart from lung cancer, it has been identified that, among a wide range of diseases, air pollution increases the risk of *inter alia* heart and respiratory diseases as well as other forms of cancer. In 2012, the exposure to air pollution resulted in 7 million deaths worldwide, making it the number one health risk in the world today.[11] In fact, there are small communities in China referred to "cancer villages", as the towns are polluted to the degree that even living there is considered a cancer risk.[12]

Resource depletion, environmental degradation, climate change, pollution, and waste are merely a few of the contemporary environmental concerns. While these issues are considered common knowledge in most parts of the world, environmental degradation has a far deeper impact on human life –and health- than many may realize. The United Nations Environment Programme (UNEP) affirms that

"Shifting weather patterns, for example, threaten food production through increased unpredictability of precipitation, rising sea levels contaminate coastal freshwater reserves and increase the risk of catastrophic flooding, and a warming atmosphere aids the pole-ward spread of pests and diseases once limited to the tropics."

All these concerns are a result of climate change, which is, according to UN Secretary General Ban-Ki Moon, the "the major, overriding environmental issue of our time."[13] However, climate change is only one problem of environmental degradation that the world is

[9] the Specialized Cancer Agency of the WTO
[10] WHO climate change, http://www.who.int/topics/climate/en/
[11] WHO climate change, http://www.who.int/topics/climate/en/
[12] See http://uk.businessinsider.com/chinese-cancer-village-caused-by-toxic-industrial-landfill-2014-12?r=US
[13] UNEP, Climate Change, Introduction, http://www.unep.org/climatechange/Introduction.aspx

currently facing, thus it has become increasingly clear that there is a substantial need for intervention.

While the solution to these environmental concerns is complex, and certainly dependent on several factors, one of the determining areas is the legal field. By reviewing and making useful amendments to existing legislation, current procedures and processes which are causing alarming damages to the environment can be minimized or even prevented.

WIPO[14] states that "Extending the use of environmentally sound technologies (ESTs) is a key component in mitigating and adapting to climate change."[15]

Thus, it makes clear that EST dissemination is a key factor in coming to terms with the global environmental problems. Since this is recognized internationally, measures for increased EST dissemination have been considered worldwide, however the focus of this dissertation is European legislation. In particular, due to that technology dissemination is directly linked to Intellectual Property (IP), especially patents, European patent legislation is the crux of this thesis.

At the moment, there are two patent systems in Europe, namely the national laws of the individual countries, and the European Patent system based on the European Patent Convention (EPC), which is relevant to all Member States and extension states of the European Patent Organization (EPO). However, there is a third system on the rise, namely the new Unitary Patent Protection system (UPP), which is intended to become the patent system of the European Union. This thesis will focus both on the European Patent and the Unitary Patent. Throughout this dissertation, the aspiration is to understand how these two patent systems influence the dissemination of ESTs.

1.2 Purpose and Research Questions

A wider adoption of ESTs, as has been outlined above, is a key factor in solving global environmental challenges. The purpose of this Master thesis is to analyze whether the European patent legislation, more specifically the European Patent system and the Unitary Patent system, support or hinder EST dissemination. It is first necessary to investigate the

[14] World Intellectual Property Organization
[15] WIPO Magazine, "WIPO Green: Facilitating Dissemination of Green Technology", http://www.wipo.int/wipo_magazine/en/2012/03/article_0006.html

purpose and function of the two patent systems in order to determine how patent regulations can contribute to innovation in ESTs. It is hereafter necessary to investigate to what extent there is a conflict between how the patent systems work to promote innovation and the goal of EST dissemination. It is the hypothesis of this thesis that such a conflict exists, and if this proves to be true, it will be necessary to further investigate to what extent it can be mitigated by instruments that are already available in the current patent legislation or whether further legislative action is needed.

1.3 Method and Material

This investigation is based on traditional legal method, which *inter alia* consists of an analysis of legal sources, such as legislation, preparatory works and case law, in order to determine the content of valid law. Legal sources have been complemented by other sources that to some extent aid in understanding the context of the patent legislation, both from an economic and an environmental perspective. It is, however, not the purpose of this thesis to investigate the economic or the environmental consequences of the patent legislation.

The most important sources in this investigation are the EPC, the Proposal COM (2011) 215/3 of the European Commission, Regulation(EU) No 1257/2012, the UPC Agreement and the report "An Enhanced European Patent System" by the Preparatory Commission. Also the Treaty on the European Union (TEU) and the Treaty of the Functioning of the European Union (TFEU) and a number of other sources were of importance. Since the effect of the European patent legislation on EST dissemination is a novelty, sources which specifically discuss this relationship are extremely limited. However, there are abounding sources regarding ESTs in general, patents and technology transfer, which have been of monumental importance in this dissertation.

Furthermore, international bodies such as UNEP, UNFCCC, WIPO, IRENA, IPCC, WTO etc., have also been used to some extent in order to provide depth to the investigation. Since these organizations are dedicated to research on environmental issues, green technologies and their spreading, as well as strategies and action plans to handle these concerns, they provide valuable insights in this area. Additionally, in today's globalized world, European legislation is in many ways connected to other international actors, agreements and frameworks which can influence not only the extent to which the provisions of the European legislation can be

applied, but also how the legislation relates to the environmental challenges of our time, and specifically, in which ways it facilitates or hinders the diffusion of green technologies. Interpretations of *inter alia* the TRIPS agreement, the UNFCCC, Agenda 21, UNEP, IARC, etc. are plentiful, and these sources have been useful. These sources are thus helpful firstly for understanding the international patent legislation, and secondly in recognizing the link between these tools and EST dissemination. It must be clear, though, that all international sources are intended to serve as complements, and are of secondary importance in this Master thesis.

In order to determine if the European patent legislation facilitates or inhibits the dissemination of ESTs, one must possess a deep understanding not only of the European patent legislation, but equally so of ESTs, patents and technology transfer. Therefore, a thorough study was conducted on every subject. The very first step in this investigation was recognizing the prevailing, worldwide environmental concerns, *inter alia* climate change, air pollution, deforestation, etc., and the gravity of these issues.
The second step was thoroughly determining what ESTs are, and what significance they have. This step was necessary before commencing further analysis.
The third step was discussing technology dissemination; what it means and why it is important, particularly in the case of ESTs. This involves a comprehensive study of IPRs, particularly patents.
Finally, an analysis of European patent legislation was provided; this is the actual crux of the dissertation. Only after acquiring sufficient knowledge of these was it possible to determine how European patent legislation influences EST dissemination.

When analyzing the legal sources, the intent was to understand the underlying scope of the patent legislation; which are the underlying objectives of European patent legislation? Were the systems designed to support environmental protection and facilitate technology diffusion or rather to generate economic benefits to society by creating incentives to potential inventors? Which purpose do they serve in theory and which do they serve in reality? Do they serve both, or are they in fact mutually exclusive? What possibilities does the legislation provide for EST dissemination?

1.4 Delimitation

Although examples of environmental concerns have already been mentioned, and several others will also be called attention to briefly in order to provide the reader with sufficient information regarding the problems, the scope of this thesis is not to provide an analysis of the environmental challenges of our time, thus, the environmental concerns themselves will not be analyzed. The purpose is to identify how the European Patent system and the Unitary Patent system influence the dissemination of ESTs, and whether they are tools or in fact obstacles for this purpose. For this reason, much importance is placed on the significance of EST dissemination, patents and technology transfer.

1.5. Outline

While this chapter provides the introduction, chapter two will provide information about the European patent legislation, which in this investigation is limited to the European Patent system and the Unitary Patent system. The chapter discusses the nature of these systems, providing information about their strengths and weaknesses. It also provides fundamental information of Intellectual Property Rights (IPRs) and the European Patent Organization, in order to introduce the reader to the topic.

Chapter three will highlight the basic conflict of this thesis, namely the conflict between patent protection and environmental protection through EST dissemination. It examines both sides of the dilemma, commencing by discussing the need for ESTs followed by a deliberation on the need for patent protection. Furthermore, it provides an investigation on the effect of patents.

Chapter four sheds light on how the European patent legislation relates to EST dissemination. Firstly, it discusses general methods of technology dissemination, followed by an analysis of how the European Patent system influences technology transfer and EST dissemination specifically. Similarly, it examines how the Unitary Patent system influences technology transfer and EST dissemination, followed by an investigation of the part played by the TRIPS Agreement in this context.

Finally, Chapter five will provide a short summary as well as the conclusions reached in this investigation.

At the very end of the thesis, the bibliography is available.

2. The European Patent System

2.1 Introduction

In order to determine how the European Patent legislation influences EST dissemination, it is vital to have a deep understanding of the legislation. Therefore, this chapter will provide the reader with necessary information about the components of European patent legislation, namely the European Patent system and the Unitary Patent system. It is a rather descriptive chapter, however the information provided is necessary in order to prepare the reader for the upcoming analyses of the following chapters.

In this chapter, it is imperative to distinguish between the EU and the EPO, and secondly, between EU legislation and the EPC, the latter being the legal framework of the European Patent Organization, which is an independent organization and *not* a part of the EU. It is vital to understand these differences, as the focus of this thesis is European patent law, not only EU patent law. The chapter will commence the investigation by providing background information about intellectual property rights, as they are the basis of both systems. Secondly, the chapter provides an examination of the European Patent system of the EPO, followed by the Unitary Patent system of the EU.

2.2 IP and IPRs defined

WIPO defines IP as "creations of the mind," *inter alia* designs, images, symbols, inventions, literary and artistic works, and names used in business. Thus IP can be obtained within science, industry, artistic and literary fields, and in our case, specifically within ESTs. Moreover, IP is divided in two categories, namely copyright and industrial property. While copyright incorporates artistic and literary works, the latter refers to industrial designs, patents, geographical indications of source and trademarks. In this investigation, patents will be the focus.

WIPO defines IPRs as ”Instruments of public policy which confer economic privileges on individuals or institutions solely for the purposes of contributing to the greater public good.”[16]

IPRs provide an individual, corporation or institution with an exclusive right to be the sole user of a particular invention, thus preventing other parties from using it without a granted consent. This is, according to experts in the field such as Alan Sykes, necessary in order for innovation to occur. However, IPRs and particularly patents can pose significant problems within an industry due to the monopolistic power they confer to the patent owner. This is the core problem in this investigation, and will be examined further in chapter three. In order for it to be understood, though, a thorough investigation of the two European patent systems must be conducted.

2.3 The European Patent Organization and the EPO

The European Patent Organization was set up on October 7th 1977, and is a regional IP authority based on the European Patent Convention, similarly to the EA, OAPI and the ARIPO, which are based on other international treaties. It is an intergovernmental organization consisting of two bodies, namely the European Patent Office in Munich, EPO, and the Administrative Council, which is composed of representatives and alternate representatives from the EPO Member States, and has the role of supervising the activities conducted by the EPO.

The main role of the EPO is providing the opportunity for innovators to pursue patent protection valid throughout the EPO area (EPO Member states and extension states), thus in maximum 40 countries. Consequently, the system is a significant improvement from the system of applying for patent protection in each country individually, which was the only possibility before the implementation of the EPO in 1977. Similarly to the TRIPS Agreement, patents granted by the EPO are usually valid for 20 years.

The EPO is currently involved in various international collaborations in order to find international solutions to contemporary patent problems, *inter alia* by discussing and sharing information on data standards and patent information. One such partnership is the Trilateral Cooperation with JPO and USPTO, which, at the time they were set up in 1983, were the

[16] See http://www.iprcommission.org/graphic/Views_articles/Spiked_Science.htm

largest patent offices in the world. Similarly, the EPO is also involved in the IP5, consisting of the Trilateral Offices and those of China (SIPO) and South Korea (KIPO), and was created in 2007 due to the increasingly important role of China and Korea on the international market.

Furthermore, the EPO also takes part in international cooperation specifically targeting to balance the problem of patent protection for patentees versus the availability of vital technologies for third parties. As has been mentioned, patents are essential for innovation, however they also generate challenges for third parties, especially developing nations, thus the role of EPO also involves striving to obtain a balance between the needs of both sides. While the EPO is a centralized patent authority in Europe and thus viable in all EPO Members and extension states, this is not sufficient to meet the global needs of today. For this reason, the EPO has developed strong relations not only with other patent offices worldwide, but also with international actors in the field of IP, such as WIPO and OHIM, as well as with other international actors outside the patent system, *inter alia* OECD, UNEP, ICTSD, etc. Thus, the EPO recognizes the need for international cooperation in order to create a system which tackles current environmental issues.

2.4 The European Patent System

2.4.1 Introduction

All patents granted by EPO are referred to as European Patents, and the granting procedure is regulated by the European Patent Convention, EPC, which was established on October 5th 1973, and provides an autonomous system for the granting of patents valid in all EPO Member States and contracting states. By stating that the EPC provides an autonomous system, it is meant that it does not fall under EU legislation, or any other, but follows only the provisions of the Convention itself.

The EPC is useful because it offers applicants the possibility of only applying for patent protection from once centralized authority, as opposed to applying separately in every individual country in which protection is desired. While the EPO can grant patent protection throughout all EPO Member States and extension states, the patentee must specify in the application for which countries protection is requested. Thus, a patent application at the EPO does not automatically imply patent protection in 40 states.

2.4.2 The strengths of the European Patent System

The most evident strength of the European patent is that it can provide a patentee with protection in the entire EPO area through a relatively simple application procedure. Although the European patent can be referred to as a collection of national patents, by applying for a European patent at the EPO in Munich, one does not have to apply for protection in every country of interest individually. Thus, this is clearly an improvement from the system of national patent laws.

By giving patent applicants the possibility of applying for patent protection not only in the whole of the EPO area but also in particular countries of choice, the European Patent system provides freedom while simultaneously still being useful to applicants even in cases when protection is not sought in all of the 40 states.

It is made clear in the very beginning of the EPC, Chapter I Article 2 that

"The European patent shall, in each of the Contracting States for which it is granted, have the effect of and be subject to the same conditions as a national patent granted by that State, unless this Convention provides otherwise".

Thus, it is clear that the patents granted by the EPO are not in any way inferior to patents granted by national authorities. As opposed to other international frameworks and collaborations, this Convention is not an NLBI, but directly binding to all Member States and extension states of EPO, which provides security. Due to that European patents are a bundle of national patents, the patent holders receive security of this kind on an international level, in all countries in which protection was applied for.

2.4.3 The Weaknesses of the European Patent System

One of the major weaknesses of the European patent system is the high costs it involves. While European Patents are granted protection in the specific countries which were stated in the application, in order for this to become valid in the various states, it is necessary to validate the patents in each individual Member State or extension state. In order for this to be done, there are certain requirements, *inter alia* the requirement for translation. In certain

countries, the national patent laws require the patentee to file a translation of the obtained European patent in the national language of the country. This involves not only additional work and hassle, but also high costs. Proposal COM(2011) 215/3 provides in the explanatory Memorandum article 1.1 that

"The overall cost of validation of an average European patent reaches 12 500 EUR if validated only in 13 Member States and over 32 000 EUR if validated in the whole EU."

Therefore, the high costs involved due to the translation fees are definitely one of the main downsides of the European patens. Furthermore, costs are involved also in the renewal of the patent, and these costs may vary between Member States.

The second weakness is the hassle which arises due to the lack of one single legal authority within the European Patent system. While the grant of the patents is based on the EPC, in case of infringements or other problems, there is no central authority to contact. Article 64(3) of the EPC provides that "any infringement of an EPO patent is to be addressed by the national law" of the country in question. Thus, it is the national authorities in the various countries which must be contacted. Experiencing problems of *inter alia* infringement in a country other than the country of residence involves further complications, as there may be a need to travel to the country in question to settle things, or hire legal professionals to deal with the matters. In any case, these involve further expenses for the patent holders, and they can be substantial. Moreover, the varying national legislations can have further complications. For instance, in a matter in which Country X finds that an infringement has occurred, Country Y might not find any infringement whatsoever. Another problem caused by the varying national legislations is that the period during which the patent holder can apply for a renewal may vary. Thus, it is clear that the varying national legislation and the lack of one central authority cause a number of difficulties.

In conclusion, the more countries a patent holder enjoys protection in, the more difficulties can arise. Should a patent holder have rights in all the 40 Member States and Partners, he or she must keep up with the national legislations of 40 countries. Thus, it is highly probable that some sort of complication will arise.

2.5 The Unitary Patent System

2.5.1 Introduction

The European Patent with Unitary Effect is intended to be the new patent system of the European Union. The EPC provides information about unitary patents in Article 142, stating that

"Any group of Contracting States, which has provided by a special agreement that a European patent granted for those States has a unitary character throughout their territories, may provide that a European patent may only be granted jointly in respect of all those States."

The fact that the granting of the Unitary Patent is, like the European Patent, based on the EPC, makes the Unitary Patent serve as a link between the EU and EPO.

In the report "An Enhanced European Patent System", the Preparatory Committee states that despite the introduction of the Unitary Patent, it will still be possible to apply for the European Patent or national patents. Furthermore, it makes clear that there will be a possibility to combine the new system with the old one, and receive a Unitary Patent and also "validate the patent as a classical European Patent in other EPC Contracting States." That way, the Unitary Patent can be valid in more states than solely the contracting parties which are currently involved in this enhanced cooperation.

The unitary patent will be valid throughout the participating states of the European Union, currently all states except Spain and Italy, thus providing patent protection in all 25 States. However, in order to take part in the cooperation, the contracting Member States must also be in favor of the Unified Patent Court, which is part of the Unitary Patent system and required to come into force before the system can be launched and become operational. The Unitary Patent Court will be the centralized legal authority under the Unitary Patent system, thus it will be exactly what the European Patent system is lacking. Consequently, a state must be a contracting party of the UPC Agreement in order to qualify for the enhanced cooperation. However, Poland has chosen not to be in favor of the court, although it is in favor of the Unitary Patent. For this reason, Poland will, like Spain and Italy, not be considered a contracting state. Thus, at the moment there are only 24 EU Member States in which there

will be a possibility to apply for the Unitary Patent. This is corroborated by the UPC Agreement, which affirms that

"By virtue of Regulation (EU) No 1257/20121, patent holders can only apply for unitary effect of their Unitary Patents within the contracting EU Member States which are parties of the enhanced cooperation."[17]

Furthermore, the pre-grant procedure of the Unitary Patent is similar to that of the European patent, thus the patent application must be done at the EPO. After having received a patent, the owner may, within one month, request to receive unitary effect, thus it is not granted automatically. After applying for this, assuming that all formal requirements are met, the patent holder will be provided with full protection within the entire participating area of the union, regardless of member state. The patent protection will be of the same extent in all participating nations.

2.5.2 Strengths of the Unitary Patent System

Firstly, it is important to note that the effects of the Unitary Patent system are speculations; since the system has not yet been introduced, it is impossible to determine with certainty what effects it will have. However, based on economic theory and the opinion of experts within the legal field (particularly the patent field), reasonable theories and assumptions can be made.

One of the most significant benefits of the Unitary Patent system is that it will generate one European market, as opposed to many small markets which exist as a result of the current system. By having a Unitary Patent system, EPO President Benoit Battistelli claims that the borders which currently exist due to the varying national patent legislations of the individual countries will disappear, generating one single market, which means that it will be easier for goods and services to be transferred between the participating Member States. The UPC Agreement provides that

"The fragmented market for patents and the significant variations between national court systems are detrimental for innovation, in particular for small and medium sized enterprises

[17] See page one of EPC Agreement, on "the Contracting Member States"

which have difficulties to enforce their patents and to defend themselves against unfounded claims and claims relating to patents which should be revoked."[18]

Similar provisions can be found throughout the UPC Agreement, as well as in Proposal COM (2011) 215/3 of the European Commission. From these sources, it is evident that the unitary patent was designed to be supportive of SMEs[19]. In other words, the focus of the Unitary Patent system is patent protection.

Another obvious benefit of the Unitary Patent system is that the presence of the Unitary Patent Court will ensure that it will no longer be necessary to keep track of various national legislations and comply with different requirements, thus the risks and insecurities related to infringements will fall. Experts in the field such as David Knight argues that since the UPC will act as one single central authority dealing with all issues concerning the Unitary Patent, the hassle and complications which currently exist due to the lack of such an authority will be greatly diminished. For this reason, the Unitary Patent system will be a useful tool for patent holders, who will no longer be exposed to these problems.

In addition to this, Battistelli highlights that the translation costs under the Unitary Patent system will be significantly lower than of the current system, because they will not be needed to the same extent. Since the aim of this system is to aid businesses, he makes clear that the decreased translation costs are of immense importance to patent holders, which will in turn find it easier to work for innovation and technological progress.

As opposed to the European Patent system, the Unitary Patent system will only involve one renewal fee to pay, as opposed to one in every country in which the patent is protected. Therefore, the Unitary Patent is expected to be cheaper also from this point of view.

Another benefit of the Unitary Patent system is that although it will be implemented, it will not eliminate the European Patent system and the National Patent systems. Knight explains that those who wish may continue to apply for European Patents as well as National Patents, thus there will be three options, which provide innovators with more freedom.

[18] See http://www.wipo.int/wipolex/en/other_treaties/text.jsp?file_id=348033
[19] Small and Medium sized enterprises

2.5.3 Weaknesses of the Unitary Patent System

One weakness of the Unitary Patent is that this system cannot provide protection in such a great area as the European Patent can. Lawyer and patent expert Steve Howe explains that while the European Patent can be valid in 40 European states, the Unitary Patent is strictly limited to EU Member States, and more so, only to those Member States which are cooperating states (24 at the moment). Thus, while for the European Patent protection can be sought in 40 countries, the Unitary Patent can only be valid in a maximum of 24 states.

Furthermore, patent expert Beatriz San Martin claims that the Unitary Patent might allow for an increasing number of so called "patent trolls", which are companies that apply for patents and also purchase patents from patent holders and gain revenue from granting licenses for those patents, as well as from litigation costs. San Martin claims that as a result, the patented technologies themselves risk to be used to a lower extent than if they were held by a conventional patent holder, who intends to use the technologies. Consequently, the dissemination of these technologies would be lower, which implies that if the technologies happen to be ESTs, then the spread of ESTs will be limited due to patent trolls.

In case of infringement under the European Patent system, national courts are responsible of handling cases. This means that a particular court may not find an accused infringer guilty of infringement, which would mean that within that country, the patentee would have to accept actions which he or she is displeased with. However, if the same verdict would be sentenced under the Unitary Patent system, the patentee would have to accept those actions in all 24 contracting EU Member States- which would be far more damaging to the patentee. Thus, there is an opposite side of the UPC; while it can certainly be patentee friendly, solving the infringement issue in favor of the patentee throughout the 24 contracting states, it can also make a verdict against the patentee, allowing what the patentee perceives as infringement to be allowed- in all of the 24 states. Thus, should the UPC not be on the side of the patentee in a claimed infringement case, the patentee would not only suffer in one country, as would be the case under the European Patent system, but in 24 countries. Thus, there can clearly be a monumental downside of a Unified Patent Court, and thus of the Unitary Patent system, both for a patentee and for an accused infringer.

Another weakness of the Unitary Patent may be increased patent litigation costs, which can be a major issue, especially for small businesses, who may not afford them. Knight believes that holders of Unitary Patents may not be able to enforce their rights within the contracting EU Member States, thus necessitating them to intervene by hiring legal professionals to help them. While validity throughout the contracting states is certainly one of the main goals of the UPP system, it remains to be seen whether this will indeed work in reality, especially during the transition period, when the rules and implications of the new system may not be clear to all relevant actors within the contracting states. However, even after, high litigation costs may in fact reduce the benefits of the Unitary Patent system to zero; if small businesses cannot enjoy the rights granted by patents, but suffer infringements which they cannot do much about because they do not have the funds for litigations, then what is the point in receiving a patent in to start with?

2.7 Concluding Remarks

One very evident aspect which is common to both the European Patent system and the Unitary Patent system is that the information provided about them is almost entirely related to how the systems influence innovators, patent holders and businesses. While there is much talk of how the systems stifle or benefit these actors, no real information is provided about how they affect green technologies, the environment or sustainability in any way. This is not because the author has chosen to bias the information, but because the sources themselves are biased in this way. Whether one regards the EPC, the Proposals of the EU or the UPC Agreement, there are no real references to those elements. The focus of all sources is very evident, and it is not the environment. Although this is only the second chapter, it provides a very strong message. If the European patent systems are concerned with the good of patent holders and businesses, while making no reference to how they may be beneficial to the environment, already here it becomes clear that, from the perspective of the environment, the systems are deeply flawed, because the focus is clearly not environmental protection, but patent protection. While it is reasonable for a patent system be concerned with patent protection, in the year 2015, when the alarming environmental concerns are clearly identified and recognized in Europe as well as worldwide, it is ironic not to adjust the patent systems to these evident, and highly significant problems which have been proved to directly cause

deaths worldwide.[20] It is, in fact, profoundly curious, that the Unitary Patent system, which is considered an updated version of the European Patent system, has not been updated from this point of view. In the following chapter, this conflict between environmental protection and patent protection is taken to the next level.

[20] See example on air pollution in Chapter 1, Context.

3. The Conflict between Patent legislation and EST dissemination

3.1 Introduction

As has been presented in the previous chapter, European patent legislation contains several elements in favor of patent holders. However, aspects which are beneficial to patentees are often obstacles for technology dissemination. Thus, what is actually needed in this context is balancing patent protection with environmental protection; the interests of innovators and patentees versus the need of the environment. This is the key conflict in this thesis. Europe has acknowledged the importance of increased action to protect the environment and both created EU legislation on the matter e.g. in the form of the 7th Environment Action Programme, as well as taken part in international cooperation to address the issues. For this reason, it is essential for Europe to have a patent system which is in tune with the constructed environmental plans and programmes, not contradictory to them. While it is important for patent holders to receive protection, it is vital to find a balance; a system which is not partial, but beneficial to both sides. Moreover, it is important to understand that this balance also depends on the technology in question, as some technologies are more important for humanity than others; a luxury good is clearly not needed to the same extent as e.g. HIV pharmaceuticals, which have the potential to save thousands of lives. Similarly, ESTs can reasonably be considered equally important as vital pharmaceuticals (if not even more important). This chapter will shed light on these aspects.

3.2 What are ESTs?

The UNEP defines ESTs as technologies that are less damaging to the environment and have a greater potential to significantly improve environmental performance compared to other

technologies which are substitutes. They are protective of the environment, generate less pollution, provide more efficient solutions for recycling and take administer waste products in a more environmentally friendly manner. The same definition can also be found in the UN Agenda of 2015.[21] It is further provided that

"ESTs are not just individual technologies, but can also be defined as total systems that include know-how, procedures, goods and services, and equipment, as well as organizational and managerial procedures for promoting environmental sustainability."[22]

Consequently, it can be concluded that certain factors, *inter alia* human resources, can be of significance, notably in terms of competence development and capacity building.

Additionally, Agenda 21[23] provides in Chapter 34 that in terms of pollution, ESTs are a

"/…/ process and product technologies that generate low or no waste, for the prevention of pollution."

Likewise, the chapter states that they cover 'end of the pipe' technologies, used in the handling of pollution after it has been generated.[24]

However, defining environmentally sound technologies is problematic to some extent, as the social, economic, cultural and geographical conditions differ across nations. The impact of various ESTs will differ depending on *inter alia* diversified human populations, biota, ecosystems and the availability of aiding infrastructure and human resources. The sustainability of natural systems also plays a part in this context.[25] Consequently, this necessitates adaptation and reconditioning of technologies in order to be of use in varied areas. Furthermore, the extent to which a particular environmental technology is "sound" also depends on temporal and geographical factors, as certain technologies may be environmentally sound in the present, but substituted by even cleaner ones in the future.

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[21] Agenda 21, Chapter 34, Transfer of Environmentally Sound Technology, Cooperation and Capacity-Building, 34.1, http://www.webcitation.org/5at3jiGC2

[22] UNEP, Freshwater Management Series No. 7, Phytotechnologies, A Technical Approach in Environmental Management, Introduction, see http://www.unep.or.jp/ietc/Publications/Freshwater/FMS7/2.asp

[23] UN Department of Economic and Social Affairs, Division for Sustainable Development, Documents, archived at http://www.webcitation.org/5at3iTet3. Agenda 21 was adopted at the UN Conference on Environment and Development in Rio de Janeiro, 1992)

[24] UNEP, Agenda 21, Chapter 34.2, "TRANSFER OF ENVIRONMENTALLY SOUND TECHNOLOGY, COOPERATION AND CAPACITY-BUILDING"
http://www.unep.org/documents.multilingual/default.asp?DocumentID=52&ArticleID=84&l=en

[25] Ibid

3.3 Why ESTs?

At the very beginning of this thesis, an example was given about the GHG emissions in Djibouti and the need for renewable energy in the country.[26] Similarly, the introduction contains an example about air pollution currently being the greatest health risk worldwide, causing 7 million deaths in 2012. The reason for these international examples is very simple: while the focus of this thesis is European legislation, environmental problems will not stay within or outside the borders of Europe. Greenhouse gas emissions in Djibouti will in the long run influence the environment in Sweden, just as the burning of fossil fuels in China will influence the ecosystems of the US, who's dumping of oil in the Mexican Gulf will influence marine life in Latin America. One of the most vital issues to be understood in this dissertation, is that environmental problems are global problems, equally so for every single country on this planet- developing countries as well as developed ones. If the glaciers melt, if the air becomes poisonous and the waters become polluted, then all of humanity will ultimately suffer equally- it is just a matter of time until the problems existing in a certain part of the world will influence the others. Although one may argue that e.g. the melting of glaciers will influence certain parts of the world more than others, one must realize that such a possibility would imply other environmental problems for the rest of the world, as well as socio-economic ones, e.g. a significant influx of refugees, which in turn involves further challenges. One of the most famous theories on ecosystems and their interactions is the Gaia hypothesis, which is supported by numerous scientists worldwide, and implies, in short, that the world is like one big cell; one single ecosystem which, in an intelligent manner, reacts to happenings in the environment and consequently, alters the planetary environment through biological and geological processes. Thus, the world is currently in a vicious cycle; problems in one area will, in the long run, cause problems in other areas. Therefore, the perception that we in Europe can protect ourselves and escape the effects of environmental problems in the rest of the world, e.g. LDCs, is simply not reasonable. Along these lines, it is clear that the availability of ESTs in e.g. Djibouti is significant for us in Europe, as is the availability in all other nations. Consequently, it is essential to have a legislation which supports the transfer of ESTs, not only within Europe, but also to and from the continent.

[26] See Abstract

Furthermore, the lack of ESTs will not only have devastating effects on the environment in the future, but does, in fact, generate considerable problems already today. One clear example is that of air pollution mentioned earlier; is it not bizarre that legislations worldwide allow for such a disaster? Does that not reflect that legal systems worldwide focus on the interests of businesses on the expense of the environment? Had the legal systems instead focused on environmental protection to a greater extent, and pushed for the use of environmentally sound solutions, it is plausible to believe that the problems we face today would be far more limited. The fact that environmental degradation has reached such a tremendous degree is a very clear warning sign. Thus, the use of ESTs can be of monumental importance, while the lack of them can literally mean death to human and animal life. The so called cancer villages in China[27] are undeniably an example of where humanity can end up when not using ESTs to the required extent. Therefore, it is reasonable to consider ESTs at least as important as pharmaceuticals, and in many ways even more important, because while pharmaceuticals can save human lives stricken by particular disease, ESTs have the potential to save both human and animal lives (both sick and healthy), as well as our future generations and the very existence of life on the planet.

3.5 The conflict posed by IPRs

The problem with IPRs is that they appear to be contradictory to their underlying aim. In order to see this one must look no further than to their fundamental purpose, which is

"/…/ to contribute to long-run social and economic development by providing incentives to creators of intellectual property."

This sentence clearly indicates that the scope is both to contribute to long-run development in society, and simultaneously, to provide actors with incentives for innovation. Unfortunately, from an economic point of view, these interests can to some extent be mutually exclusive.

Patent expert Jehangir Choksi explains that developing a new invention of any kind, *inter alia* an EST, requires significant investments of time, physical capital, human capital, financial capital etc. In order for an institution/corporation/individual to make these investments, there must be reason to believe that the investments incurred will generate incomes not only large

[27] See Chapter 1, Context

enough to pay back the initial investments made, but also to provide profits. Thus, creating something which others can use freely without having to pay for is discouraging for investors, who would lose their incentives for innovation. While there are individuals, corporations and institutions that freely make significant donations *inter alia* to R&D, which do not generate any income, making an investment into something which is expected to become a patented innovation is a different matter. If one decides to make a donation, one is not expecting to receive back anything of monetary value; however, if one has the intent to create an innovation, the expectations are very different. From this perspective, Choksi argues that the existence of IPRs is beneficial as their presence assures investors that no other party may make money on the invention created, unless it is specifically approved by the patent owner. This ensures that there will be an incentive for innovation, which has positive long-run effects in the economy e.g. through technological progress.

However, the high levels of patent protection which are currently being granted to patent holders by the EPO are in fact limiting the availability of the patented technology on the market. By offering protection for 20 years, and making it impossible for other parties than the patent holder to utilize the patented inventions, the patent holder evidently holds all the power; the patentee alone has the right to decide to what extent the invention will be spread. Thus, if the latter chooses to limit the availability of the invention, then the availability will be limited, both on the domestic market and abroad if the patentee chooses not to export it. In the case of ESTs, this implies that an important technology which could be useful to hinder environmental degradation worldwide would be unavailable, simply because one person (the patentee) has the legal right to make such a choice. Since the purpose of IPRs is, as established earlier, to contribute to long run development in society, such a scenario is directly contradictory to this purpose. For this reason, it is reasonable to find that from this perspective, IPRs are designed in a way which is contradictory to their ultimate objective. Instead of contributing to long-run development, they are, as explained in the example, in fact hindering it. What is worse is that the possibility of other parties to obtain compulsory licenses (which would enable third parties to use the patented invention without the consent of the patent owner) is very tricky under the European patent legislation, because the EPC does not contain any provisions on compulsory licensing. Consequently, this matter falls under the authority of the legislations of the individual Member States. This means that a party currently seeking to obtain a compulsory license for a particular EST must apply for it not only at one, centralized authority, but in every individual state in which the invention has been granted

patent protection; a process which is not only expensive, but also time consuming and complicated. Thus a key element in this investigation is the conflict between protection for patent owners and the availability of patented ESTs; between the interests of innovators and the long-run benefits of society.

3.6 Patents and their economic effects

While innovators require high levels of protection in order to maintain incentives for innovation, it is indisputable that the rights granted to patent owners are comparable to those of monopoly. A patent holder can, through the protection received, comprehensively (and perhaps fully) eliminate competition, and stand as the sole provider of a particular innovation. This implies that patent holders may cause deadweight losses in society by setting a significantly higher price than the cost of production, thus resulting in higher prices than would exist if competition were present on the market. This results in an inability of many nations to acquire the innovation.

As mentioned in chapter two, the degree of significance this has in the economy depends on the type of innovation, however as has been mentioned, limited availability of ESTs could have compelling consequences. If proper measures are not taken to the extent necessary to protect the environment and replace environmentally damaging technologies with green ones, we might not have a planet available to destroy anymore. Thus, welfare losses in this area are undoubtedly a problem, especially for particular ESTs which have no close substitutes. In this context, the inability of nations to acquire crucial ESTs due to an exceedingly high price can have devastating long-run effects on the environment, and consequently, on the economies, health care, and life itself.

From this perspective, it can be argued that the needs of innovators must be cast aside or adjusted to some extent, since lives are already today indirectly lost due to the effects of such monopolistic power. We must not risk the lives of future generations for the sake of such extensive rights of patent owners; the cost to society is simply too high.

One cause of this problem is that all patents receive equal levels of protection, despite the differences in the cost of production. In reality, though, innovations vary, thus also the required level of protection varies. Along these lines, is appears obvious that the protection

received by innovators of ESTs is excessively high. Alan Sykes discloses an engaging view on this. He claims that

"If one had reason to believe that the patent protection afforded in a particular context was excessive, such a "property right" could not be defended as important to valuable incentives."

He argues that in some situations, the deadweight losses are inordinately high, in which case the very purpose of patent protection is defeated. In this context, patent owners benefit from more protection than necessary in order to feel that the investments made were lucrative. In such cases, the negative effects of the monopoly power are undoubtedly immoderately high, and this, one may argue, should not be permitted. While most technologies which become "over-rewarded" in this manner are pharmaceuticals, it is a reasonable view to hold also in the case of ESTs, because in the long run, their lack of presence can have the same devastating effects as global health issues- if not even greater. Consequently, there is evidently a need for international tools which can prevent such issues.

Another problem according to Sykes is that the monopoly power enjoyed by patent holders creates incentives for innovators not only to obtain patents, but to specifically target obtaining monopolistic power on the market. For this reason, it is not uncommon to find innovators investing resources to reach this target, which results in so called patent races, causing further deadweight losses to society through wasted monopoly rents. Thus, the extent of deadweight losses generated in the economy is directly determined by the extent of monopoly power enjoyed by the patent owner.

3.7 Concluding Remarks

One central issue generated by patents is the high prices set for patented inventions which many nations cannot afford, thus limiting the availability of patented ESTs. However, the scenario may be even worse; patent holders may in fact refuse to export technology for a while and limit the EST only to one particular institution, e.g. for research purposes, thus making it completely impossible for other nations to acquire the technology. This not only causes deadweight losses to society due to the unnaturally high prices created, but directly counters the purpose of IPRs, which is to inspire social and economic development in society.

As follows, this problem requires a legal framework which can intervene and restrict this inordinate power held by patentees.

As has been found in chapter two, chapter three corroborates that while patent protection can be useful and justified, for some inventions more than others, in the case of ESTs patents are granted exceedingly high protection. This is made evident by the existence of patent races. Evidently, if patent holders would not receive extensive power, these races would not exist to begin with. Furthermore, restricting the availability of acutely needed technologies worldwide is evidently not in tune with "contributing to the long run social and economic effects of society", which is stated as the main objective of IPRs, thus the effect of patents is in this case directly contradictory to the purpose of IPRs. Therefore, it is reasonable to conclude that patents are, in the case of ESTs, granted disproportionate amounts of power, and ought to be reevaluated in a way as to be increasingly supportive of EST dissemination. The following chapter investigates whether the European patent legislation comprises the necessary tools for dealing with this excessive power held by patentees.

4. Technology transfer: the key solution

4.1 Introduction

As has been hinted so far, the regulations on technology transfer are the key to the problem of this thesis. The extent of EST dissemination is a direct result of whether the European patent legislation encourages or stifles technology transfer. Chapter two provides some insight to the underlying focus of the legislations, and it makes evident that both the European Patent system and the Unitary Patent system are designed to support patent holders. Both systems are concerned with offering incentives for innovation, thought to ultimately contribute to long-run socio-economic development in society. However, as has been established in the previous chapters, this aim clashes with the interests of the environment and long-run sustainability. It should be noted, though, that despite the fact that the focus of the patent systems is patent protection, not environmental protection, this does not mean that the systems do not indirectly encourage EST dissemination. This is why it is essential to deepen the investigation on the regulations affecting technology transfer. After all, other patent tools such as the TRIPS Agreement favor both sides, although it is an Agreement on IPRs. This final chapter will discuss technology transfer under the two patent systems as well as under the TRIPS Agreement, which will be shown to have an important role to play in this context.

4.2 Methods of technology transfer

So far in this thesis, it has been established that there is a significant need for EST dissemination, which is a form of technology transfer.[28] However, it is important to identify how exactly such transfers can occur, because only then will it be possible to determine what tools are needed to make it possible and consequently, whether the European patent legislations provides those tools or not.

[28] The IPCC, which is currently the leading authority in the context of climate change, specifically states that technology dissemination is a form of technology transfer.

As provided by a joint investigation between EPO, UNEP and ICTSD , it is commonly distinguished between two fundamental methods of technology transfer, namely market-mediated mechanisms and non-market mechanisms. Phenomena inert alia trade in goods and services, licensing, cross-border movement of personnel, foreign direct investment and joint ventures fall within the first category, while legitimate forms of imitation, data in patent applications, departure of employees, or temporary migration fall under the second. The following section sheds light on some of these mechanisms.

The most apparent elements subject to technology transfer are materials (physical capital), capacity (e.g. human capital) and various forms of design (e.g. prototypes and models). Although much transfer of technology occurs through international trade of goods and services, most transfers do not involve actual physical tools such as machines or medicine, but know-how. For instance, many institutions and companies hire international staff to join their teams as well as international lecturers to train their employees. This transfer of services and know-how is frequently smoother and more helpful in the long run. For instance, if an LDC imports environmentally friendly buses it will surely be a good investment, however, it the country has access to the particular processes used to develop such buses, it could, at a lower price, produce the same product and variations of it to a greater extent.

Evidently, the ideal situation would be for know-how to be widely accessible by law and in terms of prices, enabling any LDC to acquire it. That way, the dissemination of ESTs would be highly facilitated and increased. The BOAI[29] is currently working on a strategy to enable every individual with an internet connection to access research within sciences, medicine and health care, for free. While there are currently around 5870 signatures from individuals and 782 from various organizations, the initiative has not yet been implemented.

Another means for technology transfer is foreign direct investment, FDI. The OECD library defines FDI as a

"cross-border investment by a resident entity in one economy with the objective of obtaining a lasting interest in an enterprise resident in another economy"[30] and further states that FDI "encourages the transfer of technology and know-how between countries."[31]

[29] The Budapest Open Access Initiative, see http://www.budapestopenaccessinitiative.org/
[30] http://www.oecd-ilibrary.org/sites/factbook-2013-en/04/02/01/index.html?itemId=/content/chapter/factbook-2013-34-en
[31] Ibid

Thus, if the investments happen to be made in ESTs, there will consequently be a dissemination of ESTs from the country of the investor to the host country. The reason for this might be, among other factors that an investor must own at least 10% of the voting power in order to classify for FDI, thus he or she will make an effort to use the most efficient technologies and know-how possible. This can have a positive effect not only on the company itself, but also in the economy as a whole through a spillover effect.

4.3 The European Patent system and Technology transfer

4.3.1 Introduction

Since a patentee can decide how many countries protection will be applied for, the effect of the patent on technology dissemination depends on how many countries the invention is protected in. If the applicant seeks protection within all the 40 Member States and contracting states, then no other party than the patent owner would have the right to use the invention or offer it for sale on those markets, thus the public availability of the patented invention will be limited in all 40 states. This means that the spread of the patented technology would also be limited. The patent holder has the exclusive right to utilize the patented invention or offer it for sale, thus he or she also has the legal right to prevent others from using or selling the invention. Accordingly, in such situation the innovation will not spread to the same extent as it would be if others would also have the right to use it.

4.3.2 Contractual Licensing and Compulsory Licensing

The exception is naturally if the patent holder would grant licenses to other parties (in such cases, the licenses are referred to as contractual licenses), *inter alia* scientists, which could develop the invention further, thus directly contributing to technological advancement, which would be a positive effect to society as a whole (and a source of income to the patent owner, who would maintain the ownership). Similarly, if patentees grant licenses to businesses or institutions, the dissemination of the patented technology could increase rapidly and extensively. Thus, if patent proprietors hold ESTs, then providing licenses directly results in dissemination of ESTs. Thus, licenses can be powerful tools for this purpose.

Due to that the production of an invention requires high costs of R&D and regulatory approval, it is, from this perspective, understandable that inventors receiving patent protection charge high prices in order to compensate for the incurred costs. However, since these costs have already been made by the inventor, a licensee will not have to undergo R&D etc., thus it frees the license holder from the unavoidable costs of inventing the technology. Consequently, it allows licensees to pay only for the costs incurred in the manufacturing of the technology, which is substantially lower. This way, the licensee may set far lower prices than the patent owner, which makes the technology incomparably cheaper and thus available to a significantly greater extent. In other words, licensing is certainly useful for EST dissemination.

Since the European Patent system is based on the EPC, which is a framework regulating the granting procedure, it does not contain regulations on contractual licensing. This is due to that regulations on licenses fall either under patent law or competition law, which in this context, are concerned with intervening in cases of excessive patent power which e.g. distorts competition. These strive to balance the power held by some patent proprietors, and can intervene in cases of misuse of power. Thus, regulations on licenses are *ex post* grant mechanisms,[32] and since the EPC regulates the grant procedure, it does not contain provisions on such mechanisms. The only provision found in the EPC with regards to this is article 73, which contains one sentence about contractual licensing. All it states is that

"A European patent application may be licensed in whole or in part for the whole or part of the territories of the designated Contracting States."

Thus, this is very limited information with regards to licensing. Furthermore, rule 23[33] of the EPC stipulates how such licenses should be recorded, either as exclusive licenses or sub-licenses, however, this is not of much relevance either in this context.

What is relevant, however, is article 2 of the EPC, which states that after the grant of a European patent, the patent is split up, and becomes a bundle of national patents, which are to be treated as any other national patents granted by the respective states, and consequently, be subject to the laws of those states. The same provision is found in article 64. Therefore, Clement Petersen and Thomas Riis state that all issues related to licensing and competition

[32] "The Unified Patent Court (UPC), Compulsory Licensing and Competition Law," by Clement Salung Petersen, Thomas Riis and Jens Schovsbo1

[33] EPC Rule 23, see https://www.epo.org/law-practice/legal-texts/html/epc/2013/e/r23.html

law are under the jurisdiction of national courts, thus, in order to determine what regulations are available on licensing under the European Patent system, one must simply look at the legislation of the individual countries.[34]

The question is, how does this influence EST dissemination? In the case of contractual licenses, which are obtained through an agreement with patent proprietors, the fact that the EPC does not regulate licenses specifically does not have to be a big problem, because the extent of the license depends on the agreement with the patent proprietor. Thus, the possibility to negotiate with the latter and receive a license valid throughout the EPO area (or whatever area one in interested in) certainly exists. The problem is, however, that the conditions may vary between nations, implying that some states may have favorable conditions for both parties, while others may involve complicated procedures. If granting licenses involves complications for patent proprietors, then the number of licenses granted is likely to be lower than if the conditions are favorable. Therefore, how easy it is to obtain a contractual license may depend significantly on which country one is interested in. It can be argued that if there were centralized regulations on this, it would imply equal opportunities for the obtaining of licenses throughout the EPO area, despite which state one is interested in. Thus, such an authority could facilitate licensing, and resultantly, technology transfer and EST dissemination. Consequently, the absence of *ex post* grant regulations on licensing in the EPC can be considered a weakness of the European Patent system.

Compulsory licensing

In terms of EST dissemination, compulsory licensing can be particularly useful, because it does not depend on the "good mood" or personal decisions of patent holders to grant or not grant licenses. If the legislation allows for compulsory licenses, the public does not have to suffer because of unwillingness on part of patentees to provide licenses. Unfortunately, the EPC does not contain any provisions about compulsory licensing, which, as mentioned *supra*, can be regarded as a weakness. As in the case of contractual licensing, the lack of provisions regarding this in the EPC implies that the national legislation of each Member State has the authority to regulate this. Consequently, in order to consider the effects of compulsory licensing in this context, an examination of national legislations would be necessary, and that is beyond the scope of this thesis.

[34] Ibid, page 9-10

What can be concluded, however, is that obtaining compulsory licenses under the European Patent system can be complicated. The evident problem with this is that if patent proprietors of important ESTs refuse to grant licenses, areas in great need of such technologies may suffer significantly, particularly if there are no close substitutes to those inventions. In such cases, EST dissemination can is hindered. Thus, the European Patent system is not at all a useful tool for compulsory licensing.

4.3.3 Exceptions to patentability

Although the EPC does not directly mention ESTs, much can be concluded after an examination of the Convention. As highlighted *supra*, if a patent holder has received protection for an invention which is an EST, and chooses not to grant licenses, then the spread of that EST will be significantly limited in the countries in which the patent is in force. As has been explained above, also imports and exports may be affected negatively. Consequently, there is a high probability that important technologies which are needed to address climate change or other substantial environmental concerns would not reach the nations, regions or industries in which they are needed. However, there is a provision in the EPC which may provide a possibility to prevent this problem.

Article 53(a), which addresses exceptions to patentability, provides a potential solution by specifying that

"European patents shall not be granted in respect of: inventions the commercial exploitation of which would be contrary to *ordre public* or morality /…/."

As this article does not directly provide information about ESTs or the environment, a bit of research must be done to in order to determine why it is of significance. By examining sources such as the Board of Appeal Decision of February 21st, 1995, T356/93 relating to Plant Genetic Systems (OJ 1995, 545) it becomes clear that protection of the environment is considered to fall under morality and *ordre public*. This principle is also found in TRIPS 27(2), which clearly states that protection of the environment falls under *ordre public*, and so does NAFTA in Article 1709:2(a), thus this view is shared and incorporated into frameworks and agreements internationally. In particular, the TRIPS Agreement is of significance in this context, e.g. because the Enlarged Body of Appeal of EPO has stated that the TRIPS

Agreement is a useful tool to interpret the EPC. Thus, the TRIPS can be used to interpret the concepts *ordre public* and morality of article 53, as well as to complement the EPC in other matters.

Nevertheless, it must be noted that while this exception to patentability is part of the European Patent system, it does not say anything about the European Patent itself. It does not shed light on how an obtained European Patent influences EST dissemination, nor is this provision a limitation of the power granted to such patents. In her book "Environmental Protection and Patent law", Agnieszka Machnicka discusses the extent to which this exception provided in article 53 is used in reality. She concludes that while the article can certainly be useful in theory, it is rarely applied in practice, thus in reality, its effect on EST dissemination is limited. On the other hand, it can be argued that the purpose of this thesis is to investigate if the patent systems do provide tools helpful for EST dissemination, not to which extent courts or other authorities choose to use them. Thus, what is of greater importance in this case is that the possibility exists in the legislation. Consequently, if Machnicka is right in her conclusion, it reflects a different problem, not the lack of available tools within the EPC. In that case, the question is rather why courts do not use the provision to a greater extent, however, that is beyond the scope of this investigation.

However, an analysis of the EPC will conclude that Machnicka is correct in her conclusion. A very interesting provision of the EPC is found among the "Guidelines for examination." Article 4 of chapter 2 specifically deals with exceptions to patentability, and what is interesting is the explanation of 4.1, which regulates inventions contrary to *ordre public* or morality. It stipulates that all inventions which would be contrary to these concepts in commercial exploitation will be excluded from patentability, due to that it is not within the scope of the EPC to grant patents to inventions which are

"/…/ likely to induce riot or public disorder, or to lead to criminal or other generally offensive behavior."

Thus, not even this article specifically mentions the environment in any way, however it is does provide flexibility in terms of what may induce riot or public disorder. Inventions which could cause such environmental damage that they would generate such reactions are likely to be extremely rare. It is also established that article 53 can indeed only be invoked on these grounds in extremely rare cases. Thus, this provision does not do much to help the case of ESTs. Additionally, it is also provides that

"The mere possibility of abuse of an invention is not sufficient to deny patent protection pursuant to Art. 53(a) EPC if the invention can also be exploited in a way which does not and would not infringe *ordre public* and morality.

Thus, it is evidently very difficult for an invention to be regarded to fall into this category. Furthermore, 4.4.1 stipulates that although a particular exploitation is prohibited by laws or regulations in all contracting states, it is still not necessarily classified as obstructive to *ordre public* or morality, thus further emphasizing that only extreme cases are to fall within this category. The explanation to this provision, which may appear rather extreme, is that the invention may be exported to states where it does not constitute infringement of laws or regulations.
On a different note, 4.1.3 sheds light on economic effects generated by patent protection, which is key in this investigation. It provides that

"The EPO has not been vested with the task of taking into account the economic effects of the grant of patents in specific areas of technology and of restricting the field of patentable subject-matter accordingly."

This is an important insight, because it corroborates what has been hinted throughout this thesis, namely that the EPC does not appear to be concerned with the environment or with ESTs. As made clear in this provision, it is ordained to deal with patent protection, but not to consider what consequences it may have and how the patent protection influences the environment. And in fact, if one looks at the characteristics of the EPC and of the European Patent system as a whole, this is evident, because as has been established in this thesis, the system is clearly more useful for patent holders than for technology transfer.

Another article providing limitations to patentability in the EPC is Rule 28, based on article 53. However, it merely specifies what is to be understood as biotechnological inventions, which are stated as exceptions to patentability in article 53a. Thus, it is not really of relevance in this context. Furthermore, also article 52 regulates what can be considered an invention, and what does not qualify to fall under that category. However, since the area of interest in this thesis is EST, which unquestionably does fall under the category, this is not of relevance either.

In conclusion, it is evident that the only articles of the EPC which are directly relevant in this context are article 53, and article 4, which explains what is meant by *order public* and

morality in article 53. Particularly 4.1.3 is important, because it truly confirms the impression that the European Patent system and the EPC, on which it is built, truly are neither concerned with the economic effects that the European patents have on the environment nor the spread of ESTs. The EPC is simply not appointed to intervene in order to change those effects in any way. The only effects it is concerned with are the extreme situations causing riots, disorders and similar problems, and clearly, only inventions which would cause such affects qualify as exceptions to patentability. Thus, Machnicka was correct in her finding that article 53 is rarely used in reality.

4.3.4 Patent Revocation

In situations in which the exceptions to patentability were not correctly applied when granting a patent, or if after the grant the patented invention proved not to be in conformity with the requirements of patentability, there is a possibility to revoke the patent. Naturally, this may appear somewhat controversial, and it is indeed a highly complicated method of intervention, however, Prof. Dr. Joseph Straus claims that revocation procedures are common in at least three European countries, and this intervention is possible under the EPC. The requirements are stipulated in article 138, although useful information can also be found in articles 99-105, which deal with opposition procedures. Evidently, revoking a granted patent is a last resort, as, at least in theory, such an intervention would require 15 proceedings, along with immense costs. Furthermore, the patent can only be revoked in each of the designated contracting states in which it is viable, under the laws of the respective states.[35] One possibly negative effect of such a revocation is, according to Straus, that the outcome may vary between states. One may revoke the patent, partly revoked in another, and fully maintained in a third state. Furthermore, Straus argues that this would result in fragmentation of the market. However, revocation can also have very positive effects on technology dissemination, because as demonstrated *supra*, the exceptions to patentability of the EPC are more keen on granting patents to inventions than restricting them due to their possibly excessive power and thus negative effect on EST dissemination. For this reason, the possibility of revoking patents is in favor of EST dissemination, because if it can be proved that a particular invention which has been granted patent protection under article 53 is after all obstructing *ordre public* to such a

[35] "The Present State of the Patent System in the European Union As Compared with the Situation in the Unites States of America and Japan*", Prof. Dr. Joseph Straus, p. 15

degree that it is considered not to meet the patentability requirements, it can be withdrawn. That would imply that the dominant power held by the patent proprietor would vanish, and with it, the negative effects created by it. In particular, this is favourable to ESTs if the patented invention is one which damages the environment, or which severely inhibits the spread of vital ESTs. Therefore, although this is not the first plan of action one may consider due to the high costs and complications involved, according to Straus it is a measure which is actually taken frequently in Europe, thus it is not unrealistic. Since it offers possibilities to rid the market of patents which produce more harm than good, this is certainly a good tool to have available under the European Patent system, especially since the other tools are not very strong in terms of supporting EST dissemination.

4.3.5 Varying national legislations

Another aspect which can be favorable for EST dissemination is, ironically, the lack of a central authority ordained to handle issues concerning granted patents. Due to that national patent legislations vary across EPO Member states and extension states, parties other than the patent owners may have the possibility to use, offer for sale or make available patented inventions through potential infringements. Since what is specifically considered infringement may vary across nations, even if a particular state finds an infringement to occur, another state may not. In such cases, third parties may use the patented technology, even if the patent holder objects. In order for the patent holder to stop them, he or she must take legal measures to appeal the verdict given by the sentencing court. However, this is obviously not the best way to spread technology, and apart from that, it can be considered immoral to some extent. Furthermore, it involves hassle both for third parties, who must beware of legal measures taken by patentees, as well as for the patentees, who must spend more time and money on intervention. Therefore, this is evidently not the ideal solution. However, it does allow for a greater extent of EST dissemination than would be possible under a system which has one central legal authority, because in such a case, the court may be in favor of the patentee, thus restricting third parties from using the patented invention within the entire EPO area. Under the current system, although third parties may not be able to use the patented invention throughout the EPO area, it is more likely that they can use it in some countries, due to the various national legislations, than in a centralized system, which has one set of regulations which are viable and binding throughout the area.

4.3.5.1 Imports and exports

Another aspect which is influenced by the differing national legislations within the European Patent system is that of imports and exports. The example *supra* also influences imports and exports of close substitutes. If a particular country does not consider such imports as infringements, imports and exports of that technology would occur, resulting in technology dissemination. Should the technologies be ESTs, then the EST dissemination would occur. This reflects a system which, at least from this perspective, is not particularly beneficial for patent holders. Nevertheless, while this is considered a weakness by patent holders, it may in fact be a positive feature for technology transfer. In countries in which such imports or exports are deemed as infringement, providers outside the protected area which have similar products might not even attempt to export them into the EPO area due to the risk that the similarity of the goods might result in infringement of the patented technologies. Also in this case, much depends on how many countries the invention is protected in. Should the patent holder only apply for protection within e.g. 3 countries, then those are the only countries in which patent protection will be received, and as a result, similar inventions can be imported and exported to and from the remaining 37 countries without running the risk to cause infringements.

Furthermore, problems related to imports and exports also depend on actions initiated by patent holders, which can choose whether to export the patented invention or not. Should patent owners of important innovations choose to restrict availability and not export the inventions, it could have dire consequences on the international community if the inventions are important one, *inter alia* crucial pharmaceuticals or ESTs. Thus, however one may turn this problem, the same truth still remains: the exclusive rights granted to patent holders can prevent vital imports and exports, which is the very opposite of what the EU and EPO are aiming at, and a direct obstacle to EST dissemination. Moreover, while the European Patent system allows for certain possibilities of technology transfer through imports and exports due to the differing legislations of EPO Member states and contracting states, this is, as mentioned above, still not the ideal way to transfer technology. Additionally, it is not a tool one can rely on as a support system for significant EST dissemination.

4.3.6 Concluding Remarks

The most important aspects in terms of technology transfer are those of licensing (both contractual and compulsory licensing) and the regulations on exceptions to patentability. By providing third parties with the possibility to acquire licenses, a legislation or agreement can provide powerful possibilities for technology transfer, and consequently, for EST dissemination. Similarly, by having good provisions about exceptions to patentability, a system can hinder patentability of inventions which could gain such extensive power that they would significantly inhibit technology transfer and specifically EST dissemination. Under the European Patent system, however, neither licensing nor exceptions to patentability provide the desired effect.

In terms of compulsory licensing, the major problem is the fact that it is not regulated in the EPC. Thus, the European Patent system does not include a system vested to deal with this matter. Consequently, it is up to the various Member states to have such provisions in their respective legislations, and deal with these things. For this reason, it is more difficult for third parties to obtain compulsory licenses. As that would require separate applications in all states in which the license is desired, it is not only time consuming but can also be very costly.

The possibility to obtain contractual licenses, however, could be easier, as it would require conducting discussions with patent owners. Since there are actors such as patent trolls, which specifically seek to acquire patents in order to license them and receive monetary compensation, a fair possibility exists for this. Moreover, not only patent trolls are open to offer licenses, but also other more conventional patent owners.
However, it may also be difficult to gain contractual licenses, because they depend on the willingness of patent proprietors to grant them. The worst part is that as a result, the extent of EST dissemination to a great extent depends of the personal wishes of patent holders, as they have the power to decide whether they will agree to provide contracting licenses or not.
Thus, the fact that the European Patent system is an international system does not make any significant improvements in terms of licenses and EST dissemination compared to the first patent system of solely national laws. In other words, while this system involves benefits for patent proprietors, it does not imply any real benefits in terms of EST dissemination, at least not from this point of view.

Regarding the exceptions to patentability, the EPC does, through article 53 provide for the possibility to deny patents for some inventions which contradict morality or *ordre public* in a country. As has been demonstrated, these concepts can include problems such as environmental degradation, thus inventions which can reasonably be believed to cause such effects can, according to article 53 of the EPC, be denied patentability. However, as can be seen in article 4.1 which analyses how morality and *ordre public* should be interpreted under article 53, inventions are only denied patents in extreme, and very rare, cases. Thus article 53 is not applicable in normal situations, which means that the possibilities it can offer are limited in this case.

In conclusion, although there are some possibilities for EST dissemination, it is evident that the European Patent system is not the best tool for this purpose. The possibilities for EST dissemination existing due to the variations in national legislations do not provide reliable support for this purpose. These possibilities are more a reflection of a "loop-hole in the legislation", i.e. a weakness of the system, than serious legal tools. Although the regulations on patent revocation are certainly favorable, due to the complex and highly expensive nature of such a possibility, the system cannot fully rely on this as the solution to increased EST dissemination. Without solid support from other tools such as the regulations on licensing and exceptions to patentability, this tool alone is not sufficient to make the European Patent system a favorable tool for EST dissemination.

4.4 The Unitary Patent system and Technology Transfer

4.4.1 Introduction

As established in chapter two, the Unitary Patent system is designed to support patent owners, and provide incentives for businesses. According to Battistelli, this is indeed the aim of the Unitary Patent system. It is an approach intended to stimulate innovation in society by providing patent owners with substantial protection and enterprises with incentives to invest in innovation, and that way promote e.g. long-run technological and scientific advancement in society. While this is certainly favourable, it has also been mentioned that, as argued by Sykes, strong patent protection is usually not favorable in terms of technology transfer, as the exclusive rights of patent owners to a great extent prevent the spread of technology. He claims

that this also makes it more difficult for other nations to import patented technology, which means that the spread of that technology will be limited not only within the states in which the patent is viable, but also outside that area. In the case of ESTs, this is a significant problem, because countries outside of Europe are the ones in the greatest need of ESTs. From this perspective, the Unitary Patent system is likely to have negative effects on EST dissemination.

While Sykes does not specifically discuss the Unitary Patent, nor can anyone be fully certain of the system's exact effects since it has not yet been introduced, one can speculate about them. Since the Unitary Patent offers stronger protection to patent owners than the European Patent, it implies stronger monopolistic power. For this reason, the transfer of technology is likely to be more limited. Therefore, I agree with Sykes, because as has been seen in chapter 3, economic theory supports his claim about the effect of patents.

Proposal COM (2011) 215/3 provides in article 6 that it

"Lays down the right of the proprietor of a European patent with unitary effect to prevent third parties not having his consent from making, offering, placing on the market or using a product which is the subject matter of the patent, or importing or storing the product for these purposes."

The article continues to limit the rights of other parties even further, as does Article 7. Hence, it is not only according to economic theory that patents have a stagnating effect on technology dissemination. The regulations on the Unitary Patents themselves reflect that they attempt to inhibit the use of third parties. Thus, if the technology in question is an EST, then its spread will be limited.

4.4.2 Contractual Licensing and Compulsory Licensing

Article 8 of Proposal COM (2011) 215/3 specifically allows for the granting of contractual licenses under the Unitary Patent system, and this possibility evidently supports the spread of ESTs. Thus, if a patent holder agrees to provide licenses for the patented technology, then the granting of licenses directly results in technology transfer. If the patented technology is an EST, then granting licenses for the patented EST directly generates EST dissemination. Similarly, if licenses are granted to parties who are concerned with developing ESTs of some

sort, and the patented invention is a technology which could help the development of an EST, then the availability of licenses would support the development of ESTs. Thus, it is clear that, just as under the European Patent system, licenses can be powerful tools for EST dissemination. Regulation (EU) No 1257/2012 specifically states in recital 15 and article 8 that proprietors of unitary patents should have the possibility to grant licenses in order to:

"Promote and facilitate the economic exploitation of an invention protected by a European patent with unitary effect."[36]

Thus, the Regulation clearly recognizes the importance of licensing and the value of having the patented innovations used to a great extent, not to a limited extent. In other word, it recognizes that a spread of patented technology is positive, and clearly supports it, which means that the Regulation supports EST dissemination. In fact, it can be argued that the Regulation, and the Unitary Patent system as a whole, encourages the granting of licenses, because recital 15 also stipulates that if patent owners decide to grant licenses to third parties, they will no longer have to pay the conventional renewal fees, but enjoy a reduction of the fees. Furthermore, a patent proprietor obviously is to receive compensation for granting licenses from the licensees,[37] which is also encouraging to patent proprietors. Moreover, the only thing required by patent holders is to file a statement to the EPO, stating that he or she is willing to grant licenses to third parties in exchange for suitable consideration and renumeration. Thus, granting a license is rather straightforward and simple for the patent holder, which is encouraging, making it more likely for patent proprietors to grant licenses. Therefore, it can be concluded that the Unitary Patent system encourages the granting of licenses, which implies a spread of ESTs, thus under this system, licensing can indeed be a good tool for EST dissemination. Accordingly, it can also be concluded that from this perspective, the Unitary Patent system is a better tool than the European Patent system, which lacks significant regulations on contractual licensing.

Compulsory licensing

The point which could make the Unitary Patent system monumentally different in this context is the presence of the Unified Patent Court (UPC), which will be the central legal authority of the Unified Patent system, authorized and responsible to handle all issues related to infringement of European patents. One might wonder, however, what effect the presence of

[36] Regulation (EU) No 1257/2012, recital 15
[37] Ibid, article 8

this central authority will have on compulsory licensing; will the UPC make it possible to receive a compulsory license with unified effect? It would make sense, since the Unitary Patent system is all about unitary effects. Such a possibility would imply that the compulsory licenses would be viable throughout the contracting states, which could mean a substantial increase of EST dissemination. However, the answer is somewhat complex.

First it must be recognized that, as opposed to exceptions to patentability, compulsory licensing is used after patents have been granted, in order to balance patent rights,[38]and make certain that patent holders do not abuse their power. Thus it is evident that in the context of this thesis, compulsory licensing is one of the most important possibilities for EST dissemination. However, regarding the possibility of the UPC to grant compulsory licenses, EU Regulation 1257/2012 (the Regulation implementing enhanced cooperation in the area of creation of the unitary patent system), stipulates in recital 10 that:

"Compulsory licenses for European patents with unitary effect should be governed by the laws of the participating Member States as regards their respective territories."

Thus, from this provision it appears that the UPC will have no such authority as speculated *supra*, and therefore, not make any difference in the matter of compulsory licensing, but leave the Unitary Patent system on square one, exactly where the European Patent system is in this context. However, this provision has been deeply criticized, e.g. by professor Ullrich, who argues that this is "legally flawed" and inconsistent with EU law.[39] Moreover, there are other provisions which contradict recital 10. For instance, the same Regulation provides in article 15 that, despite its role, it

"/…/ shall be without prejudice to the application of competition law and the law relating to unfair competition".

Experts such as Clement Salung Petersen and Thomas Riis state that the application for compulsory licenses can be done either based on the specific rules on them found in patent law, or, equally so, based on competition law which specifically deals with preventing right holders from misusing their monopolistic power. Similarly, compulsory licensing can evidently be regarded as relating to unfair competition, because the very reason compulsory

[38] Schovsbo, Jens, Fire and Water Make Steam: Redefining the Role of Competition Law in TRIPS 308 –358, Kur and Levin (ed.) Intellectual Property Rights in a Fair World Trade System, Edward Elgar 2011

[39] Ullrich, supra note 22 (42-44)

licensing exists is to inhibit unfair competition.
Moreover, recital 10 also contradicts article 3(2) of the same Regulation, which provides that compulsory licenses with effect only within a specific contracting state are definite exceptions to the unitary effect, which is supposed to characterize the Unitary Patent system. Even more so, the article specifies that a European Patent with unitary effect

"May only be limited, transferred or revoked, or lapse, in respect of all the participating Member States," and further, that such a patent "may be licensed in respect of the whole or part of the territories of the participating Member States."

Thus, it can be argued that the possibilities of the unitary patent system with regards to compulsory licensing are ambiguous. Therefore, Petersen and Riis conclude that while the Unitary Patent system may offer stronger possibilities in this regard than the European Patent system (which clearly does not regulate compulsory licensing whatsoever under the EPC), it does not provide the strong effect which one may desire in order to truly and forcefully support EST dissemination through its provisions on compulsory licensing. Petersen and Riis argue that while for the European Patent system the various national laws on compulsory licensing continue be applicable, the authority of the Unitary Patent system in the context of compulsory licensing is questionable. Thus, with regards to compulsory licensing, the Unitary Patent system really does not bring any significant improvements to the market. Since compulsory licensing is one of the most important tools for balancing the excessive power of patent owners and thereby promoting EST dissemination, it can be considered peculiar that an updated patent system (which the Unitary Patent system is intended to be) does not offer stronger possibilities for this. This is a concern shared by the Max Planck Institute for Intellectual Property and Competition Law.[40]

4.4.3 Exceptions to patentability

As in the case of the European Patent system, the grant of the Unitary Patent is based on the EPC, thus article 53 which deals with the exceptions to patentability is equally relevant to the Unitary Patent system as it is to the European Patent system. Since unitary patents will be granted according to the same requirements as the conventional European patents, they will

[40] See "Unitary Patent: An overview of the European Patent with unitary effect, Diana Parreira, 2013

be subject to the same exceptions to patentability. Due to that the exceptions to patentability of the EPC were discussed in 4.3.3, such a comprehensive discussion will not be repeated here. As established earlier, the EPC does provide a possibility to exclude inventions from patentability if they are believed to contradict *ordre public* or morality to such a degree that would generate effects such as riots and public disorder. However, article 4.1 stipulates that only extreme cases are qualified to fall within this category, thus, it is in fact not the best tool, because most technologies do not generate such effects. In that case, the possibility to deny them patent protection on grounds of article 53 will not be possible, meaning that technologies which may be significantly harmful to the environment will be granted protection simply because environmental damage generated by the technologies is usually not considered severe enough as to classify under article 4.1, at least not most forms of environmental damage.

Since a granted unitary patent will have unitary effect within all contracting states, a patented invention which hinders EST dissemination would have significant power throughout the area, meaning that EST dissemination would be limited in all contracting states. For this reason, it would be desirable to have exceptions to patentability which are more severe, and do not grant licenses so easily, but take more consideration to the environment and how potential patents would influence EST dissemination. Naturally it would be favorable if the exceptions to patentability were more supportive of this cause than they are. In such cases, EST dissemination could significantly increase. However, the existing exceptions are more keen on accepting inventions for patentability, not paying much attention to their effects on EST dissemination[41], which evidently has negative implications for such dissemination.

Considering also the limitations regarding compulsory licensing, it becomes increasingly clear that, as hinted in chapter two, the Unitary Patent system indeed appears to be a useful tool for patent proprietors, but not equally so for EST dissemination.

4.4.4 Patent Revocation

The possibility of patent revocation is valid also for unitary patents. However, while the EPC regulates revocation of European patents in article 138, Proposal COM(2011) 215/3 for the Regulation "Implementing Enhanced Cooperation in the area of the Creation of Unitary

[41] EPC, Chapter 2, 4.1.3

Patent protection" makes no reference to article 138, although the granting of the unitary patent will, as the European patent, be based on the EPC. Only article 54(3) is mentioned as relevant for unitary patents. This article allows for a limitation or revocation of a patent if it is found that it lacks novelty as stipulated in the article. Furthermore, it is provided that such a revocation is to occur only in contracting states designated in the European patent application, and that any revocations of patents must be reported to EPO. Additionally, the actual Regulation (EU) No 1257/2012 on "Implementing the Enhanced Cooperation in the area of the Creation of Unitary Patent protection" makes not reference to any articles regulating patent revocation, nor does it establish under what conditions such a revocation may occur. Moreover, the UPC Agreement regulates the validity of patents in article 65, providing that the Unified Patent Court may only revoke a patent (partially or completely) on grounds provided in article 138 (1) and 192(2) of EPC, while there is no reference to article 54 in this context. The UPC Agreement also stipulates that in cases of revocation, a copy of the decision must be sent to the EPO and, and in cases of conventional European patents, also to the national patent offices of all countries concerned.[42]

What is essential, however, is that similarly to the European Patent system, also the Unitary patent system provides the possibility of revoking patents, which can have positive effects on technology transfer. The difference lies in the grounds of patent revocation, which seem to vary. Since Proposal COM (2011) 215/3 only refers to patent revocation on the ground of article 54, which deals with the requirements of novelty, there appear to be fewer opportunities to invoke patent revocation under the Unitary Patent system, which is curious, because since the unitary patents are also based on the EPC, it would be logical for them to also be affected by article 138. However, it must be remembered that since this system has not actually come into force yet, some regulations are still ambiguous, thus as mentioned at the beginning of this chapter, one cannot know with complete certainty exactly how this will work in reality.

4.4.5 Exhaustion of rights

Exhaustion of rights is a limitation of patent rights in this case, and due to this, it may allow for increased EST dissemination and technology transfer in general. In essence, this principle

[42] UPC Agreement Article 65(5)

implies that if a particular patented technology has been placed on the market by the patent owner or someone who has received the consent to do this by the owner, the patent right can no longer be exercised by the patent owner, as it is "exhausted". That way, once the patented product has been offered for sale, the patent holder cannot prevent other parties from using it. Thus, at this point, technology dissemination can increase substantially. Regulation (EU) No 1257/2012 addresses this in recital 12 and article 6, providing that this principle should be applied to the unitary patents. Furthermore, also Article 9 of Proposal COM (2011) 215/3 relates to exhaustion of rights, and corroborates the provisions of Regulation EU 1257/2012.

While this makes evident that the exhaustion of rights principle shall be valid for unitary patents, it does not, *de facto*, have a very significant impact on EST dissemination. This can be seen in the fact the principle of exhaustion is an international doctrine on limitations to IPRs, also valid for national patents and European patents[43], and under these systems the problems with EST dissemination still remain- thus it does not solve the problem. Therefore, while it is good to know that the Unitary Patent system will be limited to this exception and not receive "special rights" allowing patent holders to exercise rights even after placing the patented product on the market, it is really not a tool which can significantly diminish the problem with EST dissemination caused by strong patent protection. Furthermore, article 6 provides that there can, in fact, be exceptions to the exhaustion of rights principle in the case of unitary patents, and that, in some situations, the patent proprietor may continue to limit the commercialization of the patented invention even after it has been placed on the market. While this is only applicable in very rare and specific cases, it adds to the uncertainty of this principle as a tool for EST dissemination. Thus, so far, it appears that the strongest tools for EST dissemination under this system are the contractual licenses, exceptions to patentability and possibilities of patent revocation.

4.4.6 Private and non-commercial use

Proposal COM (2011) 215/3 provides in article 8 that third parties may make use of the patented invention for non-commercial purposes, which may be helpful to some extent. Recital 10 provides that while a granted patent with unitary effect does provide the patent proprietor with the right to prevent third parties from using the invention in the states in which

[43] See "International exhaustion and parallel importation", WIPO, http://www.wipo.int/sme/en/ip_business/export/international_exhaustion.htm

the patent is valid, there are certain limitations to this right. One such example is the use of the patented invention for private and non-commercial purposes. Similarly, the same applies for experimenting, and for "acts allowed specifically under Union law or international law,[44]" including the right of farmers to use protected livestock for farming purposes. While these exceptions do provide for technology transfer and specifically EST dissemination to some extent, they are unlikely to generate such dissemination to a significant effect. Therefore, while these limitations are good to have, they cannot be considered a powerful tool in terms of EST dissemination under the Unitary Patent system.

4.4.7 Concluding Remarks

The most evident conclusion that can be drawn is that, with regards to how the Unitary Patent system actually influences EST dissemination, it is very similar to the European Patent system. There are significant differences between the two with regards to patent protection, since the Unitary Patent system provides clear improvements compared to the European Patent system, however in the context of environmental protection and especially for EST dissemination, the Unitary Patent system is not a very improved tool.

In terms of contractual licenses, the system is in fact a good tool, as it facilitates the possibility of patent proprietors to grant licenses, thus encouraging them to provide contractual licenses, which implies a dissemination of the patented inventions. Consequently, in cases where the patented inventions are ESTs, it also implies a dissemination of ESTs.

However, in terms of compulsory licensing, the Unitary Patent system is a surprisingly poor tool. It offers ambiguous provision, contradictory to each other, however, Regulation 215/3 states that the Unitary Patent system will not regulate compulsory licensing, thus, it does not offer any significant improvements compared to the European Patent system. Therefore, it does not provide for increases in EST dissemination in this context.

With regards to the regulations on exhaustion of rights, they are based on EPC article 53, as in the case of the European Patent system. Therefore, the provisions are the same. As has been concluded also about the European Patent system, the exhaustion of right under the Unitary Patent system does offer some possibilities to promote EST dissemination, however, they are

[44] Proposal COM(2011) 215/3

rather limited, and not focused on this purpose. Therefore, while they do contribute to make this system a good tool for EST dissemination, more instruments are needed to fulfil this purpose.

Finally, the possibility to revoke patents is a good instrument, supportive of EST dissemination, and combined with the regulations on exceptions to patentability and on contractual licenses, they contribute to make the system a somewhat good tool for EST dissemination. Despite the fact that the principle of exhaustion of rights and the possibilities of private and non-commercial use of patents do not contribute very much to significant EST dissemination, in combination with the instruments mentioned *supra*, they can help the Unitary Patent system be a fairly good tool. However, significant improvements would be desired in order to make the system a truly strong tool for EST dissemination.

4.5 The TRIPS Agreement

4.5.1 Introduction

While the chapter has so far discussed how the European Patent legislation influences EST dissemination, a substantially important aspect to note is that all states of relevance, both the contracting Member States of the EU as well as the Member states of EPO, are also members of the WTO. Consequently, they have ratified and are bound by the TRIPS Agreement, which is a central international agreement on IPRs. In fact, also the EU itself is bound by the TRIPS. For this reason, neither the European Patent system nor the Unitary Patent system can contain regulations which conflict with the regulations of the TRIPS. Moreover, the EPO itself stated through the Enlarged Board of Appeal, G2/02 and G 3/02 (OJ 2004, 483) that it is fully justified for the boards of appeal to consider TRIPs provisions and take them into consideration in order to interpret provisions of the EPC. Therefore, the TRIPS Agreement is of vital importance in this investigation, and quite possibly, offers the solution to the weaknesses of the two patent systems. Furthermore, due to that this investigation is concerned not only on the effect of EST dissemination within Europe but also outside, the importance of TRIPS is even more significant. The next section discusses the role of the TRIPS in this puzzle, as well as how it may provide the solution to this equation.

4.5.2 Patent regulations under the TRIPS Agreement

The TRIPS Agreement is, apart from the GATT and GATS, is one of the most significant agreements of the WTO, and the patent regulations provided in TRIPS, which are an extension of the Paris, Rome and Bern Conventions, are found in articles 27-34 of the Agreement. However, it provides minimum standards, and allows all member states to develop them further in their own national laws. Furthermore, TRIPS clearly provides in article 7 that the underlying purpose of IPRs is to

"Contribute to the promotion of technological innovation and to the transfer and dissemination of technology."

Thus already in this sentence, technology transfer and dissemination are specifically stated, as is the aim to encourage them. Additionally, the TRIPS Agreement affirms in article 8.2 that

"appropriate measures /…/ may be needed to prevent the abuse of intellectual property rights by right holders or the resort to practices which unreasonably restrain trade or adversely affect the international transfer of technology."

Again, it is evident that the TRIPS contains tools which are lacking in the EPC, as the TRIPS is far more specific in this context, specifically identifying these problems and recognizing the importance to prevent them.

4.5.3 Limitations and exceptions to patentability

Furthermore, TRIPS affirms in principle 1 of article 8 that members may

"/…/ adopt measures necessary to protect public health and nutrition, and to promote the public interest in sectors of vital importance to their socio-economic and technological development."

Thus, an investigation can be conducted in order to determine exactly what falls under the categories "public health", "the public interest" and "sectors of vital importance". Considering the fact that IARC has officially declared air pollution as cancerogenic to humans, relevant ESTs which can address this issue would incontestably fall under "measures necessary to

protect public health", and such an intervention would clearly be of "public interest". Additionally, it is undoubtedly a "sector of vital importance." Thusly, this article of the TRIPS Agreement clearly favors the dissemination of ESTs, and reflects the intention of the Agreement, which is to truly be an advantageous tool for technology dissemination. By specifically stating that the aim is to "protect public health and nutrition", the TRIPS Agreement provides support in favor of the environment which is not found in the EPC, because the latter does not offer such a detailed description in its provisions on exceptions to patentability. Thus by having incorporated the terms "public health" and "nutrition", the TRIPS provides unambiguous indications, as opposed to the EPC, which appears unclear with regards to this. Therefore, the EPC could certainly benefit from using the TRIPS as a complement.

In addition to this, the TRIPS also provides in article 30 that

"Members may provide limited exceptions to the exclusive rights conferred by a patent, provided that such exceptions do not reasonably conflict with normal exploitation of the patent and do not unreasonably prejudice the legitimate interests of the patent owner."

Thus, even though patent protection is granted, the Agreement provides legal space to limit the power generated. Therefore, this article can be regarded as a provision offering balance between the interests of the patentees and those of the environment. Hence, this article may in fact serve as the key to the main conflict of this thesis, because it maintains patent protection, clearly aiming to protect patentees, while simultaneously providing the possibility to support environmental protection.

Moreover, TRIPS plainly declares in Article 27(2) that

"Members may exclude from patentability inventions, the prevention within their territory of the commercial exploitation of which is necessary to protect *ordre public* or morality, including to protect human, animal or plant life or health or to avoid serious prejudice to the environment."

Again, the TRIPS Agreement is right on target. As opposed to the EPC, it specifically identifies what is to be considered to fall under *ordre public* and morality, which are central in this thesis because in many ways, legal provisions which in practice hinder the spread of environmentally sound solutions can be viewed as immoral, because they obstruct measures taken to protect the environment. Similarly, companies or patentees pursuing as high power as

possible while not caring how that power influences environment, can also be considered immoral. By specifying human, animal and plant life or health, as well as the environment *per se*, the TRIPS provides explicit indications on what is to be done with patents which can reasonably be believed to cause damage. Thus, this article clearly reflects the intention of the Agreement in this context; it is obvious that environmental concern is granted importance, and that existing patent regulations are not intended to compromise the environment. Along these lines, the TRIPS Agreement certainly comprises elements favorable both for environmental protection and for EST dissemination, and can serve as a powerful tool in this context.

On top of this, the TRIPS offers an additional provision of vital importance in article 73, which allows members "wide discretion to take any action it considers necessary in time of war or other emergency." In this case, it is interesting to determine what can be deemed as "other emergency". However, the availability of ESTs in areas particularly stricken by environmental concerns, such as the cancer villages in China mentioned in chapter one, can reasonably be thought to fall under this category. More than that, specialists such as Henrik Lidgard and Jeffrey Atik interpret this provision as relieving members from essentially all of their principal obligations under TRIPS.[45] Thus, due to the freedom it provides to handle national emergencies, article 73 is another useful tool provided by the TRIPS agreement.

In terms of national emergencies and other situations in which excessive patent power has negative effects on the market, the TRIPS provides another possibility. Article 31 regulates compulsory licenses, which will be discussed in the following section.

4.5.4 Compulsory licensing under the TRIPS

TRIPS Agreement provides the option of compulsory licenses in Article 31(a-l), identifying the specific conditions for such a license to be granted, the extent of rights a seeker can be granted, etc. Among others, it is specifically stated in Art. 31(b) that

"This requirement may be waived by a Member in the case of a national emergency or other circumstances of extreme urgency or in cases of public non-commercial use."

[45] Lidgard & Atik, 2005, p.7

Although the word "environment" is not specified in the article, it is reasonable to believe that significant environmental concerns would qualify under "national emergency", and acute environmental concerns are highly likely to be considered as "circumstances of extreme urgency". Since compulsory licenses permit third parties to use a patented technology without the consent of the patent owner,[46] they directly enable technology dissemination without breaking any laws or agreements. Naturally, there are certain requirements which must be fulfilled in order for a party to be eligible for a compulsory license, however, the very possibility of receiving such a license in the events stipulated in article 31, is evidently useful, and adds further to the role of the TRIPS as a solution provider in this case. Since many WTO Members are developing countries, the TRIPS can be used not only to encourage technology transfer within Europe, but also from Europe to the rest of the world, where the ESTs are needed to a significantly greater extent.

For very obvious reasons, the EPO boards of appeal have considered the applicability of the TRIPS in the context of the EPC not only in the case mentioned earlier in this chapter, but on numerous occasions, *inter alia* G1/97, OJ 2000, 322, T 1173/97, OJ 1999, 609, J 10/98, thus affirming the relevance of the Agreement, and how useful it can be in this context.

4.6 Concluding Remarks

One of the most notable insight of this chapter is that by using the TRIPS Agreement as a complement, the European patent legislation certainly has the possibility of acting as a tool for EST dissemination. Since all relevant states in this case as well as the EU itself are bound by the TRIPS, they are obliged to comply with the Agreement to the same extent as they are obliged to comply with the European patent legislation. Principally through its provisions on the exceptions to patentability, the TRIPS Agreement offers significant possibilities for an interpretation of the European patent legislation which is positive for EST dissemination.

However, if the European patent legislation is to be isolated and not regarded in the context of the TRIPS but solely by itself, it is far more advantageous for patent holders than for EST dissemination.

[46] Sykes, p.7

5. Summary and Conclusions

The purpose of this Master thesis was to find an answer to the title, namely "European Patent Legislation: a tool or obstacle for the dissemination of ESTs?" Throughout the thesis, there have been discussions chiefly on the European Patent systems (the European Patent and the Unitary Patent), ESTs, patents and technology transfer in order to reach the answer. Due to that extensive conclusions have already been provided in the previous chapter, in order not to be repetitive, this chapter will only highlight their essences.

The first conclusion which can be drawn is that the hypothesis of this thesis, which was presented in chapter one, was correct. As suggested, this investigation has proved that there is indeed a conflict between how the patent systems strive to promote innovation in society through patent protection, and the divergent goal of environmental protection through EST dissemination.

In terms of the European Patent system, which has been operational for nearly forty years, it can be concluded that it is a mediocre tool, both for patent holders and for EST dissemination. It offers some possibilities for EST dissemination, however, due to its weaknesses in terms of licensing and exceptions to patentability, it does not serve as a strong tool for this purpose.

The fact that there are various ruling legislations to be followed under this system can be favourable for EST dissemination to some extent due to that infringement may be judged in differing ways across states, however this is not a solid legal instrument to count on for EST diffusion. Strengths do lie in the possibility of patent revocation, enabling patents which constraint *inter alia* EST dissemination through their excessive power to be removed from the market, thus also freeing the market of that power and allowing for an escalation of technology transfer and EST dissemination. Additionally, it must be highlighted that as found in Decision of February 21st, 1995, T356/93 relating to Plant Genetic Systems (OJ 1995, 545) of the EPO Boards of Appeal, the exceptions to patentability under EPC article 53 can be applied in cases of technologies which generate severe environmental degradation of some form. However, due to the specific requirements to qualify for this category, the problem is

that *de facto*, the EPC only allows for eminently rare cases to benefit from this possibility. Similarly, the option of patent revocation is a very complex process involving monumental costs, thus this option is a last resort solution, and not very frequently invoked. Thus overall, it is evident that the system does provide some possibilities to support EST dissemination, however, these possibilities are not sufficient in order to refer to the system as a strong tool for EST dissemination. Due to its focus of aiding patent proprietors, it is also in many ways an obstacle to EST diffusion. Therefore, it is reasonable to conclude that the European Patent system is a modest tool for EST dissemination.

In terms of the Unitary Patent system, which has not yet been introduced, one cannot predict its effects with certainty. However, based on the relevant legislation and opinions of experts, it is reasonable to believe that the Unitary Patent system will be more supportive of EST dissemination than the European Patent system, however, it will also act as an obstacle in some ways. This is mainly due to the Unitary Patent Court, which will act as the single legislative authority in all contracting EU Member States. Since infringement will be judged the same way regardless of country, third parties will not be able to enjoy the possibilities they may have to utilize patented inventions, as they do under the European Patent system. Furthermore, it is advantageous mainly because it encourages contractual licensing, although other more limited possibilities such as revoking patents, exhaustion of rights and allowing for private use of patented technologies can contribute to strengthening the potential of the system in terms of supporting EST dissemination. A weakness of the system is the lack of regulations on compulsory licenses, as well as the limitations of the exceptions to patentability. Overall, this system is also a mediocre tool for EST dissemination.

On a different note, the fact that all relevant states are bound by the TRIPS Agreement, as is the EU itself, the consideration of the TRIPS and using it as a complement to the European patent legislation certainly allows for a far more positive outcome, and can in fact be the solution to the problem. The TRIPS provides numerous possibilities for enhanced EST dissemination, thus by using the TRIPS as a complement, the European patent legislation could in fact be a very useful tool for EST dissemination. Therefore the sought after possibilities for EST dissemination do exist, it is only a matter of using them.

In conclusion, both the European Patent system and the Unitary Patent system would require updates in order to truly be regarded as good tools for EST dissemination. Since the Unitary Patent system has not yet been introduced, it would be wise to revise it before launch, and

allow for “a new beginning” of patent legislation which is equally concerned with enabling EST dissemination as it is with protecting patent proprietors, and that way support environmental protection and long-run sustainability.

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