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CLIMATE FRIENDLY TRANSFER OF TECHNOLOGY

Barriers, options, possible solutions

A Discussion Paper by

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Foreword

Transfer of technology is one of the key elements in the present UNFCCC negotiations on climate change. As indicated in the Bali Action plan from the Conference on Parties (COP) 15, "effective mechanisms and enhanced means for the removal of obstacles..." are needed to facilitate transfer of technology to support actions on mitigation and adaptation (UNFCCC 2007a).

With this discussion paper DanChurchAid and Church Development Service (EED) contribute with input to that debate, pointing at existing obstacles and possible proposals for how these obstacles may be removed.

The paper is based on a desk study on climate change, transfer of technology and Intellectual property rights in spring/summer 2008 conducted by Friedel Hütz-Adams (SÜDWIND e.V.), and Stine Jessen Haakansson (independent consultant), and financed by Church Development Service (EED) and DanChurchAid.

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Herausgeber

Church Development Service (Evangelischer Entwicklungsdienst – EED)
EED is an organisation of the Protestant Churches in Germany. By means of financial contributions, personnel involvement, scholarships and consultancy services EED supports the development work of churches, Christian and secular organisations. In this worldwide partnership, EED is participating in establishing a fair society. It takes and promotes action to arouse and enhance people's willingness to stand up to overcome need, poverty, persecution and violence. EED is an association of the Protestant Churches in Germany (EKD). It was established in 1999. EED is legally registered in Bonn as a non-profit organisation. EED is a member of the Association of World Council of Churches related Development Organisations in Europe

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DanChurchAid
Established in 1922, DanChurchAid (DCA) is today one of the major Danish humanitarian non governmental organisations (NGO), working with local partners, international networks , churches and non-religious civil organisations to assist the poorest of the poor. DanChurchAid's international work is always based on an ongoing dialogue with local partners. Activities are carried out in Africa, Middle East, Asia, Central America, Eastern Europe and Central Asia.

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Aprodev
Aprodev was founded in 1990 in order to strengthen the cooperation between the European development organisations which work closely together with the World Council of Churches (WCC). At present, 17 development and humanitarian aid organisations cooperate through Aprodev. ountries in the world.

The Aprodev members share the ecumenical understanding of development as a multi-facetted and holistic concept which comprises social, cultural, spiritual, political, environmental and economic aspects.

Given the unequal distribution of wealth, power and knowledge in the world, the sharing of resources is an important basis for the work for justice, peace and safeguarding God’s creation.

The mandate of Aprodev is to influence decision-making processes in the European Union institutions related to North-South issues in order to promote fairness and justice and the eradication of poverty; to facilitate access to the European Union institutions for Aprodev organisations and the ecumenical family and to share information and experience related to the EU; and strengthen cooperation and joint work among Aprodev agencies.

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Content

1. Introduction: Transfer of technology and climate change

"According to the IPCC, stabilisation levels of greenhouse gas emissions can be achieved by deployment of a portfolio of technologies that are either currently available or expected to be commercialised in coming decades, assuming appropriate incentives are in place."
(Ivo De Boer, Executive Secretary UNFCCC: 2008a: 2)

Climate change is a serious threat to development in developing countries around the world. The direct effects of changes in the climate are already seen as draughts, flooding, extreme and unpredictability weather. These effects are devastating for poor and vulnerable communities who are lacking the capacities and abilities to cope and adapt to new circumstances. However, developing countries are affected by climate change in yet another way, through limitations in their possibilities for future development and economic growth. Traditional development is linked to industrialization, which urgently needs to be transformed to a climate friendly and sustainable development. To meet their growth and development needs developing countries are in need of expanded energy services. If these countries are to moderate their emissions' growth and at the same time sustain their economic development, the key is access to climate friendly technology at affordable prices.

Research and Development of new technologies are generally not conducted in developing countries thus there is an urgent need for facilitation of transfer of technology from western countries to developing countries, both relatively rich countries such as India and China, and the least developed countries such as Zambia and Uganda.

The role of transfer of technology

There is a small window of opportunity to reverse the dynamics of global warming. Together with political commitment, technology plays a crucial role. According to Third World Network, the cost of reversing the process is 0.1% of GDP per year (globally). Meanwhile, the economic growth in large developing economies makes it difficult to believe in the 'business as usual' model that dominates the business side of the climate debate. The share of emissions coming from developing countries is increasing. If developing countries are to moderate their emissions' growth (and sustain their economic development), the key for these countries is access to climate friendly technology at affordable prices. There is an urgent need for substantial changes – especially in production and dissemination of new technology.

The negotiations taking place before the COP15 in Copenhagen are already more complex than earlier international negotiations (e.g. trade) as the countries are negotiating global production and consumption. Looking back at the lessons from the Uruguay Round of the trade negotiation, developing countries need to be very careful of what bargains they make in the climate negotiations. Especially the least developed countries, which are likely to keep their position as buyers/net-importers of knowledge and technology in the market for climate friendly technologies.

The International Energy Agency has foreseen that 78 per cent of the (hopefully) avoided carbon dioxide emissions by 2030 may very well come from policies that en-

courage more efficient production and use of energy. Consequently technology, and especially new and innovative technology as well as transfer of technology, are key issues in the current climate debate.

In the current negotiations for a new climate agreement, following the Kyoto Protocol, transfer of technology has become a prioritized topic, and the need for this is formally acknowledged. There is, however, still uncertainty about the definition of transfer of technology and the range of the commitments of different actors.

Transfer of technology can be facilitated through many different initiatives. To achieve the desired effect, action will be needed in most of these areas, as none of them can stand alone. Funding is an obvious factor as both development and production of technology have a price. There are different funding solutions on the table, such as the Clean Development Mechanism (CDM) and the establishment of different funds. Funds are also needed for an increase in Research and Development (R&D). New and innovative solutions, based on renewable energy solutions, are needed. The challenge here is that R&D primarily is taking place in developed countries, while experiences show that technical solutions often need adjustments and adaptations to the local context.

Funds are certainly needed but it won't be a long-term sustainable solution as purchase of technology does not automatically lead to an efficient use, adjustment and transfer of necessary knowledge and skills. It is therefore also important to consider the role of the corporations and firms which are supposed to facilitate the transfer. Their mode of cooperating with a local partner is linked to their Corporate Social Responsibility (CSR), and the long-term effect of the transfer of technology will therefore depend on the implementation of such policies.

At the Bali summit in 2007 one of the problematic areas brought up by developing countries was Intellectual Property Rights (IPR) barriers to access to technology. Meanwhile, in the developed countries, the business sector also expresses its concerns for dissemination of technology. The large scale innovative companies are concerned about the trade barriers facing climate friendly technology in the developing as well as the developed parts of the world (energy efficient light bulbs seem to be an example,) and of the lack of protection of their intellectual property rights in new and emerging markets.

All these factors play an important role in the transfer of technology to developing countries. This paper will focus on the role of IPR.

2. Potential Technologies and market interests

"The Conference of the Parties (...) decides to launch a comprehensive process to enable the full, effective and sustained implementation of the Convention (....) by addressing, inter alia: (...) (d) Enhanced action on technology development and transfer to support action on mitigation and adaptation" (UNFCCC 2007a).

Which technologies are concerned?

Technological development and its transfer is mentioned frequently as a central element for developing an economy that is taking care of the climate. The Intergovernmental Panel on Climate Change published a report on technology issues and "defines the term technology transfer' as 'a broad set of processes covering the flows of know-how, experience and equipment for mitigating and adapting to climate change amongst different stakeholders such as governments, private sector entities, financial institutions, NGOs and research/education institutions" (IPCC 2000: 101).

However, this is not an exact definition of all relevant sectors. Many technologies are implicitly climate friendly without being climate friendly technologies in a direct sense. E.g. the development of a technique to save energy when processing metal, or engineering energy saving laundry machines does protect the climate. What about technologies that could reduce emissions of power plants operated with coal? Could they be considered climate friendly even if the further development of solar cells would be much more meaningful from a politically climate friendly point of view? Or does it also include inventions that are relevant to the consequences of climate change, adaptation technologies, such as malaria medicine if there are increased incidences of malaria? At some point, almost all new technology may be argued to be climate friendly.

A very narrow definition of climate friendly technologies could also lead to a situation where relevant sectors might not be taken into consideration in case of relaxation of patent legislation. Research leads again and again to surprising discoveries. A German company, for example, managed to develop an innovative material made of carbon and granite. This material could be used for anything from boilerplates to skiing products or construction materials. The material could substitute metals and concrete in many areas and its production requires much less energy than that of conventional materials (WIPO 2008a: 4-5).

Given this complex background a thorough discussion of the effects of patent rights regarding climate friendly technologies will have to define first of all which sectors are to be considered. Such a definition is lacking as of now.

A research published by Roland Berger Strategy Consultants in the end of 2007 has not developed any substantial criteria but merely names those markets of environmental relevance which are economically most significant.

"The lead markets are as follows:

- Power generation and storage
- Energy efficiency
- Material efficiency

- Sustainable mobility
- Waste management and recycling
- Sustainable water management" (Henzelmann/Mehner/Zelt 2007: 3).

These areas are subdivided further. „Our selection was based on criteria such as growth potential, market volume, innovation dynamic and reduction of environmental burden:

- Solar power stations
- Hybrid vehicles
- Solar cooling systems
- Automatic separation of materials
- Low CO2 power plants (carbon capture and storage technology)
- Efficient storage of electrical energy using compressed air and hydrogen
- Membrane technology in the water industry
- Bioplastics and biopolymers
- Local treatment of water and rainwater management
- Synthetic biofuels" (Henzelmann/Mehner/Zelt 2007: 5).

This list is a first indication for yet another problem of the debate. Bioplastics and biopolymers, automatic separation of materials or hybrid vehicles might matter significantly in industrialised countries from a climate friendly point of view, however, in poorer nations they are of no particular relevance to the climate debate: the current discussion of relevant climate friendly technologies refers largely to economic areas which are of concern to large developing countries such as China and India but not to the large number of developing countries.

Fast growing markets

Similar problems of definition arise in the debate regarding the potential market volume of climate friendly goods. The research of Roland Berger Strategy Consultants, which has been mentioned before, concludes that the market for relevant climate friendly goods will grow rapidly. Sales are expected to grow by 5.4 % annually from 1.000 billion Euros in 2005 to approximately 2.200 billion Euros in 2020. "Germany alone, for example, expects an annual growth of 18 % in the environmental sector between 2007 and 2009." This growth will follow an unswerving course also after the year 2020. For Germany alone sales are expected to grow from 280 billion Euros (2005) to more than 1.000 billion Euros (2030) (Henzelmann/Mehner/Zelt 2007a: 12).

The share of European industries in the fields of energy production and energy efficiency amounts to more than one third of the global market. When subdividing this sector further it becomes apparent that in some areas the market power of the EU is by far higher than that. E.g. regarding solar thermal power plants and low CO2 emission power plants, EU companies have a share of 70%. Other sectors, however, such as energy storage, solar cooling or hybrid vehicles amount to 0%. Nevertheless the European industry is well equipped to defend as well as to establish large shares in the production of environment friendly technologies, which is a global growth sector (Henzelmann/Mehner/Zelt 2007a: 21).

e.g. Germany: Many jobs

The development of this sector would be of particular relevance to Germany. Currently 1.5 million people are employed in the environmental sector. This means that "almost 4% of all employees are working in the area of environmental protection. This amounts to more employees than e.g. mechanical engineering or car production." This number could rise substantially over the coming two decades (BUND 2006: 4).

At a conference of the European Patent Office (EPO) in May 2008, Günther Verheugen, EU Commissioner for Enterprise and Industry referred to climate change as an opportunity for European enterprises: „The problems relating to climate change can be seen as opportunities for some industrial sectors."

The development of innovative products which can be sold globally and the opening up of new markets are conditions for a growing importance of this economic sector and for increased competitiveness of European industry. Therefore opening up potential markets is to be expedited.

Opening up markets: technology transfer by means of trade

There are three different forms of technology transfer of climate friendly technology to developing countries related to mitigation:

1. Equipment transfer – the setting up and implementation of new technology in developing countries which has been developed and produced elsewhere (most often in developed countries) and the knowledge to repair and retain the technology.
2. Knowledge/skills transfer – the transfer of knowledge, learning to domestically produce appropriate new climate friendly technologies.
3. Capacity building transfers: to enable developing countries to develop new appropriate technologies specific to their circumstances.

It is currently argued within WTO, how to accelerate the spreading of climate friendly technologies. Particularly the leading industrialised nations prefer preference regulations for climate friendly goods and services that are currently embedded in the global trading system. The EU and U.S. refer to a research of the World Bank according to which the price for products like solar collectors, system controllers, wind-turbine parts, stoves, grates, cookers and hydrogen fuel cells could decrease substantially if tariffs were suspended and trade obstacles reduced. This would also speed up the spreading these technologies. „The proposal did not, however, mention several developing country concerns cited in the World Bank report, ranging from potential damage to domestic industry to the need for technology transfer." Moreover, according to the will of EU and U.S. trade obstacles to services should also be reduced. Their definition of „climate friendly" covered a wide range of sectors "including environmental, energy, construction, architectural, engineering and integrated engineering services". Many newly industrialising and developing countries reject this proposal in its current shape. They criticise that it refers mostly to those sectors where industrialised nations are market leaders (Bridges Weekly 2007: 10).

This debate also shows the difficulties of distinguishing between climate relevant products and other goods. The Indian government, for example, points out that an energy efficient refrigerator can be considered a climate friendly item. At the same

time, however, suspending trade obstructions for refrigerators would severely harm the industry in many developing countries (Waide/Gueye 2007: 15).

Likewise the European Parliament suggested in November 2007 to embed trade reliefs into the WTO for climate relevant goods. Furthermore the Parliament suggests including trade and investment in renewable goods and services into the contracts in case of bilateral trade agreements (EU Parliament 2007).

Business confederations form the G8 countries formulated an similar position in preparation of the G8 summit 2008 in Tokyo. In a "Joint Statement of the G8 Tokyo Business Summit" in April 2008 they demanded in their chapter about "Tackling climate Change" the protection of "intellectual property rights and rules of law in order to accelerate technology deployment and cooperation". Next demand is to remove "trade barriers to environmental goods and services in a non-discriminatory manner".

The strategy of opening up markets, however, does not aim at transfer of technologies so that then they could be used or produced by newly industrialising or developing countries, but only at the transfer of products manufactured in industrialised countries. Insisting on strong patent legislation thus serves protecting the interest of home industries regardless of considerations which path might be most sensible in terms of climate friendly policies.

3. Controversy regarding the significance of Intellectual Property Rights (IPR)

„From the perspective of world trade regulation, intellectual property (IP) is as valuable a monetary asset as a bond or currency. OECD countries view IP as monetary "assets" that deserve protection, just as financial instruments deserve protection" (Abbott 2007: 8).

Business interests

Contrary opinions prevail in the discussion regarding patents and their effects. Large parts of the industry hold the view that globally enforced patent regulation is essential for innovation. They argue that enterprises will only invest large sums of money into developing new technologies if they can apply for the patents and solely own such new technologies for years. The companies want to decide on their own whether to produce the items developed in own factories or sell licences to other companies: "A patent is a legal device which is generally defined as a right to exclude. It ensures inventors the right to a temporary monopoly on a technical invention. …. In exchange for patent rights the inventor must publicly divulge the technical details on the invention" (Foray 2007: 4).

New climate friendly technologies are often developed by small and medium-scale enterprises (SMEs) involving researchers from public research institutions. These innovations are expensive to take to the world market and fully exploit commercially, wherefore intellectual IPR is an important toolbox for SMEs to access investors.
The enterprises in industrialised nations are supported by politics and trade associations. The pressure of manufacturers and governments of industrialised countries resulted in including the TRIPS Agreement into the treaty of founding the World Trade Association in 1995: all member countries have to guarantee to adjust national legislation to international standards and to protect patents for a duration of 20 years. Developing nations received transitional provisions in order to create respective national regulation and control mechanisms.

In a recent research OECD points out that also in the area of climate technologies it is imperative for patents to be protected in order to support further innovation. Similar arguments are used by the World Intellectual Property Organization (WIPO) (OECD 2008: 9, WIPO Magazine February 2008: 3).

The World Trade Organization, OECD and WIPO are dominated by industrialised nations. They are accused of ruthlessly enforcing the interests of multinational corporations which are largely based in industrialised countries. However, enforcing IPRs plays an increasingly important role also with respect to bilateral contracts. In a paper on Small and Medium Enterprises the EU Commission concludes: „Strong IPR = good innovation" (European Commission - DG Enterprise and Industry 2007).

During the negotiations of new trade agreements between the EU and the ACP Group of States the EU attempts to enforce patent rights that go beyond the regulations of the TRIPS Agreement („TRIPS-plus"). Similar regulations are negotiated by the U.S. in their bilateral trade agreements (Suppan 2007: 4, Drexl 2007).

The controversy regarding patents on medication points out how scathingly these conflicts are handled. Only the pressure of many governments of developing countries and of NGOs resulted in relaxing patent rights at least in some areas. Such relaxation is aimed at providing people in poorer countries with the possibility to get the opportunity to access vital medication at all. For many governments and NGOs this relaxation is still not far-reaching enough.

Additional investment through aggravated patent rights?

The consequences of aggravating national patent rights on trade and investment are controversial. Supporters of strict patent rights often argue that they are the prerequisite for investment and trade: increasing the protection of products will increase the investment of enterprises in those countries that aggravate respective legislation. Research in this area, however, provides contradictory results. There is some evidence that, indeed, aggravating patent rights might lead to increased investment in countries with a middle income and in large developing countries. For poor nations, patent rights, however, do not play any role. Considering the development of investment streams over recent years, much speaks against the thesis that patents have a large influence on them. Particularly China could attract ever larger investment from abroad over the past two decades, even though it has frequently been accused of massive patent rights abuse. Of prime importance is the large potential market and not the role of patents. Also other large countries, such as Malaysia, Mexico, Argentina and Brazil, who have repeatedly been accused of patent rights abuse have attracted large investment (Hutchison 2005: 14-16).

No Patents on climate friendly goods?

"The issue of IPRs is not new: Agenda 21, as agreed at the Rio Earth Summit in 1992, calls for enhanced access to and transfer of patent protected Environmentally sound technologies (ESTs), purchase of patents and licenses on commercial terms for their transfer to developing countries on non-commercial terms and undertaking measures to prevent the abuse of IPRs." (de Boer 2008a: 4)

A number of NGOs argue that means have to be found urgently to provide poor countries with access to patent protected climate friendly technologies, just as it has been done with access to patent protected medication. Therefore they demand relaxation of patent law (Khor 2006, Khor 2007, South Center 2007: 17-18).

Government representatives of several states argue along the same lines during the climate change negotiations of the United Nations. Particularly the governments of China and India push for abandoning patents, in order to ease the transfer of climate friendly technologies. Yvo de Boer, Executive Secretary of the United Nations Framework Convention on Climate Change (UNFCCC) summarized the discussion in May 2008 as follows.

„At the Bangkok Climate Change Talks last month, several developing country Parties[1] identified IPRs as a barrier to technology transfer that needs further consideration, including in the following areas:

- Regulating the patent regimes to balance rewarding technology innovation with access to a common public good.
- Removing barriers to accessing technologies in the public domain.[2]

[1] Cuba, Indonesia, Brazil, India, Saudi Arabia, Pakistan, China
[2] Saudi Arabia, Pakistan

- Increasing access to clean technologies by providing compulsory licenses for these technologies." [3](de Boer 2008a: 4)

However, it should also be noted that some developing country companies also can participate in the international patent system. Particularly companies in India and China have the financial capacity to pay licensing fees for using patents or to simply take over technology leaders in the market. After a bidding competition in 2007/2008 the Indian Sulzon-Energy, for example, took over REpower for approximately 1.3 billion Euros. REpower is one of Germany's largest producers of wind wheels. Also other industry sectors of both states have the market power to acquire needed technologies (see Box 1).

Complex Technologies for Indian Cars – but what about LDCs?

Many observers were very sceptical, when in early 2008 Indian car manufacturer Tata announced to build a car that would be sold for 1,700 Euros. Concerns were raised that the car would have very low and out of date technical standards. However, soon it became apparent that Tata, indeed, attached high importance to modern technology that would suit the needs of Indian streets and customers. At least 19 components of the car are constructed and supplied by German companies, including well known manufacturers such as Bosch, FAG, Conti, or Freudenberg. Additional parts are supplied by other manufacturers from industrialised countries. They received precise instructions from Tata to produce both a modern and very inexpensive automobile. The suppliers which are active on a global level have conceded to the Indian demand, because the market for solid and inexpensive automobiles is growing fast. They are also concerned that Indian suppliers might produce the parts themselves, thus loosing the market altogether. Asked if European manufacturers are holding a grudge against Bosch because „their" supplier contributes to creating an Indian competitor through such transfer of technologies, a Bosch manager replied: "A car manufacturer is interested in exclusivity when being innovative. But only for a certain time. Then the manufacturer is interested in widely spreading the product thus reducing production costs (Lamparter 2008: 21-22).

In this case technology transfer of German automobile suppliers to India worked smoothly. The condition for this close cooperation was that both sides saw an advantage in doing so: the Indians wanted a modern car, and the suppliers did not at all want to abandon this lucrative future market. The suppliers therefore also agreed on striking out in new directions in order to provide accurately fitting modern technology.

Given the specific conditions, it cannot be concluded automatically that technology transfer functions smoothly with other products. If, for example, African countries want to buy solar technology that is smoothly fitting their needs, they are currently completely dependent on suppliers from industrialised countries. These manufacturers will only yield specific needs if the market is big enough to make any investment worthwhile. Unlike in the case of Tata it is to be feared that few lucrative African markets will not be able to enforce their needs.

The increasing successes of Chinese and Indian industry in developing modern technologies speak against softening patent rights from their point of view. In both countries, which see themselves as future industrial super powers, patent legislation has been aggravated massively in recent years.

When joining WTO in 2001, the Chinese government modernised and severely aggravated Chinese patent legislation. In case of patent rights violations in China litigation also has become much easier. Remaining problems with the implementation of this

[3] Brazil, India, Saudi Arabia.

legislation will most likely be tackled throughout the coming years, as large Chinese companies strongly request patent protection: the same amount of patents is applied for in China and the U.S. Chinese patent offices, however, employ only one third of staff as similar offices in the United States. Massive staff increases are currently on the way. Only few of the patents that are registered in China are currently applied for internationally by Chinese companies. Should this situation change, patent registration offices in the U.S., Japan and the EU will be severely overloaded with work (Harvey/Morgan 2007: 6-8). A similar development can be seen with respect to India.

4. How relevant are patent barriers?

"There can be many variations for the relaxation of IP in relation to climate friendly products and technologies. (a) A mandatory ban on patents on climate friendly technologies and products. (b) A mandatory ban on patents in developing countries only, while patents can still be granted in developed countries. (c) Developing countries are allowed to exclude patents on climate friendly technologies and products. (d) Voluntary licenses must be automatically granted on request, which will be free of royalty." (TWN 2008: 2)

Patents and renewable energies

The role of IPR in relation to climate friendly technology differs. In some areas it has limited importance, while it has a key role to play within other sectors. Below some of the main technology sectors relating to renewable energy and climate friendly technology are analyzed.

Solar Energy, *Photo-voltaic (PV) technologies*: Not yet inexpensive enough to be widely available. The market is an oligopoly with a number of entrants. Basic technology (first and second generation) is in the public domain. There are many firms in the sector, including Tata in India and Suntech in China. New generations of solar cells are in the pipelines, both as print-on solar cells (films) and as nanotech (fourth generation). These will be cheaper to produce and use, and they will be patented.

Wind energy: Very large and strong lead firms in wind turbines, which hesitate to share their knowledge. China and India have strong firms in the wind sector (Suzlon and Goldwind). In the in-land windmill industry, patents do not seem to be a significant barrier, but within off-shore windmills the situation seems to be more complex – and they seem to be the dominant types in the future as they are more efficient. Moreover, there are a number of players in the windmill sector, each solving a small technological problem by adding different parts of innovation

Off-shore windmills

It takes at least 170 patents to build an efficient off-shore windmill. One example is the rotor system that optimizes energy in a variable wind speed turbine system. This alone requires a turbine rotor shaft, a gearbox, an AC generator, sensing means etc. etc. All need to be specially designed for off-shore operations. Additionally, the producer needs a system to keep the windmills clear from corrosion, adequate software, and technologies to transport the energy.

Water: Patents do not seem to be a problem in this sector. Hydro electric technology is in the public domain.

Bio fuel: Many new gene-modified varieties (mainly maize and sugarcane) are emerging for production of bio-fuel. In 2005, 22,000 patents were granted in industrial biotechnology (up from 6000 in 2000, Suppan, 2007)[4] . Small research companies invent new varieties which are commercialized and marketed by multinational enterprises

[4] NB: The number of biotech patents includes all sectors

(e.g. Monsanto) – as with biotech pharmaceutical companies – called 'biogolopolies'. Others put their inventions on the market:

Break down of waste materials: This is not yet developed to the market.

New climate tolerant crops: As with the bio-fuel these crops (drought resistant, salt resistant, flood resistant etc.) are likely to become patented. So far, there is no available information on how many products will compete in this market.

> **Novozymes**
>
> In collaboration with Danisco they have developed enzymes and catalysts to break down starch in making sugar from maize as precursor to ethanol. They have set the royalty to 0.1 cent per liter and sell the innovation freely at the market.

Many companies question the comparison which is used often between climate relevant technologies and the dispute regarding access to medication. Wind wheels, solar systems and factories for the production of bio fuels use to a large extend common technology which is no longer patent protected. Only for the construction of most modern systems patents are needed which are owned by various companies. This makes the situation different from the case of medication where usually one manufacturer owns the patent for a certain medication. Therefore this company can decide for which price and to whom this medication will be sold. To solve certain technical problems in many cases several solutions have been developed independently. If a given company does not want to give away the own patent, oftentimes similar technologies of competing enterprises can be referred to. Another argument is that functioning competition exists for most climate relevant technologies and not a single powerful manufacturer as is the case with many innovative medications. This competition usually leads to the situation that potential customers can choose between varying potential suppliers. This choice implies considerable market power and leads to the fact that the share of patent related costs in the overall price has to remain reasonable (Barton 2007, Barton 2008, Stern 2006: 498-499, de Boer 2008a).

An additional problem is the complex manufacturing process of many parts of such systems. A modern wind power station is composed of many parts which have been assembled from a wide variety of materials. Most developing countries and even newly industrialising countries would be swamped, if they had to produce them in the needed quality.

This argumentation applies only to the current state regarding the construction of systems using renewable energies. The situation will change at the moment when revolutionary innovations appear on the market. This is currently reflected in discussions regarding the future of utilising plants for energy production. Multinational corporations are establishing their own utilising chains which span from genetically engineered plants to breeding particular enzymes which would help to make best use of the starch contained in the plants and to the development of specific systems for the transformation of plants into energy. If a company could secure vital patents along such a chain it could dictate prices of all relevant technology needed from the seeds to the processing systems (Barton 2008: 7, Suppan 2007).

Also regarding the construction of off-shore wind wheel systems new technologies have been developed which are accessible for only some few companies. As far as the solar energy sector is concerned it is currently impossible to foresee which technology

will lead to substantially better use of solar energy and who will eventually secure the patents for such technologies that would enable efficient and decentralised storage of solar energy.
Equally tough is the scramble for large power plants. For the coming decades power plants that burn coal or natural gas will remain the favourite source of energy in many countries. Whoever develops new technologies for a more efficient use of the raw materials or for cleaning emissions will own patents of substantial market value.

In an analysis UNFCCC concludes that out of 15 existing „Economic and market barriers to technology transfer" IPR issues rank last. Major problems were mentioned to be „Lack of financial resources" and „High investment costs"(UNFCCC 2007: 137).

"Relaxing IPR barriers, in and of itself, would not resolve all the difficulties faced by firms seeking to acquire patented technologies, as technology transfer involves more than a transfer of intellectual property. To be successful it also demands an adequate absorptive capacity, including primarily technical and managerial expertise in the receiving firm" (Cosbey 2007: 8).

The governance challenge

India

In the coming years the Indian government will provide some few hundred billion Euros for improving the infrastructure of the country. A large amount of this investment will be dedicated to energy supply. India currently has the capacity to produce 120,000 MW, barely more than the capacity of Germany. Considering the growing demand and the huge importance of a stable energy supply for the economy the government aims at increasing the capacity of energy production to 212,000 MW. Backbone of the Indian energy production is coal, amounting to 93.5%.

Because of the large demand it is obvious to purchase or manufacture as inexpensive technologies as possible. For the energy sector this could imply that coal power plants would be built largely based on old technologies. Apparently future emissions could be drastically reduced if the Indian government could have access to modern technology for the same price. Waiving patent rights alone will probably not be sufficient to move the Indian government towards buying the most modern systems: the country needs money in order to be able to finance more sophisticated technology.

An additional problem is the question of paradigm. The Indian government currently aims largely at building big power plants. More reasonable, from a climate political point of view is the construction of a decentralised supply generated from renewable energy sources. However, this would require clear political guidelines from the government for such decentralised energy supply systems. Only afterwards a second step could be to investigate if the costs of patents constitute considerable obstacles for implementing such guidelines. Only such an assessment could form the foundation for a more intense discussion regarding the role of patents with respect to climate relevant products.

Public funding = public patents?

„The development of new technologies, particularly those with significant public funding, could be more conducive to public IPR ownership. As these technologies would be collaboratively developed, the IPR could potentially enter into joint ownership with the aim of making the IPR available as a free or low cost public good "(de Boer 2008a: 6).

Large parts of basic research aiming at innovation are financed by public grants. The share of public funding for research in general varies from country to country. Investi-

gating this field is difficult as the given percentages do not inform knowledgeably on the amount of public funding in the area of climate research. In 2000 the IPCC published that the share of public funding in research is 40 % as far as OECD member countries are concerned (Hutchison 2005: 4, footnote 6).

In the United States approximately 34 % (95 billion US-Dollars) of the research expenses is paid by government, universities and non-profit institutions (Barton/Osborne 2007: 8). Numbers also exist for Germany: according to information published by the Federal Ministry of Education and Research a total of 55.7 billion Euros was spent on research and development. 28.4 % of this amount were funded publicly. With 7.5 billion Euros the largest part of the total amount was granted to Universities, 6,5 billion Euros went to public research facilities outside universities (BMBF 2007: 12-15).

Public research and Patents in Germany

Scientific institutions hold approximately 6 % of all German registered patents. In some technology sectors this share is, however, much higher. It also has to be taken into consideration that Universities primarily pursue basic research which many times creates the foundation for developing innovative sources of energy. Research reveals "that scientific institutions apply for a large number of patents in the early stages of the development of a certain product. At later stages industrial activity takes over" (Schmoch 2004: 25).

Between 1998 and 2007 American General Electrics applied to the European Patent Office for most of the patents related to energy production. Siemens came second, followed by a number of car manufacturers and Philips. But already place 16 is held by the public German research institute „Forschungszentrum Jülich" (EPO 2008a).

Employees of German Universities had to face considerable changes with respect to patent applications. Universities were requested to increasingly obtain own income through patent registrations. Already in 1980 this was established in the U.S. through the Bayh-Dole Acts.

Following a change in legislation in 2002, professors and other researchers at German universities can no longer simply register and market patents in their own name. The new legislation is similar to the rules for inventions of employees which regulate how the ownership of their inventions is transmitted to the respective enterprise. A university can decide how to deal with the innovations and how to use registered patents, if applicable. In reality this causes considerable problems. In theory the universities would need to set up their own infrastructure for the registration and use of patents. This requires substantial investment as the research institutes need to employ not only scientists but also divisions that deal with legal procedures and the management of converting an invention into a product (Schmoch 2007: 1).

Following the change in legislation the registration of patents by universities initially decreased. Since 2004 a slight increase can be observed. The number of cases of universities registering a patent themselves has increased significantly. Other patents however, continue to be registered jointly by universities and companies or by university employees (Schmoch 2007: 5-6).

It is currently unclear, though, if the amount of innovations in fact is reduced or if more patents are directed directly to companies as a result of growing industry funding of universities (Schmoch 2007: 18). This would also reflect a development known from the U.S. where government funded research creates patents, which are usually registered by U.S. companies (Barton 2007: 7).

Because of the close cooperation of universities and enterprises it can be increasingly noted that companies get access to patents which were developed with public funding.

An outstanding contract, for example, was signed between the oil company BP and the University of California – Berkeley. This contract was controversial both amongst climate researchers and university staff. BP financed 500 million USD for a period of 10 years aimed at developing an "Energy Bioscience Institute". In return the company would receive the related patents. The university would receive some of the royalties on patents. The controversy was caused by the fact that the research was done in laboratories financed with 40 million USD by the Californian tax payers (Suppan 2007: 3).

Given the growing climate crisis, it has to be debated critically if climate relevant research results which have been (partly) financed by public institutions do not also have to be made accessible to the public. This would imply to not register patents in such cases or to keep the patents in public property for use free of charge. Such a solution is suggested by the report of Stern magazine: technological developments that have been supported by public funding could remain in public IPR ownership (Stern 2006: 500).

This approach is not unknown to those German researchers dealing with renewable energies. Many scientists do not register patents in order to contribute with their work to reducing climate change. They want their research to be used globally as soon as possible.[5]

A relatively low number of climate patents

'Business as usual is not an option. What we need is an industrial revolution' (Lee 2008: 2).

The share of innovation taking place within renewable energies is decreasing. Studies from the US Patent and Trademark Office (USPTO) show significant decrease in the period from 1977 to 2003. Although the total numbers have gone up from approximately 500 in 1977 to more than 3500 in 2003 (as a result of the oil crises), the relative share of environmental technologies declined from 2.5% to 1.5% of the patent applications received at the USPTO (antipollution has gone down from 2.7 to 1%, renewable energy from 1.5 to 0.8%) (Marinova 2008).

Currently there is less resources spent in new energy research than in the pet-food industry in the US. This is despite a (in the view of the industry) well-functioning patent system.

The situation in Europe is similar. Despite the prominent debate on climate change and particularly despite the urgent need to discover means to produce energy with low emissions, only 1.3 % of registered patents with the European Patent Office (EPO) originate from this kind of technology research. And only half of these patents mentioned concern renewable sources of energy. The second half concerns patents related to energy production from gas, oil, coal or nuclear sources. Statistics also indicate where industries currently see the largest market for energy production from renewable sources: half of the registered patents related to potentially renewable processes concern fuel cells (EPO 2008a). This technology is interesting mostly for industrialised countries as it will remain expensive and very complex for the coming years.

According to information of the German Patent and Trade Mark Office the number of registered patents in the areas of solar technology, wind and water power and car emission technologies has increased considerably between 2001 and 2006, though from a low level (DPMA 2007: 15-16).

[5] Source: Discussions of the author with researchers of various public institutions in May 2008.

5. Patent system facing collapse?

"What was once the preserve of a small legal and technical department now often forms an integral part of boardroom strategy. Patents are no longer simply a defensive shield, but a key weapon of corporate strategy. The constant threat of potential litigation by patent holders puts pressure on others to enter into patenting – described by some as an 'arms race', particularly in the IT field. Technology licensing is big business, generating an estimated US$45bn annually in the US, and approximately US$100bn worldwide, and patents are one of the keys to unlock the door to those revenues." (EPO 2007a: 17)

Is the European Patent Office able to work?

„Geschäftsinteressen werden nicht mehr gewahrt, wenn Tugendhaftigkeit nicht mehr honoriert wird (...) Die Interessen der Gesellschaft werden nicht mehr gewahrt, wenn Tugendhaftigkeit nicht mehr honoriert wird." (EPA 2007a: 20)*

In 2007 the number of patents registered with the European Patent Office (EPO) has almost doubled to 218,000 from 116,832 in 2003. Half of the applications were received from outside Europe. Due to the workload of EPO the average processing time of a patent application has increased to 44.3 months in 2006. At the end of 2006 more than 300,000 patent applications were still to be processed by EPO (Wild 2008: 9). Due to the rising complexity of the applications, the European Patent Office is no longer in the position to examine the applications in due time. Innovation can thus no longer be transformed into usable products quickly.

In May 2008 the backlog of the German Patent and Trade Mark Office was not as severe. But it can take between 8 to 10 months before the applicant will receive initial information concerning a patent application.

A further problem is caused by the fact that neither on a European nor a global level unified patent rights legislation exists. This can lead to a situation where a patent has been registered by the European Patent Office and lawsuits against this decision are filed in various European countries with differing results. This results in enormous legal insecurity for those applying for a patent registration. This situation does not only cause hazard for the transition from patent into product but can also be very costly. Litigation in court costs between 100,000 and 500,000 Euros in the EU – and this only regarding a first instance ruling (Knight 2008: 27).

During the annual assembly of EPO in May 2008 which was held in Ljubljana all parties raised fundamental concerns, questioning the current system. During discussions alongside the assembly representatives of various companies and researchers indicated that the current system in some parts is ineffective. Costs for smaller companies have increased drastically while the registration of patents does not effectively protect from lawsuits. The concern mentioned by enterprises was not the possible success of litigation. A much larger problem for many companies is the duration of litigation and the unpredictable amount of legal fees. The annual assembly of EPO was closed by a rather thoughtful speech of Mrs. Alison Brimelow, President of the European Patent Office. She reflected thoughts asking if the current patent system remains up-to-date in light of the threats of climate change. Self-critically she added, that currently in many cases her institution might not be in the position to treat applications timely, thus adding to

the fact that innovations reducing the effects of climate change do not get on the market as quickly as possible.

> "So much weight is attached to technology development in this era that countries fiercely compete with each other to develop cutting-edge technologies. Consequently, many similar technology development projects are concurrently carried out around the world, and development costs are becoming enormous. In this situation, the current system of granting the patent right, which is an absolute right, to only one engineer who developed the most advanced technology in the world could cause a waste of technology development efforts. The engineers in the second and third places may also deserve some kind of privilege"
>
> Yoichi Omori, Executive Director of the Institute of Intellectual Property, Japan (cit. in EPO 2007)

Do patents paralyse research?

"Patent thickets lead to hold-up situations, or in some cases to royalty stacking. That encourages companies to use patents as bargaining chips – if their innovation is being held up or they're being blackmailed for onerous royalty payments, they can counter-threat with potential infringement of their own patents. So they file as many as possible for each innovation to strengthen their hand – it's 'strategic patenting'" (Source: EPO 2007a: 90)

A substantial amount of patent registrations does not serve to protect innovation but has a strategic character: through expanding innovations that can be patented, it has become particularly in the United States partially possible to not only register products but also research tools, business methods, software and living organisms (Foray 2007: 5). This expansion can lead to a situation where research of competitors is severely hindered, thus making innovation impossible.

The market for bio fuels shows how problematic the use of patents against competitors can be. Some registered patents for synthetic biology products and processes are formulated in such a broad sense, and licences handed out are so complex that scientists raise concerns about the potential to prevent any further research outside of the laboratories of the patent owner. Suspicions are raised that patents have been designed purposefully in a way that will hinder competition (Suppan 2007: 3-4).

The huge workload of patent offices leads to inadequate controls of such broad patents, thus favouring this kind of obstruction of research.

patent-trolls

Such undesirable developments in the patent sector are aggravated by so-called patent trolls. Patent-trolls are companies which register or buy patents but do not produce any products on their own. In many cases this is done by investment companies or law firms that purposefully buy certain patents from bankrupt enterprises. Then they look for enterprises that use these patents or similar technological developments. Such enterprises are taken to court with the aim to increase licensing fees or to get license fees in the first place. Enterprises attacked in such way need to make a choice between downright paying or risking long lasting litigation.

6. Possible solutions: Inside the framework

EPO-Scenarios

Following an extensive discussion process EPO has developed four scenarios regarding the potential development of the patenting system until the year 2025:

- **Market Rules**: a world where business is the dominant driver.
- **Who's Game?** a world where geopolitics is the dominant driver.
- **Trees of Knowledge**: a world where society is the dominant driver.
- **Blue Skies**: a world where technology is the dominant driver (EPO 2007a - details see Annex 1).

Given the needed speed for implementing innovation in the climate sector, the fourth scenario is of prime importance: The patent system is not a 'one size fits all' model, but differentiates between technologies and mirrors the qualitative step forward in development an inventions. 'Soft patents' are developed for climate friendly technologies, while industries as the pharmaceuticals keep hard protection. For some technologies the monopoly rights would be replaced by a license of rights regime for technology intensive and complex products

Trade-related aspects of intellectual property rights (TRIPS)

Although new ideas of patent regimes occur, the TRIPS agreement remains the institutional framework of patents for the WTO member states. A reform of the European patent system is impossible unless the TRIPS agreement is reformed with it. This also counts for the ideas coming from the UNFCCC on technology transfer; they need to fit into the TRIPS agreement. The TRIPS agreement needs changing unless technology transfer can work under the compulsory licensing system. So far, compulsory licensing does not seem appropriate for climate friendly technologies.

Technology transfer has continuously been a central point in the TRIPS negotiations. As in the climate policies, the de facto transfer of technology is very limited, something which generally concerns the developing countries.

The implementation of intellectual property rights in the WTO (implementation of the TRIPS agreement) resulted in global patent minimum requirements. Least developed countries have until 2013 (2016 for pharmaceuticals) to fulfill these requirements. However, many already comply with TRIPS. These are not allowed to 'roll back' their patent laws (except for pharmaceuticals). Moreover, patents systems protecting climate friendly technology are in place in most countries within the WTO system.

In areas of high priority, member states' options for making exclusions to patents need to be dealt with globally. Access to essential medicine was the first topic to be addressed in this regard. Public health is specifically mentioned in the TRIPS agreement; therefore the negotiations on public health were straight forward. However, according to Article 27.1, member states are generally not allowed to discriminate on the basis of technology – e.g. they cannot exempt climate friendly technology from patent protec-

tion. 'Environment' is mentioned in Article 27.2 but this refers to the fact that some inventions may be harmful to the environment and society – these inventions are excluded from patent and from being commercially exploited.

Proposed solutions

There are a number of possible solutions to how to increase access to climate friendly technology through changes in IPR regime. Below the following possible solutions will be dealt with: 1) compulsory licensing, 2) voluntary licensing, 3) changing criteria for patenting, 4) public private partnerships, and 5) cross licensing/patent libraries.

1) Compulsory licensing

Through compulsory licensing states would force holders of patents, copyrights and other intellectual property rights, to grant the use of a technology. South-based NGOs, for example the Third World Network, have suggested compulsory licenses as a way to improve technology transfers. Developing countries have also brought up this option at the ministerial meetings.

During the Bali Climate Conference in December 2007, Brazil suggested a similar statement from the WTO as the Doha Declaration on the TRIPS agreement and Public Health. The situation is somehow similar: developing countries need innovations developed in the North in order to enhance development – in this case their commitments to climate change. Although the TRIPS agreement already allows member states granting compulsory licenses, such a statement would in this view provide more confidence in using it for developing countries.

Developing countries are generally reluctant to undertake negotiations with the patent holding companies and they are under high pressure from developed countries – especially USA. The response from the Industry is that if countries begin to force compulsory licenses on companies, they will lose their trust, and withdraw their foreign investments.

However, to grant a compulsory license certain conditions need to be fulfilled (TRIPS article 31 f.). One of these is 'cases of national emergency or extreme urgency' in which governments are allowed to by-pass patents. Hence, compulsory licensing seems to be a good solution in the case of pharmaceuticals which are needed urgently in a public health crisis and relatively easy to reengineer. In the case of climate friendly technologies the issuing of a compulsory license is more difficult. Firstly, the emergency or urgency is in the relatively far future; secondly, compulsory licensing in such cases is likely to bring the parties in to a confrontational situation.

The more tacit knowledge a technology involves, the less useful compulsory licenses become. Accordingly, some of the climate friendly technologies are more difficult to grant compulsory licenses for than medicine. Besides, the Doha Declaration on TRIPS and access to medicine has not shown increased access. Until now compulsory licensing for imports of medicine has only been used by Rwanda. Declaring a 'national emergency' for carbon reducing energy sources is not plausible as there are no evidences of catastrophic conditions before it is too late. However, compulsory license may be useful in dealing with the consequences of climate change – adaptation technologies such as de-saltination of drinking water etc. But this is also unlikely to happen as donors will probably be the main sponsors of such programs, as it is the case for ARV medicine for people living with HIV.

2) Voluntary licensing

Voluntary licensing would function similarly as compulsory licensing, but being voluntary it may be easier to initiate. As most of the climate friendly technologies are difficult to transfer and reengineer, developing countries may benefit from more cooperative solutions with the patent owner. In order to improve the transfer of knowledge, know how and the capacity building in developing countries, some sort of voluntary licensing would therefore be preferable. Third World Network has suggested a solution which would allow developing countries to grant 'voluntary' compulsory licenses free of charge for required technology under the UNFCCC framework.

3) Changing the criteria for obtaining a patent

There are certain criteria which have to be fulfilled to obtain a patent. Changes of these criteria could help to facilitate transfer of climate friendly technology. This could for example be:

1. To reduce the number of new patents by strengthening the issue of non-obviousness in patents to include 'build-on' processes. This would significantly shorten the life of a patent.
2. To grant more specific patents. This implies that innovators cannot patent the idea of e.g. a hybrid electric vehicle – only a specific model. There has been a case with 'The Paise Patent' filed on hybrid cars in the US. This patent is formulated as: 'a hybrid electric vehicle comprising: two or more wheels… a controllable torque transfer unit… an engine… an AC electric motor… a battery' etc. (Barton 2008).

4) Public Private Partnerships (PPPs)

PPPs could also promote the transfer of climate friendly technology. This could involve different types of policies:

1. Voluntary buy-out of patents from SMEs. This was discussed for pharmaceuticals but never implemented as the large scale producers argued they would not market products for which competition was free. However, climate friendly technology is not sensitive to established brands and marketing – therefore this could be a good solution. This would increase access to climate friendly technologies and turn them into public goods.
2. Purchasing commitments by governments. This would ensure the commercialization of good ideas and help SMEs 'jump the valley of death' – that is to overcome the financial gap between discovering the product and the time it reaches the market.
3. Joint IPR ownership if research is publicly funded. For example, if a university funded 70% of an invention, the license to the company holding the patent should only be 30%.

5) Cross licensing/Patent Libraries

There are examples of pooling of patents by cross licensing. This allows all producers to access relevant technology, but also opens up the possibility of 'free-riders' – companies using technology without contributing to the pool.

Cross licensing was done in the US automotive industry. Companies pooled their inventions to be able to meet the requirements under the 'Clean Air Act' compulsory license enacted in 1970. All companies were allowed to use the technology necessary to live up to the standards set by the government. This could possibly work for industries such as the windmill industry and reduce the level of double research. However, it

would require a new standard policy at the global level, which is not necessarily beneficial for developing countries.

There are new reasonable and flexible models for reforming the international patent system. If the political will is present, a patent system built on the principle of technology 'libraries' would be a solution for innovators as well as buyers of climate friendly technology. If knowledge and inventions on the different climate friendly technologies were pooled into a database, to which users can buy access for a set percentage of their profit – e.g. 10 pct. The profits are then pooled into the library and divided among the innovating parties according to the number of times, their knowledge has been used

7. Possible Solutions: Outside the framework

IBM, the biggest patent holder in the world, currently already generates more revenues from its activities related to Free and Open Source Software (FOSS) than from their patent portfolio. (EPO 2007a: 73).

Open Source

Given the huge workload of patent offices EPO and many companies discuss if a further use of Open Source is not inevitable. The innovation cycle of some high-tech industries is less than two years. If, however, the application, registration, implementation and possible litigation for a patented technology can last many years and be very cost intensive, the process is questionable altogether. An additional problem is that companies waiting for the approval of their patent registration have no secure legal frame to share their development with other companies (by means of sale) or with scientists for further development of the respective technology.

The Indian government stressed the potential of open source models at the UNFCCC-Meeting in June 2008 in Bonn (TWN Bonn News Update No. 6).

Free software and Open Medicine

In the area of software development open source programmes already play a substantial role in the market. Research done on behalf of the EU concludes that the market for open source software will grow rapidly over the coming years. More than 22 billion Euros have already been invested in such free software, equivalent to 20.5% of the overall software investment. The same tendency can be noted for the U.S. American market. By 2010 open source products could reach a market share of 32% of all IT services. Besides cheaper access to modern technology open source software could reduce research investment by up to 36%. Such savings could be re-invested into the development of further innovation (UNU-Merin 2006: 9-11).

Similar attempts to provide free access to certain developments also exist in the medical sector. Starting point was a petition to the U.S. Congress in August 2004 signed by 25 Nobel Prize winners of chemistry, physics and medicine demanding open access free of charge to certain areas of medical research. They were particularly concerned with tropical diseases which cost millions of lives every year. However, pharmaceutical companies have stopped further research: concerned patients are economically not interesting. Therefore the scientists demanded open access to existing results, thus reducing the costs of further research.

Computer hardware and automobiles as open source

Regarding computer hardware several companies, including IBM, have also opened up a number of patents. They hope for the development of new technological possibilities which would open up new markets.

But also independent of big enterprises a large number of experiments using open source exist. Since 1999, for example, a network aims at developing a car by using only open patents and principles of open source (http://www.theoscarproject.org)

Bounty hunter: finding specific approaches for developing countries

A possible scenario could be that the respective UN bodies and developing countries would jointly identify climate related problems, publicly tender for finding a solution and eventually offer the solution found by scientists as open source. Such a system could be financed through emission taxes.

This kind of system could use already existing experiences. InnoCentive is, for example, a global network of 140,000 people from 180 countries. The founder of this company, Alpheus Bingham calls his researchers modern bounty hunters: companies advertise a specific technical problem and researchers from all over the world work on finding the solution. The financial reward is published together with the technical problem. Once a researcher solves the problem, he or she receives that reward. The company he or she is working for may, if wanted, register a related patent (Bingham 2008).

8. Conclusions

As shown in this paper there are many different aspects relating to patents, IPR and transfer of climate friendly technology. IPR is not in focus at the present UNFCCC negotiations relating to transfer of technology, and in general the topic has low priority in most European governments. There are several reasons.

One is that with our knowledge-based economies, Europe is in general quite happy with the working of the current patent system and politicians are generally not keen on suggesting a reform of the patent system. The business sector has found its way into this debate and into international meetings and agendas. Companies are very powerful and in most cases they support the existing IPR regime.

From a development perspective, technology for adaptation and mitigation is an urgent demand for solving climate related problems. In order to sustain economic growth and social development, access to renewable energy is needed. Developing countries are in general much more critical towards the IPR regime. Lack of resources and capacity for Research and Development, access to patented technology is limited.

As shown in this paper IPR may be a hindrance within certain technologies, like climate tolerant crops. However, when debating the IPR framework considerations must also include future technologies, which most probably will be patented, and related to hinder for transfer of climate friendly technology.

It has also been noted that different countries have different capacities. India and China are often brought up in the debate, and industries in these countries are in many cases capable to do their own research and development, as well as purchasing patented technologies in other countries. The situation is however totally different in the least developed countries where IPR may constitute another type of hindrance.

Reform of TRIPS and international patent regimes are complicated and several solutions need to be explored. When discussing possible solutions of the concerns raised, various aspects have to be taken into consideration.

Finding a framework

Define technologies that are climate friendly?
It is important to define which technologies can be considered climate friendly. Such a definition should be broad enough to embrace new unforeseeable innovations.
For each of these areas it has to be investigated how innovations can be found that could be produced and implemented in decentralised and uncomplicated manner in developing countries. This is essential as in many cases large technical solutions are unaffordable and socially incompatible.

Name cases where patents delay the distribution of climate friendly technologies
For a clear discussion of this question and for finding efficient solutions those technologies that delay the distribution of climate friendly technologies need to be indicated concretely. This could be done by governments of developing countries and nongovernmental organisations.

Reforms of the current system

Improving the patent system

A fast track system for climate friendly innovation should be established, in order to avoid that the current patent registration system functions like a bottleneck of innovation.

Patented innovation should be limited to vital technology components in order to avoid restriction of further research for alternative solutions or further improvement (Open Science).

Guidelines for the withdrawal of patents in urgent situations should be developed. Clear guidelines could prevent that patents block technological development that is essential for humankind. They could also point out clearly that protection for enterprises exists, thus stimulating further research.

The Blue Skies scenario, developed by the European Patent Office, fits well with the debate on climate friendly technology: The patent system is not a 'one size fits all' model, but differentiates between technologies and mirrors the qualitative step forward in development and inventions. 'Soft patents' are developed for climate friendly technologies, while industries as the pharmaceuticals keep hard protection. For some technologies the monopoly rights would be replaced by a license of rights regime for technology intensive and complex products.

Reforms of the patent system

Industrialised countries currently govern the international patent system and the respective national patent offices. A condition for adjusting the patent system to the enormous challenges of climate change (and many other areas) is a fundamental reform of the structures of power of the World Trade Organization and WIPO.

The interests of enterprises must be put behind social and environmental concerns when adjusting the patent system.

A call for a TRIPS declaration on climate change

The declaration, stating that IPRs may not prevent access to new technologies, would provide a good foundation on further negotiations, both trade negotiations but also in establishing a room for maneuver for the United Nations Framework Convention on Climate Change (UNFCCC) to approach patents as one area of climate negotiations.

Introduction of a Technology Library

A patent system which builds on the principle of technology 'libraries' would be a solution for innovators as well as buyers of climate friendly technology. If knowledge and inventions on the different climate friendly technologies were pooled into a database, to which users can buy access for a set percentage of their profit – e.g. 10 pct. The profits are then pooled into the library and divided among the innovating parties according to the number of times, their knowledge has been used.

Finding ways for faster innovations

Supporting innovation without patents

Many companies refer to the fundamental role patent rights play for financing their research. These concerns need to be taken into consideration as research is mainly financed by the industry.

Finances generated from emission trade could be used to buy certain patents and thus enable the transfer of technology to the South. Such measures have to be aimed at enabling developing nations to manufacture relevant products on their own.

Achieving open source solutions

All governments together should determine that publicly funded innovation has to be openly accessible by all.

If research is financed jointly by industry and the public, patents may not be fully owned by the companies involved.

Finances generated from emission trade and similar sources could be used for establishing a price fund. This fund could be largely used for finding specific solutions for problems that particularly affect developing countries.

Developing open source models and patent pools for openly accessible innovative technologies should be supported by all governments.

In addition, strategies have to be developed that would ensure that new technologies are put on the market without delay and adapted to the needs of developing nations.

Abbreviations

ARV	Antiretroviral drugs
CDM	Clean Development Mechanism
COP15	The 15th Conference of Parties
CSR	Corporate Social Responsibility
GDP	Gross Domestic Product
EPO	European Patent Organisation
IPR	Intellectual Property Rights
LDC	Least Developed Country
NGO	Non Governmental Organization
PPP	Public Private Partnership
SME	Small and Medium-sized Enterprise
TB	Tuberculosis
TRIPS	Trade-related aspects of intellectual property rights
TWN	Third World Network
UNFCCC	United Nations Framework Convention on Climate Change
USA	United States of America
USD	United States Dollar
USPTOUS	Patent and Trademark Office
WTO	World Trade Organization

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Annex 1: EPO Scenarios for the Future

Market Rules - a world where business is the dominant driver.

It's a story of the consolidation of a system so successful that it is collapsing under its own weight. New forms of subject matter – inevitably including further types of services – become patentable and more players enter the system. The balance of power is held by multinational corporations with the resources to build powerful patent portfolios, enforce their rights in an increasingly litigious world and drive the patent agenda. A key goal is the growth of shareholder value. Patents are widely used as a financial tool to achieve that end. In the face of ever-increasing volumes of patent applications, various forms of rationalisation of the system occur and it moves to mutual recognition of harmonised patent rights. The market decides the fate of the system, with minor regulation of visible excesses. Patent trolling, anti-competitive behaviour and standards issues all come under scrutiny.

Who's Game? - a world where geopolitics is the dominant driver.

This is the story of a boomerang effect which strikes today's dominant players in the patent world as a result of changing geopolitical balances and competing ambitions. The developed world increasingly fails to use IP to maintain technological superiority; new entrants try to catch up so they can improve their citizens' living standards. But many developing world countries are excluded from the process, and work instead within a 'communal knowledge' paradigm. Nations and cultures compete, IP has become a powerful weapon in this battle. The new entrants become increasingly successful at shaping the evolution of the system, using it to establish economic advantage, adapting the existing rules as their geopolitical influence grows. Enforcement becomes increasingly difficult and the IP world becomes more fragmented. Attempts are made to address the issues of development and technology transfer.

Trees of Knowledge - a world where society is the dominant driver.

In this story, diminishing societal trust and growing criticism of the IP system result in its gradual erosion. The key players are popular movements – often coalitions of civil society, businesses, concerned governments and individuals – seeking to challenge existing norms. This Kaleidoscope Society is fragmented yet united – issue by issue, crisis by crisis – against real and perceived threats to human needs: access to health, knowledge, food and entertainment. Multiple voices and multiple world views feed popular attention and interest, with the media playing an active role in encouraging debate. This loose 'knowledge movement' echoes the environmental movement of the 1980s, initially sparked by small, established special interest groups but slowly gaining momentum and raising wider awareness through alliances such as the A2K (Access to Knowledge) movement. The main issue is how to ensure that knowledge remains a common good, while acknowledging the legitimacy of reward for innovation.

Blue Skies - a world where technology is the dominant driver.

The final story revolves around a split in the patent system. Societal reliance on technology and growing systemic risks force this change; the key players are technocrats

and politicians responding to global crises. Complex new technologies based on a highly cumulative innovation process are seen as the key to solving systemic problems such as climate change, and diffusion of technology in these fields is of paramount importance. The IP needs of these new technologies come increasingly into conflict with the needs of classic, discrete technologies. In the end, the patent system responds to the speed, interdisciplinarity and complex nature of the new technologies by abandoning the one-size-fits-all model: the former patent regime still applies to classic technologies while the new ones use other forms of IP protection, such as the licence of rights. The patent system increasingly relies on technology, and new forms of knowledge search and classification emerge.
(Source: EPO 2007a: 10-11)

Climate Friendly Transfer of Technology.
A Discussion Paper by Friedel Hütz Adams and Stine Jessen Haakonsson

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