The area of conflict between technology transfer and intellectual property protection

1. Introduction

Against the backdrop of a changing climate, the transfer of clean technologies to emerging and developing countries is urgently called for. At the same time, there is also the legitimate interest of protecting the intellectual property for these technologies. To answer the question whether this area of conflict affects the mitigation of or the adaptation to climate change, the framework of technology transfer and the herein existing obstacles shall be explained.

2. Transfer of clean technologies essential for climate protection

Mainly due to the demands of developing countries, global energy consumption is set to rise; these countries will be responsible for two thirds to three quarters of the total increase in energy-related emissions. In 2004, developing countries caused 40% of all emissions from fossil fuels but will probably replace the OECD countries as the main emitters by the beginning of the next decade.

In this scenario, China will soon replace the USA as the No. 1 emitter (*Figure 1*).

Consequently, it is not enough that individual countries or groups of countries implement climate protection programmes. Only if all countries participate, will we be able to stop climate change.

The extent of the required economic transformation can be equated to that of the industrial revolution, except that it has to be three times as fast and encompass the whole world. Not only industrial greenhouse gas emissions must be reduced quickly and dramatically but also the outdated and therefore greenhouse gas intensive technologies used for everyday purposes, which are an important factor in respect to climate change due to their high numbers [1].

The UNFCCC, the Kyoto Protocol and the Bali Action Plan encourage developed countries to take all possible measures to facilitate the transfer of clean technologies. Different views and positions have crystallised and those pointing to intellectual property rights are hindering the transfer of clean technologies.

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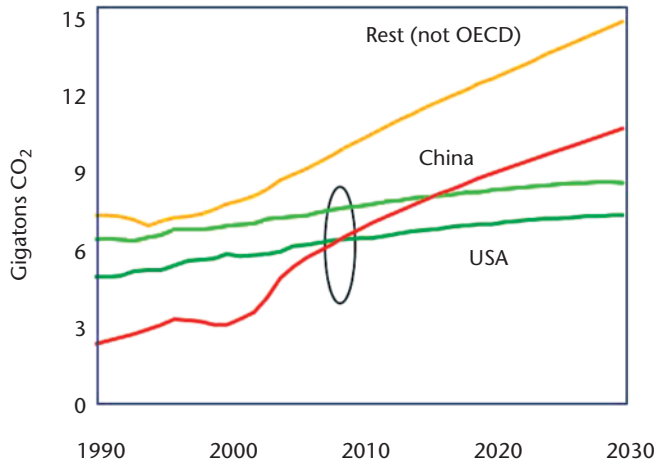
Figure 1
Reference scenario: energy-related CO_2 emissions by region
Source: OECD/IEA World Energy Outlook 2006



China overhauls the U.S. as the world's biggest emitter already before 2010. Even though china's per capita emission will reach only 60% of the average per capita emission of OECD countries in 2030.

3. The relationship between technology transfer and intellectual property

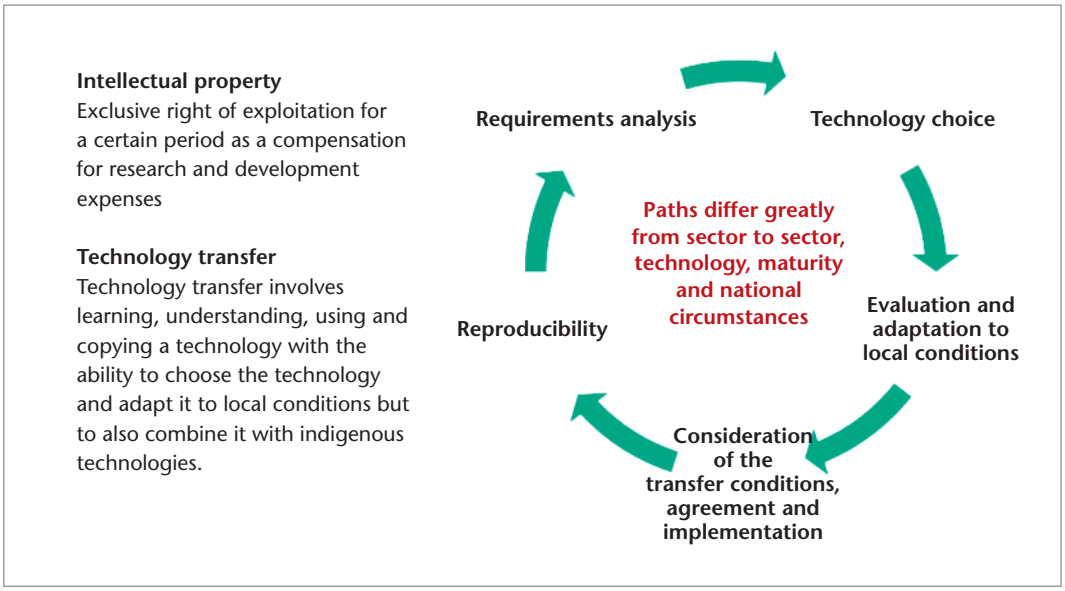
Intellectual property rights are basically understood as a privilege granted to the inventor and developer as a compensation for research and development expenditure. It is supposed to be an incentive for further innovations. Intellectual property rights include an exclusive right of exploitation for a limited period, by virtue of which the holder can set a higher price than he could in a competitive situation. This right was added to the General Agreement on Tariffs and Trade (GATT), a pillar of the World Trade Organisation, within the framework of the Trade Related Intellectual Property Rights (TRIPS) in 1994. The agreement strengthens intellectual property rights, its implementation is mandatory and it includes an enforcement mechanism.

Against the backdrop of climate change, technology transfer refers to the requirement of introducing clean technologies to mitigate and/or or adapt to climate change in regions where such technology is not yet generally available [2] (*Figure 2*). Successfully transferring technology includes learning, understanding, using and copying technology with the ability to choose the technology, adapt it to regional conditions and combine it with indigenous technologies [3]. These factors form the so-called technological "hardware and software", where hardware mainly includes devices and software consists of training, education and management.

Intellectual property rights shape technology transfer: There are two kinds of paths along which such technologies can be transferred: horizontally and vertically.

- **Vertical technology transfer** implies relocation or sale of a technology without sharing the underlying intellectual property rights, usually by selling finished products to end users or by transferring all production rights to an investor [2].
- **Horizontal technology transfer**, on the other hand, implies the exchange of intellectual property, mostly in the context of joint ventures or between a foreign direct investor and a native company located in the target countries [2].

Figure 2
Relationship between technology transfer and intellectual property



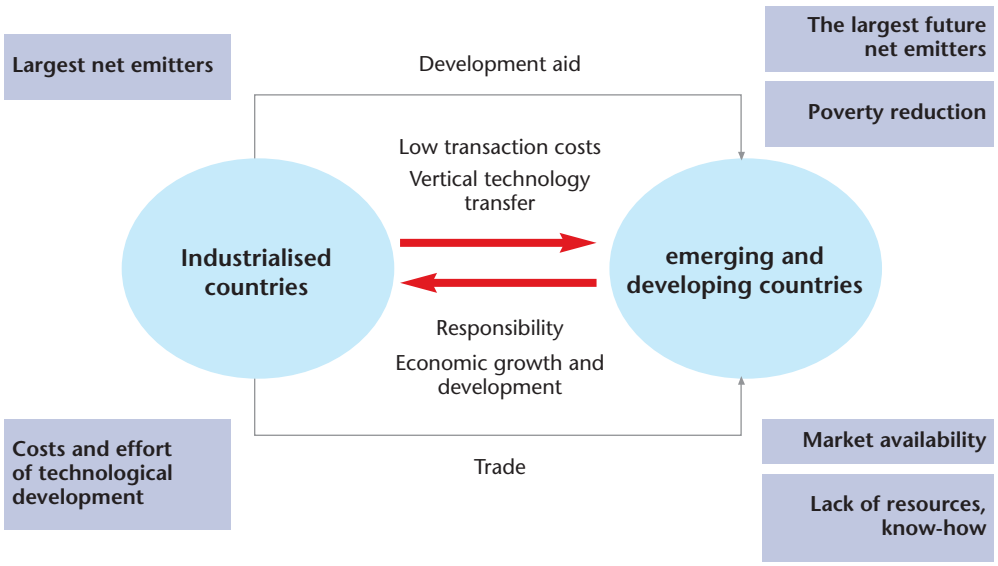


Figure 3
Causes for the stagnation of the transfer process

4. Causes for stagnation of the transfer process

Certainly, a manufacturer and developer of clean technologies does not „lose" know-how if he makes it available to emerging and developing nations at no costs, however third parties may now benefit without consideration of costs and efforts of developing said new technologies; undercutting and the resulting market displacement imperil the company's economic survival. Intellectual property rights are based on these considerations and they serve to protect from exactly these losses, but at the price of complicating technology transfer [1].

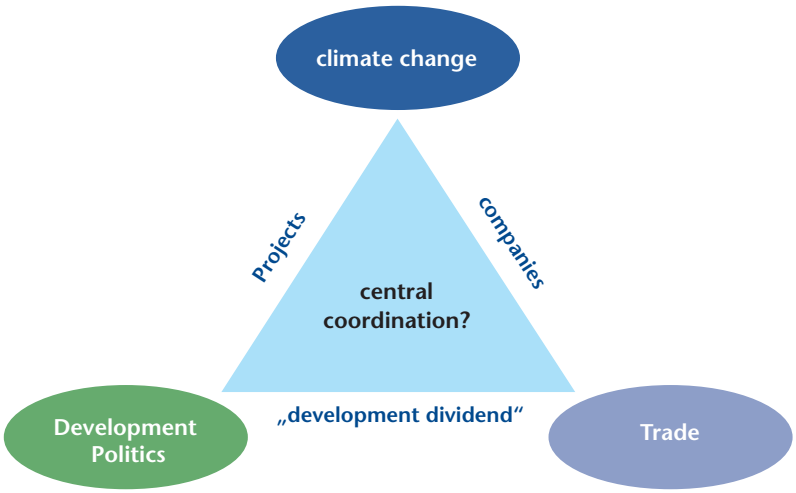
In order to ensure that intellectual property rights do not hinder the transfer of clean technologies, an extensive transformation, or even re-establishment, of administrative and legal institutions is necessary (*Figure 3*). Most developing countries, however, lack the required means. On top of that, the necessary skills and expertise need to be acquired. So instead of directly using their resources to reduce poverty and stop climate change, developing countries would first have to establish an extensive bureaucratic and legal apparatus for the protection of intellectual property rights of developed countries, and even that would not guarantee a quick and widespread implementation of clean technologies. Of course these countries will be reluctant to adjust a part of their public institutions to cater to the specific interests of foreign companies. They would then be in a situation in which they would be allowed to use technologies they cannot use due to lack of resources and know-how [1]. Intellectual property rights play a role in technology transfer but only regarding emerging and developing countries' access to advanced technologies, not to common technologies [4]. So the question is: Who is responsible for capacity building? And so one side pushes this responsibility to the other.

5. The area of conflict

The problem with so many industrialising countries is that they cannot jeopardise their economic growth aiming towards a higher quality of life for the population and that they have to avoid an energy-intensive, unsustainable and environmentally harmful industrialisation process at the same time.

Vertical technology transfer unfortunately ignores this dilemma. It may be entirely possible to spread the technology for solar cells, for example, by selling them in developing countries

Figure 4
The area of conflict



(Figure 4). From an environmental perspective, this might even be satisfactory but the interests of developing countries in capacity building and application expertise, for example, would be undermined [5].

To date, almost all organisations mainly follow a project-oriented approach, which lacks a strategic dimension with regard to the integration of renewable energies into the energy supply systems. Coordination is informal, meaning that there are no evaluation reports for assessments, lessons learned and experience gained from the projects. Another risk of lacking networking lies in the fact that projects are carried out independently or in competition with one another, and in occurring redundancies [6].

In short: The problem is characterised by heated and biased questions of responsibilities and operating primarily without a solid empirical foundation.

6. A step-by-step approach based on economic criteria

Technology transfer usually starts with local development projects. This is mostly about improving the living conditions of the locals and building their confidence in the new technology. Even if this can be accomplished, the following steps will have to be taken to ensure a successful technology transfer (*Figure 5*):

A) Pilot project

In addition to the objectives of a project, the potential of a further technology transfer should be analysed, too. Here, one quickly comes across criteria of economic efficiency, in addition to political and/or environmental aspects, which should be evaluated in a structured analysis. When selecting the pilot projects, the subsequent spreading to the larger region ought to be an important selection criterion.

B) Service and maintenance

Securing an active and operating system includes two aspects:

- Storing spare parts on site, in order to start repairs quickly and avoid lengthy and costly ordering processes.

Experience from previous projects has shown that complete system failures were often caused by apparently small problems. For example, the lack of a suitable fuse costing just a few cents resulted in failure and even ruined the whole system in a short time.

- Equally important is a more thorough understanding of the products in order to maintain an adequate quality level of service and operation.

C) Installation of products

This requires furthering one's understanding of existing technologies and products significantly. At the same time, entrepreneurial structures have to be established, including project management, logistics, quality management and after-sales service.

D) Production

This will usually only be useful if the market volume of the specific region is large enough for an adequate sales volume.

It is also necessary to build a working network with suppliers, customers and universities to develop own processes and patents and thus limit licensing costs. It is suggested that from steps A to D, the plant sizes increase from the sub-kW into the MW-range and thus the extent of the intellectual property (IP) to be transferred. By step C or D the latest, companies will usually only agree to a transfer if the economic exploitation of IP rights is clearly regulated.

Technology transfer to emerging and developing countries should not only be a matter of economic criteria but also of environmental and developmental goals. Only with the role of a „central coordinating body" that controls this area of conflict, that considers IP an economic good and does not lose sight of the steps A to D will it be possible to ensure transfer of technology to these regions to the necessary extent and with long-term success.

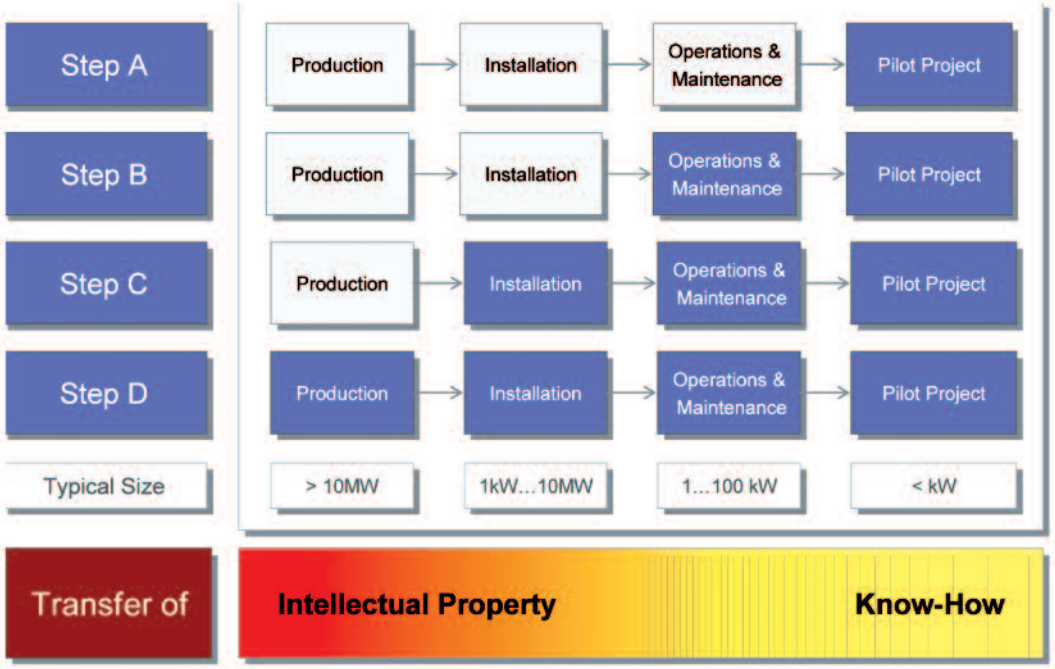


Figure 5
Technology transfer in four steps with an increasing scope of transferred intellectual property (IP)

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See also:
Forsyth, Tim (2007): Promoting the "Development Dividend" of Climate Technology Transfer: Can cross-sector Partnerships Help? In: World Development Vol. 35, No. 10, S. 1684–1698.