Climate Justice as Business Case

Innovative Business Models for the Transfers of Climate-friendly Technologies

Preliminary English Version

EUROPEAN
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European Business Council for Sustainable Energy (e5)
Hauptstr. 43,
D-61184 Karben
Germany
Tel: +49 6039 9291958
E-Mail: office@e5.org
Internet: www.e5.org

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Responsible:
Julio Lambing

Authors:
Hans Schuhmacher,

with support from
Gudrun Merkle, Julio Lambing, Peter Linsenmann, Sebastian Gallehr

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Introduction[1]

Climate change is a global threat and must be tackled on a global scale. Obviously, the growing impetus of Eco-Innovation in Europe cannot stem the tide alone if the major part of the world does not provide significant contributions to the struggle of climate change. Emission reduction and mitigation measures in Europe, for example, do have an impact on the speed of climate change. But compared to the steadily growing quantities of greenhouse gases emitted by newly industrialised countries, emission reduction in Europe, important as it is, loses significance within a global scenario.

It has to be kept in mind, however, that it is neither feasible nor recommendable to try to deny the right to develop claimed by developing and newly industrialised countries. To strive to improve one's standard of living, including the material dimension thereof, is a right that cannot be denied to anyone. The populations in economic poor societies claim this right, in such a way that their economic possibilities will increase, their markets will grow, modern consumer goods will be acquired in massive quantities and their economies will follow a path of development analogous to the one outlined by the industrialised countries. Speaker of developing countries make it clear that their nations are not willing to pay extra costs for carbon efficient technologies in order to reduce greenhouse gas emissions. Climate Justice means acknowledging both the right to develop and the historical responsibility of industrialised countries for climate change.

Business, especially in industrialised countries, holds the relevant carbon efficient technologies and is experienced regarding their implementation. But business cannot deliver and implement these technologies free of charge. On the other hand, the situation provides interesting business options. The emergence of new markets in up to now less economically developed countries of the South provides an opportunity to transcend the satiated markets of the industrialised countries. If Europe contributes to the venture of implementing carbon-neutral and resource-effective technologies on the southern half of the globe, Europe's strategical role concerning emerging markets will be ensured, even if the initial transfer is not financially compensated within dimensions which are appropriate for western market prices. Access to non-stationary energy, modern means of communication and fast and reliable means of transport are crucial elements of economic development which initiate further economic processes that rely on the former and obtain the financial means for ulterior needs and demands. These new markets will have to resort to European core competences: Eco-Innovation and climate-neutral technologies.

But this is only the viewpoint of political economy. The situation implies also considerable opportunities for private business. Today it is commonplace that all technologies necessary for the embankment of climate change are already present, they only need to be employed. From a business point of view, this commonplace perspective lacks insight. Business is not interested in development of *technologies* as an end in itself, but in developing and selling *products*. A technology which does not find buyers does not contribute to a company's survival and is, therefore, a bad product. From an entrepreneur's point of view, a product is only a *good product* if it meets the requirements of the market, namely by taking into account purchasing power and users' know-how. There always looms a competitor who offers a solution which is better tailored to match the consumer attitude of the respective market segment and which is better adapted to local needs and demands. From international development cooperation we are familiar with the problem of inefficient technology transfer, for example of innovative climate-friendly technologies without taking into account local user habits, local technological maintenance know-how or, bluntly, local purchasing power. So maybe the technologies for the embankment of climate change are present, but certainly not all the products. This is why business in industrialised countries as well as in developing and rapid developing countries is keenly interested in

[1] The paper is a concise English version of the German memorandum „Klimagerechtigkeit als Anliegen der deutschen Wirtschaft – innovative Businessmodelle für klimafreundlichen Technologietransfers“, to be presented and distributed at the international climate negotiations in Copenhagen (COP 15). Taking into account the difference between audiences - the German memorandum also addresses SMEs in German-speaking countries with little or no experience in international transactions or the minutiae of international climate politics – some background explanations and elucidations were abbreviated or entirely omitted in this version. Also, references to particular German circumstances were generally omitted.

generating products which meet the requirements of future customers in developing and threshold countries.

There is a lack of effective instruments and institutions for the advancement of transfers of climate-friendly technologies into the global South. Appropriate institutions and instruments must meet the original interests of business and the needs and capabilities of those who are to receive the technologies. From the perspective of business, this lack is an obstacle for business activities – technology transfers do not take place, economic potential lies idle. Demand in receiving countries cannot be met because financial means, environments as well as knowledge and know-how on site are insufficient. For the same reasons, innovation potential remains untapped. Developers and producers of climate-friendly technologies in industrialised countries miss a tide of novel technological knowledge due to the technology transfers deadlock.

Business in Europe is required to contribute its share in order to create the necessary instruments and institutions. Innovative spirit and willingness to take risks can be supported by adequate environments and framework conditions. In the run-up to the Copenhagen negotiations, climate-friendly business wishes to advance proposals how individual companies – SMEs as well as corporations, both in direct cooperation with businesses in the global South – can contribute to the transfers of climate-friendly technologies. Therefore, the European Business Council for Sustainable Energy (e5) organised in Germany in 2009 a workshop series at which more than 100 experts from clean energy business, finance, development cooperation and climate policy discussed how to create win-win-situation between business and poor societies in need of carbon efficient technologies. Especially the situation of SMEs was examined. The project was financially supported by the *German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety* and the *German Federal Environment Agency.*

This paper is a preliminary result of this evaluation process. It intends to give fresh impetus to harness the potential benefits of transfers of climate-friendly technologies for all concerned by creative entrepreneurship. „Climate-friendly technologies“, in this context, are defined as mitigation technologies which contribute to sustainable development decoupled from an increase of greenhouse gas emissions. It presents instruments that are to assist developing countries in their efforts to reduce GHG emissions in a measurable, reportable and verifiable way. (Also in the sphere of adaptation it is desirable that business evolves instruments which initiate and advance technology cooperation. This paper, however, does not cover adaptation inasmuch this sphere of activities necessitates a separate study.) Furthermore, the paper focusses explicitly on novel innovative approaches and instruments which up to now have not been employed in technology transfers, or, if so, only scarcely. These models and instruments do not figure largely in the debate on technology transfers.

Climate-friendly technologies also contribute to economic development, initiation of value chains and emergence of markets in developing countries if, as a first step, these technologies and their components are transferred from industrialised countries. If the implementation processes and maintenance are transacted by local companies which are trained accordingly, and if tenancy fees as well as the generated energy remain in the country and the region, this transfer already advances economic development. This creation of value can serve as a base for further development. In the medium term, independent operation and local adaptation of technologies and ultimately local ownership of technologies are attainable, i.e.,. independent development and production of carbon-efficient technologies.

The instruments presented here are in the majority low-threshold and offer tangible options for activities. If they are to be implemented more broadly, there is need for political regulation, in industrialised countries as well as in developing countries, in order to create or improve environments.

Overview

Section I covers financing of technology cooperation. In the process of the project „Climate Justice as Business Case“ e5 transacts an expert survey on private financing models regarding the transfers of climate-friendly technologies. This survey is intended to reveal whether private investors already developed adequate financing instruments and finance products. Some of these findings were taken into consideration in this section.

Innovative financing models are presented. The Mezzanine model which provides participation rights in eventual profits for investors is recommended due to its suitability for start-up companies. Founding of Mezzanine funds for technology cooperation is suggested. As a flanking or stand-alone model, the novel Peer-to-Peer Finance may be employed. Microcredit is compendiously evaluated regarding its suitability for technology cooperation. A proposal regarding a Web 2.0 Cleantech Investment Forum is introduced. The instrument is intended to bring together interested investors and companies for projects. Alternative monetary models like local currencies and B2B complementary currencies are proposed particularly for regions in which an economic cycle and, thus, value chains have to be initiated. Regarding Barter Trade, the establishment of specific barter exchanges for technology cooperation is recommended.

Section II is dedicated to the necessary transfer of knowledge and to open innovation systems in this context. These systems provide opportunities to activate the untapped innovation potential of those regions into which climate-friendly technologies have been transferred only scarcely or not at all. The instruments Open Hardware, Technology Cooperation Commons and the concept of Open Communities are introduced. The Open Hardware model, already employed by companies and initiatives, is to be implemented for technology cooperation under a viral GPL license. This model is particularly auspicious regarding rapid diffusion, local adaptation and collaborative further development of technologies. Technology Cooperation Commons are a collaborative model designed for the building of capacities regarding technology-related basic knowledge, implementation and maintenance know-how as well as regarding business know-how. The integration of public RD&D is briefly discussed.

Section III contains novel approaches in the sphere of capacity building. Although the necessity of interlocking of technology cooperation and development cooperation is widely known, these spheres of activities run past each other in far too many cases. More involvement of technology companies with initiatives for capacity building is recommended. The proposed instruments for this are Centres of Expertise which work towards technology cooperation projects and support them by means of education, training, dialogue and building of trust. These Centres may serve as bases for „Technology Cooperation Scouts“. These agents are to identify and initiate economically valid and socially and culturally reconcilable local measures by virtue of combining the functions of trend scouts and local facilitators of cooperation. Another proposal introduces a network of so-called „Humboldt Centres“ for the development of local sustainable lifestyles.

Section IV describes new flexible mechanisms driven by emissions trade. Programmatic CDM as a derivative of the Clean Development Mechanism is discussed regarding its potential for technology cooperation. Additionally, the Sectoral Crediting Mechanism, which will probably be introduced at the Copenhagen negotiations, is discussed in the same context.

Each section concludes with concrete proposals and recommendations.

Contents

Central Elements of Technology Cooperation

From technology transfers to technology cooperation

Technology transfers in a conventional sense, i.e. sale of products through to industrial plants, chargeable licenses for the use of patented technologies or build-up of production facilities on site are successful in economic environments which resemble those in industrialised countries. The less this is the case, the less economically attractive and the more difficult conventional technology transfers are. Therefore, the international debate on technology transfers was dominated by conceptions and proposals which were based on the assumption that such environments primarily would have to be created on site. Technology transfers, according to this assumption, would follow suit automatically.

Such an approach, however, practically excludes all countries and regions from technology transfers that are unable to create such environments to date. Technology transfers are, thus, postponed for an indefinite period of time. Developing countries have to allocate their resources to the reduction of poverty first and foremost, and threshold countries refuse measures like binding emissions reduction targets which consider to be detrimental to growth and modernisation of their economies. Measures summarized under the term „enabling environments“[2] in the context of the international climate negotiations are very important, some of them indispensable. However, some aspects of appropriate environments can only be realised by initiating a sustainable economic development process. It is helpful to develop models and instruments which make technology transfers attractive under the conditions on site as they are and for everybody concerned. In this context, technology transfers do no longer appear as a handover of technologies but as a cooperation process.

Sustainable development means that technology cooperation should result in the long run in the full right of use of the particular technologies in the destination area. They have to meet local demands and have to be integrated into local ways of life which, thus, will transform towards growing prosperity and sustainability. An auspicious initial point for local value chains is the production of the particular technologies on site which generates consumer power and demand for additional business.

Exchange of technical and non-technical knowledge

According to Working Group II of the IPCC, successful transfer of technology takes place when the receiver of the technology understands it and is able to implement it. This includes the ability to choose a specific technology among alternatives, to adapt it to local socio-economic environments and to sell the further developed technology.[3] This does not only highlight the importance of Capacity Building but also the scope of necessary activities. Imparting of knowledge regarding how to operate and maintain a given technology is clearly not enough.

For the main part, businesses are suitable as local partners for private technology cooperation. The need for knowledge and know-how of businesses in the global South, particularly the need of SMEs, will exceed purely technology-related knowledge. Furthermore, it has to be assumed that in the poorest and most backward regions there will not even be businesses which may act as partners.

Businesses on site – already present or to be founded – will play a key role in the sustainable development of their region. But this can only succeed if novel elements, technological as well as economic, blend in with the local way of life without evoking conflicts or inconsistencies. These could easily bring about failure of projects. Cooperation on site implies that local partners

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[2] „Enabling environment is the expression that encompasses government policies that focus on creating and maintaining an overall macroeconomic environment that brings together suppliers and consumers in an inter-firm co-operation manner (UNCTAD, 1998a. TD/B/COM.2/33). IPCC (2000) states that for promoting successful, sustainable transfer of environmentally sound technology for the purposes of the Framework Convention on Climate Change, a context that implies multi-faceted enabling environments in both developed and developing countries is needed.“ http://unfccc.int/ttclear/jsp/EEnvironment.jsp

[3] Chen, M.: Managing international technology transfer. International Thomson Business Press, London 1996

contribute their knowledge and know-how from the beginning. Specific local concepts can only be developed jointly.

Companies that transact business in foreign countries as a matter of course make themselves accustomed to good manners in this country. Technology cooperation and sustainable development on site require further that novel technologies and private enterprise blend in with the local way of life. For the companies contributing the technologies this implies the necessity to develop appropriate models on site jointly with „Local Champions“ as key figures. By this means, particular strengths of local cultures (i.e. certain forms of cooperation, of mutual help, of knowledge exchange) can be harnessed, possible obstacles can be identified and overcome in a locally acceptable way. This ensures that change is experienced in a positive way.

It is not reasonable to reinvent the wheel in the beginning of each project. Thus, it is desirable that participants of various projects can exchange information and share experiences. Technology cooperation requires appropriate platforms and institutions for this exchange.

Section I
Financing of Business Transactions in the Sphere of Technology Cooperation: Alternative Instruments and Models

Summary

This section covers instruments for financing of business transactions which up to now were not – or only scarcely - employed in the sphere of technology cooperation.

The Mezzanine model which provides participation rights in eventual profits for investors is recommended due to its suitability for startup companies. Founding of Mezzanine funds for technology cooperation is suggested. As a flanking or stand-alone model, the novel Peer-to-Peer Finance may be employed. Microcredit is compendiously evaluated regarding its suitability for technology cooperation. A proposal regarding a Web 2.0 Cleantech Investment Forum is introduced. The instrument is intended to bring together interested investors and companies for projects. Alternative monetary models like local currencies and B2B complementary currencies are proposed particularly for regions in which an economic cycle and, thus, value chains have to be initiated. Regarding Barter Trade, the establishment of specific barter exchanges for technology cooperation is recommended.

Instruments and models

- Mezzanine
- Peer-to-Peer Finance
- Microcredit
- Complementary currency systems: local currencies and barter

XperRegio

XperRegio1 is a programme for regional development independently created by a number of communities in Bavaria (southern Germany) for the advancement of SMEs, optimised for the financial demand of SMEs in the range of 15.000 – 20.000 EUR.

XperRegio consists of two institutions: XperRegio GmbH (a company) identifies innovative entrepreneurs in the region and supports them by means of intermediation of credit, public grants and training and interlinks them with other innovative SMEs. XperCapital GmbH provides venture capital after an assessment by an independent professional has taken place. By means of gains sharing and interest, money flows back to XperCapital.

Startup capital was provided by the European Union. Regional cooperative banks, local companies and private individuals provide limited liability capital. XperRegio is expected to be financially independent after six years. In the first two years, 165 SMEs were supported and 300 new jobs were created. The initiative works with 2,5 employees.

www.xperregio.de

Introduction

Lack of financial means is one of the main obstacles for conventional technology transfers. Technology cooperation on site can overcome this obstacle when alternative instruments are employed.

Financing bottlenecks also occur – in the global North as well as in the global South – because of potential investors' information deficits. In many industrialised countries, companies face difficulties obtaining credits for ecological innovations because of a lack of technical know-how regarding such projects in the banking sector. Lack of knowledge and experience regarding business activities in developing countries and technology cooperation on the potential investors' or credit grantors' side adds significantly to these problems. Concerning investors, credit grantors and businesses in the global South, the same difficulties tend to arise.

Even in those countries in the global South where handling of credits is not a problem, external investors are not an option for SMEs. Transaction costs are too high and risks are hard to calculate. Excluding international or bilateral financing solutions, only pool solutions make sense in these cases.

There is already a variety of models which are employed in regions characterised by poverty and technological backwardness, or which may be employed there if they are modified accordingly. Most of these models were not employed in the context of technology cooperation up to now,

although they provide potential for this sphere of activities. Business models which incorporate alternative forms of gains and benefits can be lucrative for businesses when conventional sale of products or technologies is not an option due to lack of local purchasing power. This, alternative financing models can also contribute to the initialisation of local value chains.

Mezzanine Finance

- Concise definition: a form of company funding that provides participation rights in eventual profits for investors instead of interest on debt. Particularly suitable for SMEs and startup companies.
- Application for technology cooperation: Financing of companies or joint ventures in threshold or developing countries, particularly of startups, not less than 80.000 EUR
- Achievement potential: Mezzanine Finance mitigates risks from weak proprietary capital and effective interest load for young companies and, thus, for investors.
- Prerequisite for effectiveness: Bundling and spreading of investment capital by Mezzanine funds for technology cooperation. Creation of the necessary infrastructure on site in order to facilitate reliable assessments and to minimize review costs. Online platforms for brokering, networking and information exchange
- Practical experiences: Mezzanin Finance stood the test in financing SMEs and startup companies. Up to now there are no experiences regarding Mezzanine finance for companies in the global South by investors from the global North.
- Possible correlations: Mezzanine finance can be directly combined with Peer-to-Peer finance (Mezzanine capital from retail investors). As the creation od appropriate infrastructures on site is a necessity for other instruments too, there are indirect correlations. In one region, several financing instruments can be employed, for example Mezzanine finance for companies and microcredit for contractors and consumers.

This model provides participation rights in eventual profits for investors instead of interest on debt. Mezzanine finance is employed for company funding, particularly for SMEs, and is beneficial for startup companies. It can mitigate a typical weakness of young companies, the lack of proprietary capital, without bringing about restraints for the founders due to strong influence of shareholders. Mezzanine is not debt capital which demands payment of interest regardless of events and circumstances. Thus, Mezzanine capital minimizes the risk of failure due to insolvency for SMEs and startups. In industrialised countries, Mezzanine is attractive for investors because of a comparatively high rate of return. The flexibility of the model allows variations which are closer to outside capital or proprietary capital, according to the needs and interests of entrepreneurs and investors. Thus, it can be adapted to specific local circumstances.

Special Mezzanine funds for technology cooperation can mitigate the risk of single investors by not allocating her investment to a single company or project in the global South. Bundling can also minimise transactions costs.

For companies or planned projects in developing countries, such special Mezzanine funds would reduce difficulties to find investment capital. Their counterpart would be a Mezzanine fund which, in order to facilitate coordination and information exchange, would cooperate closely with the companies that provides the technologies in question. These companies, in turn, could choose a Mezzanine fund as partner during the planning phase who could act on site together with representatives from the technology companies and who would be included in the planning of the project. This would ensure that the Mezzanine fund is well informed regarding the status of projects and can use this knowledge when dealing with investors.

A correct risk assessment and competent monitoring on site are decisive in order to avoid dead losses. To facilitate reduction of the significant review costs, an appropriate infrastructure has to be created in the destination area of the technology transfers, where applicable employing public or NGO assistance. Mid-term, experienced Mezzanine funds can use their knowledge regarding local conditions to pave the way for SMEs in the global North into the regions where the fund is active. Thus, these funds may become initiators of technology cooperation.

To date, regulations concerning investment companies allow the realisation of Mezzanine funds only as private placements. This restricts them to a small segment of investors willing to take

risks. International efforts aim at softening these regulations. In part, these efforts stem from the proponents of socially responsible investment. The results of the current financial crisis may accelerate this process.

Microcredit

- Concise definition: Small-scale credit developed in the global South (Frontrunner: Grameen Bank, Bangladesh), typically employed to finance labour-intensive small-scale trade and industry with minor material costs. Microcredit bridges lack of access to the regular banking sector for the poor and, thus, mobilises economic potential.
- Application for technology cooperation: Financing of small-scale business activities in threshold and developing countries, for example implementation of technologies in households, maintenance, distribution. Volume: less than 10.000 EUR in case of community projects; consumer credits in the global South, for example for solar cookers or Compact Flourescent Lamps (CLFs).
- Achievement potential: Microcredit is particularly suitable for the financing of very small-scale entrepreneurial activities, in the context of technology cooperation for example implementation of household technologies, maintenance and distribution.
- Prerequisite for effectiveness: Economically sustainable interest rates which minimize the risk of project failure due to overindebtedness of borrowers. Microinsurance (analogous conditions) for further risk mitigation. Valid credit assessments and feasibility analyses, valid risk management systems. Collaboration with microfinance institutions (MFIs) that act in a target-aimed manner in the sphere of technology cooperation, when appropriate founding of such MFIs.
- Practical experiences: Microcredit is successful regarding the mobilisation of economic potential. There are already positive practical experiences in the sphere of technology cooperation. „Grameen Shakti“, for example, offers soft consumer credits for climate-friendly technologies and supports small-scale industry and trade activities geared up to the implementation of these technologies by means of microcredit and training.[4]
- Possible correlations: The Peer-to-Peer microcredit platform Kiva[5] works with MFIs which transfer non-interest-bearing loans from private individuals and civil society organisations to small-scale entrepreneurs in developing countries as interest-bearing loans. It should be examined whether such a combined instrument would be suitable for technology cooperation.

Microfinance attracted considerable attention in recent years, not least due to the conferment of the Nobel Prize to Muhammad Yunus, the founder of the Grameen Bank. Its subsidiary, Grameen Shakti, utilises microcredit for the implementation of solar modules on houses in Bangladesh for years. Meanwhile, a multitude of MFIs throng in the market. The strength of microcredit is its ability to reach those who are classified as unbankable and do not have access to credit under reasonable conditions. The volume of a single microcredit ranges from 1 EUR and 10.000 EUR. MFIs can be specialised finance institutions, but also NGOs.

Interest rates typically range between 15% and 40%, run durations are short. Payback and monitoring are usually organised by groups of borrowers. The Grameen Bank, like many other MFIs, grants new credits when the old ones are repaid. This brings about tight social control which, in turn, results in very few dead losses. Activities financed by means of microcredit are usually labour-intensive and require minor material expenditure.

Microcredit, however, cannot bring about sustainable economic development on its own when infrastructure, healthcare and access to education, training and qualification are deficient or not present at all.[6] There is also the problem of, in places, extremely high interest rates (in some cases up to 70%) which are accounted for inflation, high administrative costs and the difficulties involved with acquiring capital by the MFIs in question.[7]

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4 http://www.gshakti.org/

5 http://www.kiva.org/

6 http://www.evb.ch/p25013161.html

7 Oekom Research: Mikrofinanz. Oekom Position Paper, Juli 2009, S.5

Disproportionate interest rates can affect the application potential of microcredit for technology cooperation negatively. Success of technology cooperation also depends on mid-term and long-term solvency of local partner entrepreneurs and companies and on their capability to prosper. Therefore. technology companies wishing to employ microcredit in technology cooperation projects should choose with care a MFI and collaborate with it. The interest rates of this MFI should be oriented towards sustainability. This applies both to financing of economic activities that are part of the project and to credits in the project's environment. It is advisable to take into account the national or regional rate of inflation when evaluating interest rates, the „real" interest rate may in fact be lower than the figures indicate. It should be possible that microcredit debtors obtain positive accounts in credit in the long run in order to strengthen local purchasing power. Furthermore, microinsurance for loan loss should be available under advantageous conditions.[8]

Kiva – Peer-to-Peer Finance for Microcredit

The Peer-to-Peer microcredit platform Kiva works with MFIs which transfer non-interest-bearing loans from private individuals and civil society organisations to small-scale entrepreneurs in developing countries as interest-bearing loans. Kiva allows MFIs around the world to post profiles of qualified local entrepreneurs on its website. Lenders browse and choose an entrepreneur they wish to fund. Kiva aggregates the loan capital and transfers it to a MFI, that disburses the money to the entrepreneur chosen by the lender.

It should be examined whether such a combined instrument would be suitable for technology cooperation. Also in this case, it is necessary to create appropriate risk management systems.

www.kiva.org

In case there is no suitable MFI present in the region, institutional investors may play this role or found special MFIs, so long as the asset managers of institutional investors are increasingly bound to invest in sustainable projects[9].

Another possibility would be the founding of special MFIs by already existing MFIs or joint ventures in developing countries. Appropriate education and training of students and interns from developing countries may bring about functioning banking systems in regions where there is a lack of them, led by executives who understand local environments.

Peer-to-Peer Finance

- Concise definition: Intermediation of capital from private individuals
- Application for technology cooperation: Admission of investment from private individuals for businesses, joint ventures and projects. Investments from private individuals/retail investors are suitable for equity finance for SMEs in threshold and developing countries. Volume approx. 10.00 EUR – 50.000 EUR.
- Achievement potential: Admission of investment from private individuals can extend available capital and involve these investors with technology cooperation. Possible positive side effects are spread of awareness and growing support of technology cooperation which may in turn lead to improvements of framework conditions for climate-friendly business.
- Prerequisites for effectiveness: Assessments of credit, validity, also assessments of business models, feasibility analyses on site, creation of adequate infrastructures. When appropriate, collaboration with organisations on site which provide these assessments. Online platforms for coordination and information exchange. It should be possible for the investors to choose a company or a project that was assessed and rated. Ratings by professional organisations should be complemented by ratings provided by the investors based on their experiences with the borrower. Thus, trust can be established like in social networks (web 2.0). Legal and juridical frameworks have to be clarified, for example regarding taxation and liabilities.
- Practical experiences: Excepting very few examples like Kiva, Peer-to-Peer finance is up to now practically restricted to industrialised countries. In music business experience with Mezzanine finance (www.SellaBand.com)

[8] Oekom Research: Mikrofinanz. Oekom Position Paper, Juli 2009, S.2

[9] UNEP (United Nations Environmental Programme) Asset Management Working Group: Fiduciary Responsibility. Legal and practical aspects of integrating environmental, social and governance issues into institutional investment. July 2009

- Possible correlations: Peer-to-Peer finance can be combined with microcredit (exemplified by Kiva), but also with Mezzanine finance.

Peer-to-Peer finance is a novel approach to intermediate credit between private individuals by employing modern communications technology. Credit intermediation is a service provided by companies that transact assessments of credit. Examples in industrialised countries are Zopa[10] (Great Britain) and Prosper (USA).[11] This instrument may facilitate company financing for SMEs in the global South. Private individuals may act as investors.

In industrialised countries, it is relatively easy for individual private investors to obtain the necessary informations about potential borrowers. In case of default, there are conventional means of response. Differences regarding legal, juridical and infrastructural framework conditions bring about initial difficulties for financing companies in the global South using this instrument. But admission of investment from private individuals can extend available capital and involve these investors with technology cooperation. Possible positive side effects are spread of awareness and growing support of technology cooperation which may in turn lead to improvements of framework conditions for climate-friendly business.

Small and Medium Enterprises Rating Agency (SMERA)

SME Rating Agency of India Limited (SMERA) is a joint initiative by SIDBI (Small Industries Development Bank of India), Dun & Bradstreet Information Services India Private Limited (D&B) and several leading banks in the country. SMERA is the country's first rating agency that focusses primarily on the Indian SME segment. SMERA's primary objective is to provide ratings that are comprehensive, transparent and reliable. The ratings facilitate greater and easier flow of credit from the banking sector to SMEs.

SMERA's ratings are based on comparisons of SMEs, financial as well as non-financial aspects are taken into account. Parameters are dynamic and updated regularly. The costs of a first-time rating for a small company amount to 120 EUR, significantly bigger companies pay 190 EUR. Businesses that are not members of the official small entrepreneurs agency NSIC have to pay three times these amounts. Meanwhile. SMERA collaborates with 28 lieading banks and financial institutions.

SMERA also conducts ratings of MFIs that are based on their financial and social performance. In October 2008, SMERA's CEO advised Indian SMEs to realise that economic sustainability is the order of the day and recommended investments in sustainable technologies.

http://smera.in

Admission of investment from private individuals may in many cases suffice as equity finance for SMEs in the global South. The creation of special online platforms for matchmaking between potential investors and potential borrowers is recommendable. Without credit assessment on site, however, Peer-to-Peer finance (or allocation of venture capital) is not workable. Generally, investors will have to rely on local expertise. In any case it should be examined which infrastructure on site can provide valid assessments. Cooperations with MIFIs, NGOs or IFC offices are conceivable. An auspicious example is the „Small and Medium Enterprises Rating Agency" in India, the first of this kind.[12] Such ratings can be complemented by rating options for investors comparable to those in social networks.

[10] http://p2pfoundation.net/P2P_Finance; http://uk.zopa.com/ZopaWeb/http://www.entrepreneurcommons.org/ http://onthecommons.org/content.php?id=2082

[11] http://p2pfoundation.net/Prosper

[12] http://smera.in

Web 2.0 Cleantech Investment Forum[13]

- Concise Definition: Online platform for advancement of technology corporations with several tasks: matchmaking, information on all available public funds, presentations of service providers
- Application for technology cooperation: matchmaking between potential investors and potential borrowers, information on all available public funds, presentations of service providers
- Achievement potential: After modifying the initial proposal, this instrument can remove existing deficits: lack of contacts to businesses in target regions, knowledge deficits regarding these regions, lack of means to procure these informations. Additionally, this instrument may render accessible innovative financing models and initiate their practical application.
- Prerequisite for effectiveness: Public funding, at least for the initial phase
- Practical experiences: In other spheres of activities, platforms for matchmaking and information exchange are successful.
- Possible correlations: The platform can be used to pap financial instruments and initiate their practical application. Indirect correlations are possible regarding other measures and instruments directed at the removal of knowledge deficits and lack of contacts. The platform could also be connected to platforms for barter trade (vide complementary currencies) and peer-to-peer finance.

A web 2.0-based platform may serve for bringing together investors, public funding and climate-friendly technology companies. A user-friendly database should provide information on all relevant public funding programmes, if possible in all G20 countries. This would be particularly beneficial for SMEs. Furthermore, the platform should bring together private investors and technology companies (matchmaking). This, also, would be particularly beneficial for SMEs. The platform should also collect and bundle relevant informations that are available elsewhere (investment forums for climate-friendly technologies, Reuters, Bloomberg, Wall Street Journal...) and provide forums for initiating contacts and discussions. Additionally, the platform should provide opportunities for service companies in the sphere of climate-friendly technologies to present their services. Thus, these services would become better available.

Mid-term, independence from public funding could be attained by means of fees for intermediation, membership fees and advertising.

The platform as presented in the initial proposal by the Atlantic Initiative is only designed for companies in G20 countries. It has, however, the potential to advance technology cooperation. It could be combined with alternative financing models like Peer-to-Peer finance, barter platforms and instruments for knowledge exchange.

[13] This proposal was presented by the Atlantic Initiative in their report „Towards a Global Green Recovery – Supporting Green Technology Markets“. Vide Kallmorgen, J.-F. et al.: Towards a Global Green Recovery – Supporting Green Technology Markets. Atlantic Task Force recommendations to the Policy Planning Staff of the German Federal Foreign Office, August 2009, p.11 f.

General Digression: Complementary currencies

Complementary currencies are employed as an alternative to authorised mediums of circulation issued by public institutions, establish a closed money circuit and enable value added within this circuit. They are only accepted by participants of a given system. The specific medium of circulation may take the shape of cash (for example a local currency), book money (for example in barter clubs) or e-money. There are two groups of systems and models: local or regional currencies and barter systems.

Local currencies: Typically, local currencies are initiated in order to bind cash flow locally and thereby to advance the local economy. In most cases, local currencies are issued by non-banks, i.e. without creation of credit in the shape of loans. These local currencies can be swapped with national currencies. Some local currencies lose value over time in order to prevent hoarding and to encourage swift spending. Safeguarding circulation in this way is unnecessary in scenarios characterised by poverty because no hoarding will take place and the safeguarding mechanism demands further efforts that bring about costs. Local currencies that create credit in the shape of loans require a bank, this can be a local development bank. This bank can offer (interest-free) loans.[14] In this case, the legal restraint to enable swapping with the national currency that is effective in most countries demands clear regulations. Such a local currency can advance the local economy substantially.

Barter systems: Barter systems can be divided into three groups. They do not only differentiate by different models, but also by size and volume. All barter systems have in common that they bring together participants and interlink them, the networking reduces their efforts and costs. In all barter systems, a complementary currency is emitted. This is the barter system's accounting unit. The smallest barter systems are usually called Local Exchange Transit Systems (LETS). Participants trade goods or services, the complementary currency serves as accounting unit. These participants are usually private individuals. The accounting unit can be coupled to the national currency, units of time, goods or units of energy. Payments-in or payments-out in official currencies is not possible in most cases[15], neither is swapping the accounting unit with the national currency.

The WIR-Bank

A special case in the sphere of complementary currencies is the WIR-Bank in Switzerland. This model relies on specific characteristics of Swiss legislation which provide a facilitating framework for the WIR-Bank.

The WIR-Bank works like a barter system for Swiss SMEs but has the status of a bank. A barter system is basically an accounting platform, its complementary currency is not used beyond transactions of participants. The WIR-Franken (CHW) is practically a „local currency“ used everywhere in Switzerland. Payments in CHW or mixed payments in CHW and the national currency (CHF) are possible, for example, in the retail sector and the catering trade. Additionally, the WIR-Bank offers loans, including investment loans, in CHW, like a conventional commercial bank does. For some years, these loans are accessible of private individuals. Because these credits stem from the WIR-Bank's creation of money, there are no refinancing costs. Accordingly, the conditions for borrowers are very favourable.

The credit business is the virtual motor of the WIR market. A borrower has to repay in CHW , therefore she has to procure CHW by business activities. There is no alternative as trading CHW for CHF, the national currency, is forbidden and severely sanctioned. The volume of money in circulation is facilitated by the fact that money cannot flow out of the closed system and its volume can be adapted by offering credits. While a conventional commercial bank relies solely on the registered securities of borrowers, the WIR-Bank additionally ensures that business activities of borrowers have a positive effect on the WIR economy. Thus, the WIR-Bank gains two-fold benefits from its credit business, namely these stimulating activities plus repayment and interest while the borrower enjoys the favourable conditions.

www.wir.ch

Barter clubs like Trade Exchanges and Retail brokers are profit-oriented companies. They work like LETS but offer their services, i.e. non-cash accounting, to SMEs. Participating SMEs benefit from improved opportunities for outlet and procurement. Additionally some barter clubs offer intermediation of credits from cooperating banks. These companies are active on a regional or national scale. Their complementary currency is an equivalent of the national currency and equal to it in value.

The largest barter systems are supranational barter platforms. Unlike barter clubs, there is no formal membership. The benefits for participating companies are, in principle, those offered by the barter clubs, but these platforms transact significantly more voluminous dealings and their scope is much more diversified.

[14] Interest-free loans are typical for local currencies. There are a few exceptions. Notably, the loans provided by the Swiss WIR-Bank are not interest-free, although they are very favourable (typically 1%). The WIR-Franken (CHF), however, is the accounting unit of the WIR accounting system and, thus, strictly speaking, not a local currency although it basically functions as such in Switzerland. Vide the section on the WIR-Bank.

[15] There are a few exceptions. Some barter systems allow establishing a deposit by a payment in regular currency when a participant joins the system. Some barter clubs (retail brokers) disburse leaving members' deposits after a certain waiting period (for example three years). During regular participation such interactions are not allowed, trading accounting units for official currencies is also forbidden. An extensive expert report regarding legal aspects of complementary currencies focusing on Germany: http://www.swschwedt.de/kunden/uckermark/projekte/gutachten.htm

Barter systems are not allowed to offer loans, swapping their complementary currency with national currencies is forbidden. Local currencies, on the other hand, are generally obliged to provide for this exchange. These are the reasons why both barter systems and local currencies are only suitable for specific groups of participants and do not show the capacity complementary currencies offer in principle.

Complementary currencies in the sphere of technology cooperation

Although to date most regions of the world are directly interlinked with money-based economy, there are regions in which employing complementary currencies could be more culturally accommodating than the classical money circuit. Complementary currencies can attach themselves to local nonmonetary exchange systems, and can act as interface between these systems and the global system. Existing complementary systems in Japan exemplify that such systems can also be successfully employed in modern industrial societies. Accordingly, local traditions should be taken into account when considering the application of a complementary currency system in technology cooperation.

Local currencies

- Concise definition: Local alternative currency complementary to the national currency. Local currencies can facilitate transactions when there is a lack of (regular) money, it can be used to pay for labour and services. These systems are interest-free.
- Application for technology cooperation: Bridging initial phases in regions characterised by lack of conventional money. If the local currency is issued by a bank, credit may be offered that may facilitate financing of small businesses and projects. For companies, local currencies provide favourable conditions for paying for labour and services and contributing to local value chains at the same time.
- Achievement potential: Restricted by legislation. The instrument can remedy local lack of regular money.
- Prerequisite for effectiveness: Established local currencies should be used. Initiating a local currency is generally not advisable in technology cooperation because establishing such a system takes considerable time.
- Practical experiences: Up to now, local currencies were not employed for technology cooperation.
- Possible correlations: A local currency emitted by a non-bank can be useful for technology cooperation projects if company financing is possible by other means but there is no sufficient market for goods and services in the region due to poverty. Local currencies emitted by banks are already employed in combination with microcredit at very low interest rates (Fortaleza/Brazil). Demand for capital may decline if businesses can pay for labour and services in a local currency. In these cases, economic sustainability is a necessity, i.e. there must be a local currency well-established on site so service providers and employees can make free consumer decisions. Correlations arise in the spheres of capacity building and knowledge exchange.

The main strength of local currencies consists of their ability to reduce local lack of financial means and to initiate circulation of goods, services and labour. If the local currency is emitted by a bank which offers loans, the creation of credit in a closed system facilitates guidance of economic activities by means of incentives, i.e, by target-aimed support of required activities. The closed system prevents that the created financial means drain off. An established local currency may provide incentives for businesses and skilled individuals to move into the region.

Local currencies are not restricted to the poorest regions of the globe, there are, for example, some established local currencies in Germany. Creation of credit in a closed system can be beneficial for technology cooperation projects. For example, loans in a local currency may lower the threshold for energy efficiency projects if both partner companies in the global south and their customers can access them. For the customers, the interest-free loan is attractive because of the mid-term cost reduction the project brings about. The implementing company can use the local currency at least for some transactions, it can repay its own credit by means of payments from customers.

Local partner companies in the global South have to reduce their costs, particularly if they are start-ups. At the same time, in many cases local purchasing power has to be created and advanced in order for these companies to operate in suitable environments. When there is an established local currency in the region, it can be used to pay for services and labour. If this is the case, the obstacle of having to procure the necessary amounts in a conventional way is reduced. Also cost for external finance may be reduced.

Banco Palmas

The Banco Palmas in the Palmeira precinct of Fortaleza/Brazil is a bank that emits a local currency. The bank offers credits in the local currency (interest-free) and in Brazil's national currency (interest rate 2%). For a fee of 1%, amounts in local currency can be swapped with the national currency (ratio 2:1). Stemming from a grassroots movement, the Banco Palmas operates a school (Palmatech) that imparts the concept of the bank to the local citizens and offers education and training.

The Banco Palmas succeeded in enhancing the circulation of goods in the region, this was further advanced by the creation of a brand (PALMA). The brand guarantees that the products were manufactured locally in an ecologically sustainable and socially acceptable way. In the bank's environment, the production activities it supports are organised in a way that advances transfer of knowledge and know-how. At a weekly barter fair, local citizens can offer their goods and services. The majority of financial transactions as well as payment of wages take place using the local currency.

www.bancopalmas.org

Barter Trade

- Concise definition: Complementary currency systems for swapping that circumvent problems generated by the financial markets
- Application for technology cooperation: Barter trade is employed by companies in order to spare financial liquidity. Barter trade minimises risks arising from the financial markets. Additionally, barter systems bring together transaction partners and interlink them. This facilitates the use of barter platforms for matchmaking. This can be particularly beneficial for SMEs.
- Achievement potential: Supra-regional complementary systems can provide profitability in scenarios where this may not be possible otherwise. The larger the barter system is, the higher the probability that goods and services are offered that are useful for all participants. The existence of widespread barter systems and organisations (for example the International Reciprocal Trade Association, IRTA) is an advantage for employing barter trade in technology cooperation.
- Prerequisite for effectiveness: Removal of legal and institutional restrictions for participating SMEs in the global South.
- Practical experiences: Although barter trade is prevalent, there are no practical experiences regarding technology cooperation.
- Possible correlations: There is possible synergy with all instruments for matchmaking and interlinking, for example the „Web 2.0 Cleantech Investment Forum“. Reliable rating agencies in threshold and developing countries are very advantageous. (vide SMERA).

Small regional barter systems (LETS) are generally not interesting for technology cooperation. An exception are LETS which use accounting units connected to climate protection, for example those that represent units of energy (Typically 1 kWh). A partner company in a developing country that implements mini- or micro hydro power technology could pay for services and labour by using coupons that represent energy generated by the hydro power plants. These coupons might serve as means of payment for other transactions in the region and so (like a local currency) remedy lack of financial means. In contrast to the national currency, these coupons will not leave the region. The company may spare its financial liquidity and lower its costs.

In the context of technology cooperation within weak economies, a proposal by the founder of the Japanese barter system WAT/I-WAT may be of interest. It describes the employment of an

energy-based barter system for economic reconstruction after a natural disaster.[16] An institution on site discharges three tasks: It hands over amounts in national currency to residents for the same amounts in the barter system's accounting unit, employs a workforce which is paid in the complementary currency and swaps those amounts of accounting unit it receives for national currency. Local fishermen, for example, would get equipment from the organisation and pay for it in complementary currency. Local traders could safely accept payments in complementary currency because the organisation would stand ready to swap it for national currency.

Besides of this more theoretical proposals, Barter systems which are driven by retail brokers can be directly employed for technology cooperation, particularly surpraregional systems. Supranational barter platforms can bring together companies from the global North and from the global South. SMEs may, thus, access international contacts. As the company that maintains the platform will be eager to gather as many transaction partners as possible, these platform may be beneficial for technology cooperation. There are, however, legal restrictions in some threshold and developing countries aimed at the support of the national currency that cause implicit access restrictions regarding barter trade. These restrictions should be modified.

New barter platforms, oriented specifically towards international transfer of carbon-efficient technologies and linked to existing barter systems may accelerate technology cooperation. A network of internationally recognised rating agencies in developing countries could significantly increase the proportion of participating SMEs in developing countries. Furthermore, models specifically designed to meet the requirements of SMEs like the Swiss WIR-Bank (since 1934) would be auspicious.

[16] Morino, E.; Suko, Y.; Takahashi, S.; Suzuki, T.; Saito, K.; Murai, J.: Peer to Peer Economics for Post Catastrophic Recovery. Proceedings of the 2007 International Symposium on Applications and the Internet Workshops (SAINTW '07) 0-7695-2757-4/07 IEEE, 2007

Financing of Business Transactions:
Identified Need for Action

1. Regulations, particularly admission restrictions of the capital market, should be modified in order to remove obstacles for investments in technology cooperation. The legislation should safeguard that only investments which serve global climate protection and creation and extension of sustainable economies on site are advantaged. The criteria should be elaborated by an independent expert panel consisting of experts from the spheres of global climate protection, development cooperation, finance, law and representatives of climate-friendly business. This expert panel should elaborate a framework monitoring, reporting and verification for projects. At the same time, bureaucratic obstacles should be removed and the formation of new ones should be avoided.

2. Investments in technology cooperation should be tax-supported. It would be desirable that such investments by private individuals would be tax-free.

3. In order to avoid that international cleantech business activities fail due to a lack of technical expertise in the banking sector, publicly funded independent institutions should be founded which provide this expertise. These institutions are needed in industrialised as well as in threshold and developing countries. Their task would consist of assessing technology cooperation projects in the planning phase and to draw up expert reports. These could be presented to banks and other financial institutions in order to guarantee technical feasibility and validity of business models. Project proposals should be submitted electronically and provide, besides all technical data and calculations, competent estimates regarding greenhouse gas emission reductions attainable by the project. The proceedings of this institution should be as unbureaucratic as possible and keep down transaction costs at the lowest possible level.

4. The public sector should participate in the founding of internet platforms for Peer-to-Peer finance specializing in equity finance for SMEs in developing countries. Likewise, the public sector should contribute to the creation of international barter platforms which facilitate the transfer of carbon-neutral technologies. These platforms should collaborate with institutions on site that provide ratings of companies.

5. Representatives and institutions of the public sector should only recommend microfinance institutions (MFIs) that do not jam borrowers into debt traps. Microinsurance should be part of the standard supply of these MFIs. Institutions which also provide commercial credit suitable for the advancement of sustainable economies on site should be particularly supported. The public sector should either create special programmes providing microcredit for technology cooperation or financial means for institutions that already do so.

6. The lack of know-how regarding finance in many places must be counteracted. A suitable measure would be publicly funded capacity building. Addressees would be local financing sectors in the global South and those development organisations that do not already possess this know-how. The founding of intergovernmental organisations (IGOs) for the advancement of private sustainable market economies is suggested. These IGOs should transact the capacity building and suitable programmes for the diffusion of business know-how. This may take place as „business workshops“, but a „training of trainers“ would be preferable.

7. Framework conditions for complementary currencies in the global South should be improved. Legal frameworks should be created for the advancement of banks for technology cooperation that utilise complementary currencies and combine generation of credit with barter accounting. These banks could be financed from the financial means the international community of states provides for the support of developing countries within the framework of a new global climate agreement. In this case, it should be arranged that the institution in charge is able to act in a target-aimed way, at pace and unbureaucratic.

8. „Regional Clean Tech Agencies“ should be founded in the global South for advancing sustainable development. These agencies should support local cleantech SMEs by means of intermediation of credit and training, small-scale start-up funding and by interlinking them with other companies and potential investors. As the German paragon initiative XperRegio exemplifies, two employees and a small fund can contribute significantly to local sustainable development. In the initial phase, these agencies require public funding, but in the long run they can pay for themselves by means of gain sharing.

Section II
Cooperative Models of Innovation

Summary

Cooperative innovation models provide opportunities to tap unused innovation potential, even in regions into which no climate-friendly technologies were transferred yet. In this paper, the instruments Open Hardware and Technology Cooperation Commons are introduced. Additionally, incorporation of publicly funded RD&D and the concept of Open Community are discussed.

The Open Hardware model, already employed by companies and initiatives, should be utilised for technology cooperation under a viral GPL license. This model provides swift diffusion, local adaptation and collaborative further development of climate-friendly technologies. Technology Cooperation Commons are a cooperative innovation model for knowledge dissemination and capacity building in the spheres of technological knowledge (including basic knowledge), implementation and economy/business under a Creative Commons license.

There are possibilities for collaboration with growing and multiplying initiatives in the global South which maintain platforms for advancing technological innovation. A notable example is the Indian SRISTI Honey Bee Database.[17]

Instruments and models

- The Open-Source Model - Open Hardware
- Technology Cooperation Commons

Introduction

In the sphere of technology cooperation, the necessary transfer of knowledge and know-how faces difficulties. Particularly SMEs lack the means to transact training programmes overseas, potential partner companies in the global South are likewise hampered by financial needs. The main barrier, however, is the lack of clear win-win scenarios that would motivate companies in the global North to share their knowledge.

In case conventional economic gains are initially unlikely for companies in industrialised countries, innovation gains are a viable alternative. Also in case technology cooperation does provide gains, innovation gains may be an attractive additional premium. In this paper, „innovation dividend“ is defined as gaining additional knowledge by means of investing knowledge. Creative further development of a company's knowledge in new theatres of operations may be decisive for the development of marketable products. Furthermore, from the point of view of economic development it is clear that transfer and exchange of knowledge are essential for technology cooperation. Collaborative innovation models facilitate access to knowledge, which, in turn, facilitates and accelerates capacity building and reduces its costs.

The SRISTI Honey Bee Database

The SRITI Honey Bee Database presents more than 100.000 technical ideas and innovations, at the most developed by private individuals, craftspersons and micro-entrepreneurs. There is already a SRISTI Techpedia.

SRISTI (Society for Research and Initiatives for Sustainable Technologies and Institutions), founded in 1993 to support of the Honey Bee Network, furthers Indian grassroots innovators, protects their innovations and advances the diffusion of these innovations by means of the database and a newsletter available in seven languages.

www.sristi.org/wsa
http://www.techpedia.in

Alleged panacea like the demand for one-size-fits-all and tightened protection of intellectual property rights (IPRs) in the global South or for the compulsory suspension of patents for global climate protection will not solve the problem. Important core technologies like basic wind and

[17] http://www.sristi.org/wsa/

photovoltaics technology are no longer protected by patents.[18] They are already points of origin of independent technology development in threshold and developing countries. The participating companies have become serious competitors for businesses in industrialised countries. Some stakeholders, however, point out that the international dispute on IPRs even hamstrings the use of technologies no longer protected by patents in developing countries.[19] The AWG-LCA's Revised Negotiating Text[20] exemplifies the multiplicity of positions regarding the issue of IPRs in the context of the international climate negotiations. It is likely that the growing pressure brought about by the shortcomings of the negotiations in this respect will cause more urgent calls for solutions. Technology companies in industrialised countries should briskly not only propose innovative solutions but also implement them in order to tap innovation potential and to help shape the international debate. Collaborative innovation models may be the key to accomplish this.

The are already initiatives in the global South that use collaborative innovation models and maintain platforms for advancing technological innovation. In Africa, for example, the Open Source movement is growing,[21] and Open Hardware initiatives[22] are founded. Pilot projects demonstrate that also in Africa users can cheaply access the internet from rural regions, even if the existent energy supply is deficient.[23] Thus, a prerequisite for regional as well as supranational collaborative innovation models, namely access to internet platforms, is compliable.

These examples demonstrate that utilising collaborative innovation models provides opportunities for cooperation with comparable initiatives in developing countries. It may prove beneficial for technology cooperation to access the knowledge of grassroots innovators in the global South regarding local needs and conditions.

The instruments proposed here represent various options for cooperation. Open Hardware, for example, is an option for companies and grassroots innovators to gain knowledge from collaboration. It dies not constitute a compulsion for giving away innovations. Collaborative innovation models are to create possibilities additional to conventional sales channels. Thus, they extend business options.

Such instruments could become more efficient and more economically attractive if publicly funded institutions, particularly universities, would participate in them. For these institutions, a multitude of tasks and projects would arise. Technology companies active in technology cooperation would more benefit from the innovation capacities of the public sector. This might be an additional incentive for taking the risks of participating in Open Hardware and Commons-based activities. Non-technical departments like African studies, Chinese studies, Cultural and Social Anthropology could also participate and employ their specific knowledge.

In principle, every company, every institution and every individual able to do so (or willing to become able to do so) should be allowed and encouraged to participate. This may have numerous advantages, for example for the participating technology companies that may get access to self-taught qualified professionals connected to technology-oriented communities. Concerning competition, companies collaborating with communities should be able to gain clear advantages from being known there as well as from „insider knowledge“. Furthermore, participating technology companies in industrialised countries may get into contact with developers in threshold and developing countries. They may be won over as partners or employees. New business opportunities in the sphere of consulting may also emerge.

[18] Barton, J. H. (2007) Intellectual Property and Access to Clean Energy Technologies in Developing Countries: An Analysis of Solar Photovoltaic, Biofuels and Wind Technologies. ICTSD Trade and Sustainable Energy Series Issue Paper No. 2 International Centre for Trade and Sustainable Development, Geneva, Switzerland

[19] Global Climate Network: Breaking through on technology. Overcoming the barriers to the development and wide deployment of low-carbon technology. Global Climate Network discussion paper no.2, 2009, p.19

[20] FCCC/AWGLCA/2009/INF.1, 22 June 2009, pp. 146

[21] http://www.netzpolitik.org/2009/digitale-entwicklungen-und-open-source-software-in-afrika/

[22] http://www.wireless-africa.org/

[23] http://www.it46.se/index.php IT+64: ZittNet – Fantsuam Foundation's Community Wireless Network – How to set up a rural Wireless Internet Service Provider in Africa.

The Open-Source model – Open Hardware

- Concise definition: Analogous to Open Source Software, Open Hardware is a community-based development instrument for technologies. A viral GPL (General Public License) facilitates implementation and further development of technologies.
- Application for technology cooperation: Adaption of technologies to local conditions, steady further development of technologies, cost-effective involvement of many co-developers.
- Achievement potential: Adaption of technologies can be transacted by those who know local conditions best. The viral GPL license allows commercial use of technological knowledge and know-how under the condition that further developments are accessible under the same conditions and the same license. Innovations and discoveries by grassroots innovators, also in the global South, can be utilised. Co-developers pass through an „unofficial apprenticeship". Also, technologies that are not marketable can be utilised. Participating technology companies can access the capacity of developer communities. Peer-to-Peer-assessment safeguards high quality.
- Prerequisite for effectiveness: Clarification of legal and juridical framework conditions, design of a valid business model for a Open Hardware platform, investment in the development of the database, public funding for this, international interlinking of Open Hardware initiatives, creation of suitable public environments, involvement of publicly-funded RD&D. The problem of deficient protection of innovations in many countries of the global South has to be solved, for the benefit of technology companies from the global North as well as for the benefit of innovators in the global South.
- Practical experiences: Numerous positive experiences in the sphere of Open Source software, sporadic experiences regarding Open Hardware
- Possible correlations: In the spheres of knowledge transfer and capacity building, also with initiatives for development cooperation. Cost reduction due to Open Hardware may facilitate proliferation of start-ups. Peer-to-Peer assessments, like in Open Source software development, can facilitate validation of businesses and projects.

Web Initiatives for Open Green Technologies

www.e5.org/opensource-cleantech
e5 in cooperation with the Center for International Environmental Law (CIEL), the International Centre for Resource and Energy Efficiency (SAT-iCREE) and the newthinking communications GmbH expedites since 2008 the build-up of a Clean Tech database by employing the Open Source model. Furthermore, e5 interlinks Clean Tech companies, research institutes, actors from the Open Source movement, legal experts and development organisations by providing opportunities for exchange of ideas and by hosting events in order to harness collaborative models of creativity.

www.akvo.org
Akvo - Platform for projects and donors on water and sanitation, Akvopedia: open database on smart and affordable water and sanitation technology, open to be contributed, edited and used

www.apropedia.org
Apropedia Foundation - Open Sustainability Network: Website with wiki and forum on open sustainable hardware and related projects

www.csposi.org
Concentrated Solar Power Open Source Initiative (CSPOSI) - Project Archimedes: hybrid thermal solar collector for distributed power generation and water purification; Software and electronics hardware for concentrated solar power under GNU General Public License (GPL)

www.goodstove.com
Good Stove - Cost and energy efficient stoves for the use in developing countries

www.energytower.org
Solar Heat Pump Electrical Generation System - SHPEGS - open concept for a renewable base load power station for moderate climates, based on solar and geothermal heat

The success of Open Source software development brought about the appearance of similar initiatives in the sphere of Open Hardware[24]. Utilisation of Open Hardware for global climate protection attracts growing interest. To date, e5 initiates an Open Hardware project.

[24] Examples for existing Open Hardware projects, databases and communities: http://www.e5.org/modules.php?op=modload&name=PagEd&file=index&topic_id=0&page_id=57

The characteristic strengths of Open Hardware are the following:

Generally, Open Hardware projects do not only make patent documentation accessible, they also provide information on design, components used, software codes and descriptions of development steps. This information packets are, in turn, extended by the communities and their further developments. The development of a given technology, thus, becomes intelligible for others and facilitates implementation, adaptation and further development of the technology.

Open Hardware is „viral", i.e. the model incorporates, by means of its characteristic licenses (for example the GNU public license GPL[25]), every innovation based on the original technology under this license. Thus, further innovations are accessible under the same conditions. This is important if a steady circuit of feedback and further development is desired. Analogous to companies that cooperate with Open Source communities, the innovation gain of participating technology companies may rise the faster and the more diversified the process of further development is. Peer-to-Peer review safeguards the characteristic high quality of Open Source software and will likely do the same in Open Hardware development.

Active participation in an Open Source or Open Hardware community is comparable to an unofficial technological apprenticeship that is practically costless for those who provide know-how. „Local Champions" and cooperation partners in the global South can improve their expertise as well as participating technology companies in industrialised countries. Furthermore, Open Hardware facilitates supranational or even global exchange of knowledge and experiences as well as networking effects. The intensity of the innovation stimulus is not predictable and unratable.

Open Hardware is an interesting option for technology companies in industrialised countries also because of new possibilities to utilize technologies unsuitable for the market. Advantages are also conceivable regarding technologies that can be easily imitated and are components of technologies fit for the market. In these and similar cases, the common innovation dividend provided by Open Hardware may bring about the development of new marketable products. The expenditure, however, is minimal. At the same time, these platforms can be used for establishing contacts between companies in different hemispheres. These contacts, in turn, may become points of origin for technology cooperation projects.

A difficulty encountered in the initiation phase of such an innovation model is lack of knowledge among investors regarding cooperative models. Only when business models are fully developed, clear criteria for businesses will be discernible when, depending on market penetration and state of development, a decision for a viral license is advisable. This is another reason why technology companies should participate in the development of this instrument. As an alternative or additionally to a full GPL licence, commercial license can be employed that allows patenting and licensing of further developments but grants a share of all gains to the original patent holder. This would enable technology companies with small production capacities to market their technologies globally and particularly foster SMEs. A part of these gains would be withheld by the platform for covering costs and creating funds for the advancement of technology development.

A step-by-step realisation of the instrument is conceivable. Even if technology companies in the initial phase only contribute technologies unsuitable for the market, it is possible that the model succeeds. Potential candidates are also technologies which are no longer protected by patents – e.g. many patents for the use of renewable technologies are expired. In contrast to so-called „patent databases", Open Hardware enables a return flow of further development and options for cooperation. Such an initial phase may already be beneficial for technology cooperation. At the same time, it facilitates building of trust, objectification of the debate and gaining insights which may be used to improve the instrument.

[25] http://www.gnu.org/licenses/gpl-3.0.html

Technology Cooperation Commons

- Concise definition: Imparting of knowledge and knowledge exchange on a global plane by means of web 2.0 platforms and and a Creative Commons license fur advancing technology cooperation.
- Application for technology cooperation: Overcoming of cultural, language and knowledge barriers,imparting of knowledge and knowledge exchange in the spheres of climate-friendly technology and business.
- Achievement potential: Technologies have to be adapted to local conditions, private business activities have to be integrated in cultural and social environments. In order to be effective, local „forms" of technologies and business have to be developed locally. A prerequisite for this is access to knowledge and know-how. The instrument facilitates this and also enables interlinking and exchange between technology cooperation projects and their participants world-wide.
- Prerequisite for effectiveness: Clarification of legal and juridical framework conditions, public funding, creation of suitable public environments, involvement of publicly funded RD&D.
- Practical experiences: Web 2.0-based knowledge and communication platforms and Creative Commons are successfully employed in diverse spheres of activities and knowledge, but up to now not in the sphere of technology cooperation.
- Possible correlations: Interlinking with all models for capacity building and knowledge transfer are possible. Open Hardware or the Web 2.0 Cleantech Investment Forum would benefit from this instrument, and vice versa. The instrument may facilitate startups in the global South, instruments proposed in this paper (Section I) may be employed to finance them.

GNU/LinEX: Open Source enables regional software

A European example for overcoming cultural and language barriers by means of cooperative innovation systems is the development and diffusion of a GNU/Linux system (GNU/LinEx) in the Extremadura in Spain, a region characterised by poverty. The interface of GNU/LinEx uses the local language and icons are designed along local motives, for example a mythical bird known for its swiftness for the internet browser. More than 70.000 users without prior computer experience gained access to modern communications technologies due to this local software.

www.linex.org

Cultural and language barriers are potential obstacles for technology cooperation. Language barriers alone[26] may be an obstacle for potential technology entrepreneurs or grassroots developers in developing countries as basic English, for example, does not suffice to impart complex technological information. Open Source platforms for technical texts that provide basic knowledge („How does wind power work?") up to very complex information could produce relief. Students and scientists from developing countries could provide translations under Creative Commons licenses and would, thus, contribute to the sustainable development of their countries. When translations into the main languages of a developing country are accessible, the barrier for translations into local languages is much lower. Documents under Commons licenses may be printed, copied and diffused in order to reach those who have no access to modern communications technologies. For businesses and project personnel on site it is easier to write reports on technological developments, problems and so on in their own language. If these reports also find their way to the translator communities of the Technology Cooperation Commons, local experiences can be utilized globally.[27] In the sphere of Open Source software, this response process as well as communication among users work very well.[28]

[26] Karubi, N.: Development, Micro-Credit and Women's Empowerment: A Case Study of Market and Rural Women in Southern Nigeria, Canterbury 2006, pp.22

[27] A Creative-Commons license suitable for Technology Cooperation: Attribution – Noncommercial – Share-alike. http://creativecommons.org/licenses/by-nc-sa/3.0/

[28] http://ubuntuusers.de/
See also: Ghosh, R.: Study on the Economic Impact of Open Source Software on Innovation and the Competitiveness of the Information and Communication Technologies (ICT) Secor in the EU (FLOSSImpact), UNU-Merit 2006. S.90

The portals of this virtual hubs of technology cooperation may be designed by user communities according to their own needs. Examples would be technology encyclopedia analogous to wikipedia that collect and provide implantation know-how, collections of project documents, exchange forums and synopses of local parameters based on geographical information systems. Modern ICT technology facilitates other depiction modes apart from texts and technical drawings. Video material and animations with multilingual soundtracks and sub-titles as well as other media [29] may achieve positive effects. Likewise, vital information for novice entrepreneurs can be imparted and experiences can be shared.

Open Source and Commons-based models facilitate such local versions of technologies. Technology Cooperation Commons could facilitate this in the sphere of climate-friendly technologies.

[29] Vide the U.S. Army's „Preventive Maintenance Monthly“, a comic strip imparting technical instructions and hints

Cooperative Innovation Models:
Identified Need for Action

1. Financing of translations of important websites that advance Open Source in the spheres of climate-friendly technologies as well as legal and juridical aspects of Open Source. Most of them are in English. As a first step, translations into the lingua franca of a given global region are needed, i.e. Chinese, French, Spanish and Arabian. As a second step, initiatives willing to provide translations into more local languages should be encouraged and financed. Multilingual moderation of these websites should be provided for.

2. The public sector should play an important role by the creation and financing of a non-commercial Green Open Hardware Database. Due to the current financial crisis, private companies are hard to win over for highly innovative projects. Public funding would be necessary as an initial spark. Furthermore, financing by the public sector is necessary in order to avoid the impression that a few private companies would aim at utilizing the project for hidden particular interests.

3. For the development of an international legal and juridical framework for a Clean Tech GPL License a technical expert group has to be established. Up to now, there have only be scattered approaches for appropriate licenses. This panel could also work as secretariat for the database platform. Their tasks would consist of management of the Clean Tech GPL license, maintenance of legal integrity of the original products, diffusion and promotion of technologies and Clean Tech GPL licenses, maintenance of a platform for publications on new ideas and innovations developed under this license.

4. International conferences should be funded that conjoin creative thinkers and thought-leaders of the Open Source and Open Hardware communities. Some of the thought-leaders, initiatives and experts relevant for such a venture do not have the means to meet face to face. The following key actors should be gathered: a) thought leaders of the Open Source movement from industrialised countries and from the global South; b) companies that already employ Open Hardware; c) representatives from Green Open Hardware initiatives d) legal experts on Open Source; e) companies and technology developers in the sphere of climate-friendly technologies; f) research institutions that can release patents; g) experts from the sphere of development cooperation.

5. It should be proved which of the patented hardware and software under copyright or patents the development of which was financed by G20 countries should flow into the portfolio of the Clean Tech GPL programme. This should be mandatory and regulated accordingly. Such a provision would demand either joint ownership (patent/copyright holder and platform) or a contract which allows the platform to issue licenses for these technologies. The national interest of the country in question should be taken into account.

6. Setup of international Clean Tech patent libraries: Transferring of patents into a pool for cross-licensing grants all producers access to relevant technologies. Users should be enabled to buy access by warranting a percental share in later profits. The gains would flow to the library and distributed among those who contributed to the technology in question. The allocation formula should be based on the frequency of technology use.

7. Publicly funded tenders for bounty hunters: An agency, set up by the United Nations, should identify climate-relevant problems and publish solutions under a GPL license. Such a system could be funded by emissions taxes.

Section III
Capacity Building

Summary

Regarding technology cooperation, capacity building and the transfers of know-how are vital activities. Although the necessity of linking development cooperation closely to technology cooperation is well-recognised, in practice both spheres of activities run past each other in far too many cases. It is recommended that technology companies should become more involved with capacity building.

The instruments proposed here are Centres of Expertise which, by means of dialogue and building of trust, work towards technology and knowledge cooperation projects and support them. Employed „technology cooperation scouts“ are to identify potential „Local Champions“ of technology cooperation. Another proposal describes so-called „Humboldt Centres“ for autonomous development of sustainable lifestyles.

An appendix briefly presents the RETEX concept, an instrument for technology cooperation particularly in the sphere of Mini- and Micro-Hydro Power (MHP). RETEX pursues a markedly cooperative approach and focusses on diffusion of MHP technologies in poor developing countries.

Instruments and models

- Centres of Expertise as Platform for Technology Scouts
- Humboldt Centres

LEEN - Management System for Local Energy Efficiency Networks

This system for learning networks for businesses were initiated in Switzerland in the 90s in the sphere of energy efficiency. Moderated by a professional, knowledgeable senior engineer , 10-15 companies participate in regular meetings (four times per year) for sharing experience and learning from invited experts . The companies define a joint target for energy-efficiency improvement and CO2 emission reduction with a four-year time horizon, based on individual potentials of the sites. Regularly, energy consumption and CO2 emission of the participating companies are verified, the whole process is monitored. Participating companies have reduced their specific energy consumptions as well as their specific carbon dioxide emissions by about 20% within 6 years. About thirty learning networks are active to date, the participants are approximately 1.000 companies from Switzerland and Germany.

These networks could also be employed for technology cooperation. Learning networks for energy efficiency might be as useful in rapid developing regions.

www.leen-system.de/en

Introduction

In order to achieve a global technological revolution and to enable, at the same time, raising local prosperity and quality of life, a comprehensive, broad and swift capacity building has to take place. Capacity building on site ensures that tech transfers business succeed in the destination countries. A remarkable example for a capacity building programme is the Royal Swedish Institute for Technology's „Sustainable Energy Engineering (SEE)“ Worldwide Programme, a pilot project for educating energy sector engineers by means of e-learning.[30]

Capacity building can only bring about sustainability if it is a „training of trainers“. Therefore, it should cooperate with „Local Champions“ of clean tech business in developing countries. Some of them may, as engineers and/or entrepreneurs, directly transact technology cooperations, while others will pass on what they have learnt, improve this knowledge and know-how and bring forth more trainers. In this respect, the instruments described in Section II, Cooperative models of innovation, are relevant.

Capacity building must not be defined too narrowly. It must not be restricted to technology-related know-how. Success of technology cooperation projects and programmes also depends on capacity building in the sphere of business and finance know-how. A capacity building is needed that brings about the emergence of local financing sectors or imparts knowledge and know-how

[30] Fransson, T.: Energy Education in a World-Wide Perspective. Side Event International Climate Negotiations Bonn, Royal Institute of Technology, Sweden, June 4 2009; http://www.energy.kth.se/index.asp?pnr=15&ID=1231&lang=0

regarding climate-friendly technologies to existing financing sectors. Thus, local entrepreneurs are enabled to utilize transnational company financing in a competent way.

Technology cooperation generates knowledge, also for the participating innovator or owner of clean technologies (e.g. companies from industrialised countries). The steady exchange of knowledge and know-how in the process of technology cooperation may set a dynamic „knowledge spiral" in motion. It has to be examined how publicly funded institutions like universities can be involved most effectively in extending and accelerating this „knowledge spiral". In contrast to a conventional sales transaction, these knowledge related processes may have mid-term and long-term durability. By means of involving a growing number of participants, they may accrue continuously. This tide of knowledge can be harnessed also in industrialised countries.

Centres of Expertise as Platform for Technology Scouts

- Concise definition: Centres for Capacity Building as joint ventures between technology companies and institutions and companies focussing on development cooperation; these centres appoint trend scouts (similar to those in Western countries) for low carbon innovations
- Application for technology cooperation: Target-aimed preparation and support of ventures and projects, capacity building. Identification of local business opportunities and grassroots innovators, initiation of contacts between novice entrepreneurs and innovators in the global South on one side and potential partners in industrialised countries on the other, collaboration with local networks.
- Achievement potential: Tapping unused (unknown) economic potential, facilitating sustainable local economic development, preparation and support of technology cooperation projects, pre-assessments. Dialogue and building of trust in the process of project initialisation, capacity building, local assessments, bundling of knowledge and know-how from development cooperation with the expertise of technology companies.
- Prerequisite for effectiveness: Public finance or Founding of syndicates in order to facilitate participation of SMEs, Clear definition of tasks (taking into account the interest of stakeholders in the global South), extraordinary competence.
- Practical experiences: In general there are rich experience with diverse institutions for technological cooperation.
- Possible correlations: If the Centres elaborate assessments, there are important correlations with financial instruments. These Centres of Expertise may correlate with other instruments proposed in this paper: Web 2.0 Cleantech Investment Forum, Open Hardware, Peer-to-Peer finance.
- These Centres of Expertise may collaborate with Technology Cooperation Scouts. They can initiate contacts between local stakeholders and the online platforms proposed in this paper and offer internet training when appropriate. If the Centres elaborate assessments, there are important correlations with financial instruments.

Diverse Centres of Expertise for technology cooperation between companies/institutions in industrialised countries and developing countries are already available, but mostly separated in the diverse spheres of development cooperation and business transactions in the global South.

The tide of knowledge facilitated by these Centres of Expertise should flow in two directions. To date, the German Energy Agency (DENA) provides only five country profiles of African countries but 31 of European countries.[31] Centres of Expertise could be suitable instrument to elaborate target-aimed local assessments. They can initiate contacts between local stakeholders and the online platforms proposed in this paper and offer internet training when appropriate. Also, the dialogues they can initiate on site can be very productive for technology cooperation. An example fur such an advanced approach is RETEX[32] (Renewable Energy Technology Exchange), an instrument developed by the German agency for technical cooperation GTZ.

[31] http://www.exportinitiative.de/index.cfm?cid=1780

[32] Kölling, F., Feibel, H.: „RETEX" - an instrument for RE technology exchange with special focus on Mini- and Micro-Hydro Power (MHP), May 2009

In some countries in the global South, grassroots innvators are supported by their own networks and organisations like the „Honey Bee Network“ in India. Collaboration with companies from industrialised countries, however, does not often occur. It has to be assumed that many grassroots innovators do not succeed in marketing their inventions, receiving investments or finding partners. This is a serious structural deficit.

Therefore, we propose that these Centres of Expertise integrate in their work Technology Cooperation Scouts. These highly skilled individuals are to explore important local conditions and to identify possible local key actors:

Particular local needs have to be identifies taking into account the perspective of local stakeholders. Otherwise, technological solutions for needs and problems (lack of energy supply, deficient quality of water, lack of suitable logistics for bringing local goods to markets) may disregard cultural and social aspects. This, in turn, can lead to failure. Cultural and social aspects should not only be seen as potential obstacles. They may be strengths in the sphere of technology cooperation if they are correctly identified. Instead of, for example, establishing a new distribution system for small-scale technologies it may be more cost-effective and promising to utilize existing structures. In southern Nigeria[33], for example, market women are an important economic factor. If it would be possible to entrust them with the distribution of these small-scale technologies (for example mobile phones and bicycle dynamos to charge them[34]) the products would become accessible for all their customers. In this case, a scout would have to examine whether this would be economically valid and culturally acceptable. This exemplifies that these scouts do not only have to speak the local languages, they have to possess extensive knowledge regarding local cultures and technological possibilities. By virtue of this knowledge, they can act as local technology experts and provide first estimates on technological feasibility and economic viability.

„Technology Cooperation Scouts“ would be able to identify local needs, opportunities and trends and to trace grassroots innovators. The interests of the addressees, however, have to be safeguarded. The result of the scouts' activities must not be that companies from industrialised countries appropriate innovations without consent of the innovators and without compensating them. The scouts' activities must be oriented towards technology cooperation. Therefore it is imperative that their contractees are public or publicly funded institutions that focus on development and technology cooperation.

A scout may, for example, initiate contacts between local innovators and one or several platforms proposed in this paper. In this case, it is important that the innovator can choose between different options, e.g. whether she wishes to participate in Open Hardware or whether she would prefer to search for investors on a matchmaking platform. The scout should seek cooperation with existing innovator networks and not compete with them. These networks can be utilized to reach many participants.

Scouts may provide pre-assessments and act as „godfathers“ for innovators from the global South on financing platforms. There, scouts can be rated. A good scout should be able to aquire a positive reputation. At the same time, it is important to build trust in the scout's are of operations.

The activities of trends scouts which are searching for innovative ideas in developing countries raise the question how to ensure that original innovators are rewarded for their innovations. Strengthening of the patent system in a developing country will not necessarily make it more effective in serving local innovators. Patents are only enforceable in the territory in which they are registered. Many innovators based in devoloping countries are unlikely to have the financial resources to file and enforce patents in Japan, Korea, the US or Europe. Often, innovation in poor and week economies takes place in informal sectors. However, informal sector actors tend to be less likely to cross over to formal sectors to make use of existing institutional and legal frameworks. Any sound system for supporting innovation should acknowledge both the formal and informal sectors. Many times the invention is the result of broader community knowledge.

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[33] Karubi, N.: Microcredit and Women's Empowerment: A Case Study of Market and Rural Women in Southern Nigeria. University of Canterbury 2006, p. 144 ff.

[34] “*Two Kenyan university students have invented a device that allows bicycle riders to charge their mobile phones. Jeremiah Murimi, 24, and Pascal Katana, 22, said they wanted their dynamo-powered "smart charger" to help people without electricity in rural areas.*” http://news.bbc.co.uk/2/hi/africa/8166196.stm

It should be examined which proposals[35] and approaches are suitable to meet the needs of all concerned. Experiences, approaches and demands by organisations that protect the interests of grassroots innovators in the global South should be paid particular attention. Furthermore it should be examined whether models of „Access and Benefit Sharing“[36], originally elaborated in the political regulation of biodiversity, may provide an approach for the protection of grassroots innovators that develop and implement climate-friendly technologies in developing countries. It is conceivable that the protection of innovations from industrialised countries would face less obstacles if local innovators are fairly compensated. Possibly, such novel protection mechanisms would be also viable for companies from industrialised countries operating in developing countries.

RETEX (Renewable Energy Technology Exchange)

This concept for technology cooperation was developed by the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) in collaboration with the Swiss Agency for Development and Cooperation, commissioned by the German Federal Ministry for Economic Collaboration and Development.

RETEX aims at overcoming three main obstacles for the diffusion of climate-friendly technologies in the global South, namely: lack of reliable and cost-efficient technologies; lack of knowledge and know-how; lack of financial means. The instrument focusses on poor developing countries and is to advance the South-South exchange of technologies. In the initial phase, RETEX is to concentrate on Mini- and Micro-Hydro power (MHP). Core elements are an online platform for knowledge exchange and the establishment of a network of local expert core groups which, in collaboration with other institutions, maintain a training and consulting service.

Essential elements are:

- intensive local training units;
- an interdisciplinary approach, integrating technical, business, legal, juridical and policy aspects;
- advancement of South-South exchange by means of active networking;

The online internet platform provides information on:

- standards – technical information on MHP technologies, feasibility analyses, monitoring systems, definitions of terms etc.;
- library: technical manuals, training handbooks, software for downloading (free of charge), links, an evaluation department;
- selection criteria for electro-mechanical gear – turbines, measurement and control technology etc.;
- database: providers of technologies, consulting companies, finance partners, international organisations etc.;
- best practices: examples for policies and regulations, critera for project selection, solvency, financing instruments etc.

For members of the RETEX network, the following exclusive features are also to be available:

- open expert forum for questions and discussions;
- consulting service: by experts, for a fee;
- training material accessible if certain quality standards are met;
- licenses and blueprints for members that meet certain criteria (obligation for regular training, obligation to report).

www.gtz.de/en

[35] Cannady, C.: Access to Climate Change Technology by Developing Countries. A Practical Strategy. ICTSD Programme on IPRs and Sustainable Development Issue Paper No. 25. Sept. 2009

[36] World Intellectual Property Organization (WIPO) Intergovernmental Committee on Intellectual Property and Genetic Resources , Traditional Knowledge and Folklore, First Session, Geneva, April 30 to May 3, 2001, WIPO/GRTKF/IC/1/9 Gupta, A.: WIPO-UNEP Study on the Role of Intellectual Property Rights in the Sharing of Benefits Arising from the Use of Biological Resources and Associated Traditional Knowledge., 2004

Humboldt Centres

- Concise definition: Centres for development of local sustainable lifestyles along with the integration of climate-friendly technologies as well as setup and extension of sustainable local economies.
- Application for technology cooperation: Interlinking of local social environments and local knowledge with global perspectives, relations and exchange processes.
- Achievement potential: Utilization of local knowledge and know-how, of local traditions and practical knowledge. Tangible targets and goals are to be defined by the local population which also designs the education process, assisted by professionals. Thus, endorsement of sustainable lifestyles and sustainable economies are safeguarded. This is imperative for sustainable success of technology cooperation and cannot be attained entirely by means of other instruments.
- Prerequisite for effectiveness: Public funding.
- Practical experiences: none.
- Possible correlations: Besides other strengths, these centres enable local populations to meet representatives of institutions and other instruments at eye level. Cooperation with Centres of Expertise may be arranged, a Technology Cooperation Scout or a representative of a sustainable MFI may be invited, etc. At the same time, the Centre may provide access to the internet. This is important for all internet-based instruments. The centres are suitable places for the local population shape agreements among themselves and with outsiders.

The above-mentioned Centres of Expertise may provide important contributions for the initialisation of technology cooperation. But in spite of innovative approaches there are some tasks they are not suitable for. Like ambitious initiatives by companies and NGOs they are oriented towards dialogues with the local people. For a sustainable success of technology development, however, the dialogue of the local people among themselves and learning processes designed by them (not by others) are indispensable.

Nobody can identify local needs and problems like the local people can, and nobody is better at elaborating local solutions than they are. More than others, they are able to integrate new elements (technologies, business) into their lives without evoking negative side effects. They are able to shape local sustainable economies if they receive the necessary tutelage. Modern sustainable lifestyles which suit their needs and their cultures can only be designed by them. In order to initiate and support these processes, the founding of autonomous but interlinked Humboldt Centres for Innovation“ is recommended.[37] These Humboldt Centres are to be part of a global network in order to facilitate the exchange of knowledge and experiences.

The name refers to a core element of Germany's scientific and technological rise in the 19th century, the Humboldtean education concept. According to this concept, students learned – first by participation, later by transaction of research processes on their own authority – to find innovative and creative solutions. In contrast to the historical background, however, these innovation cores will no longer be located in universities but will be established in developing countries as a new, seperate branch of knowledge generation.

Their task will most notably consist of interlinking local social environments and local knowledge with global perspectives, relations and exchange processes. For this, knowing about local needs is not enough. The new lifestyle has to be reflected adapted and newly shaped by them, in order to incorporate local traditions and knowledge and, at the same time, to advance a sustainable modern local economy which is fit to stand the test in the current global economy. With other words, these centres are to connect local sensibility with a global horizon.

A Centre – in a rural region or a poor city precinct - needs one or two classrooms and a library comparable in size to an average public library in an industrialised country. One or two animators maintain the Centre. They possess an extraordinary liberal education, have an academic background (if possible) and are well acquainted with the local social environment. They are, however, neither schoolteachers nor transactors of an alphabetisation programme. Instead, they

[37] The development theoriser Narahari Rao developed the concept of the Humboldt Centres in collaboation with e5.

guide the local dialogue and reflection process and maintain the Centre as an ideas smithy for sustainable lifestyles. Once called to their „chairs“, they enjoy the liberties of a teacher in the academic world.

Capacity Building and Knowledge Based Promotion of the Economy: Identified Need for Action

1. The creation of Centres of Expertise as joint ventures between specialised companies (like the German GTZ) and technology companies should be supported by the public sector. In order to facilitate participation of SMEs, syndicates should be founded. Involvement of publicly funded RD&D institutions (particularly universities) is recommended and should be advanced.

3. Due to the potential of climate-friendly technologies to bring about increasing prosperity and growth of markets, they should play a significantly more important role in development cooperation. Furthermore, SMEs willing to transact technology cooperation projects that include capacity building measures should be supported by the public sector. This support should include covering of travel expenses and facilitating access to business networks and decision-makers in the global South.

4. Besides the lack of technology-oriented and business know-how, there is also a lack of financial know-how in many target regions of technology cooperation. This must be remedied in order to avoid further waste of economic potential and opportunities. The financing platforms proposed in this paper cannot fill this gap on their own. Therefore, a capacity building is needed that brings about the emergence of competent local financing sectors or provides know-how relevant for technology cooperation for existing financing sectors. Such initiatives for the advancement of market economies should be supported and funded by the public sector.

5. International mobility of technology experts, engineers, students, business representatives and experts from relevant spheres of expertise (financing, assessment and rating, consulting ...) is vital for technology cooperation. Laws and regulations which prevent or impede potential participants in technology cooperation to learn, to teach, to recruit, to establish contacts and networks, to transact business or to work where they see fit and particularly where they are wanted and needed should be critically examined. A policy initiative to advance international mobility of participants in technology cooperation should be considered. Such an initiative would enable equitable proposals and measures that do not adversely effect stakeholders from the global South or industrialised countries. In any case, governments should consider their relevant policies, laws and regulations and amend them in order to advance technology cooperation.

8. It should be examined which proposals and approaches for protection of innovations in developing countries are suitable to meet the needs of all concerned. Experiences, approaches and demands by organisations that protect the interests of grassroots innovators in the global South should be paid particular attention.

Section IV
New flexible mechanisms - Programmatic CDM/ PoA and Sectoral Crediting Mechanism (SCM)

Summary

The CDM is the most well-known instrument for the advancement of technology transfers installed by the UN climate regime. Its effectiveness for technology cooperation, however, is hitherto constrained both regarding regions and regarding technology-related aspects. Therefore, new instruments were developed and proposed.

This section sketches how Programmatic CDM may be employed for implementation and diffusion tides of climate-friendly technologies. In this respect, Programmatic CDM possesses particular strengths. The instrument can be economically valid in regions which are unattractive for conventional CDM. The staggered arrangement of CDM Programmes of Activities (PoAs) in time as well as in space within a single project facilitate its utilization for new forms of technology cooperation.

Additionally, the novel Sectoral Crediting Mechanism is concisely introduced. It is a useful complement of the existing Kyoto mechanisms and should be included in a post-Kyoto agreement. Its possible efficiency for technology cooperation is briefly discussed.

Models and instruments

- Programmatic CDM – Programmes of Activities (PoAs)
- Sectoral Crediting Mechanism (SCM)

Programmatic CDM

- Concise definition: Complement of the Clean Development Mechanism for surmounting the concentration of the CDM in particular regions. Thereby extension of the potential reach of the CDM and improved conditions for smaller projects.
- Application for technology cooperation: Programmatic CDM is particularly suitable for implementation of small-scale technologies (Solar Cookers, CFLs, Micro-Hydo power) and projects (village electrification).
- Achievement potential: Programmatic CDM accommodates projects characterised by repetition of the same activities which can be transacted by multiple agents (for example SMEs).By means of generation of credits, Programmatic CDM may lower cost thresholds.
- Prerequisite for effectiveness: Improvement of the approval procedure. In principle, the instrument is already effective.
- Practical experiences: To date, 120 PoAs are in the validation phase.[38] Whether experiences from the Small Scale CDM (SSC) should be taken into account is uncertain because SSCs are only occasionally bundled. Practical experiences will emerge shortly. An example for successful bundling of small projects is „JIM.NRW“[39] in Germany. This, however, is a Joint Implementation project.
- Possible correlations: PoAs, in principle, facilitate collaboration of companies from industrialised countries, local businesses, NGOs and MFIs. Diffusion of practices can be part of a PoA. Therefore, multiple correlations are possible.

Conventional CDM projects are economically valid if the expenditures for the registration and approval procedure can by justified by high gains of CERs (Certified Emissions Reductions). The expected gains have to exceed direct and indirect project costs. Therefore, the instrument primarily advances large-scale projects. The result is a concentration of conventional CDM

[38] http://cdm.unfccc.int/ProgrammeOfActivities/Validation/index.html
[39] http://www.energieagentur.nrw.de/Emissionshandel/page.asp?TopCatID=10653&CatID=6358&RubrikID=6358

projects in certain areas of the globe, others – most notably Africa's porest regions – remain excluded.[40]

The proportion of Small Scale CDM[41] is approximately 45%.[42] This popularity appears to be partly due to a slightly simplified[43] registration and approval procedure which, however, it is still complicated and expensive. This exemplifies, on the one hand, considerable potential for small projects in the CDM, but on the other hand costs and expenditures practically exclude SMEs. Small Scale CDM is primarily attractive for banks and corporations. It seems, that it does not bring about change regarding geographical distribution of the CDM yet.

Programmatic CDM simplifies the participation of small (and even micro-scale) projects in emissions trade. It bundles identical reduction activities, the so-called CDM Programme Activities (CPAs) under a common framework programme. A theoretically infinite number of CPAs can be added to a PoA, both in time and in space. Due to the scatter and accumulation effect of PoAs, they are suitable for poor developing countries and poor and rural regions. An orientation towards SMEs, villages and households is possible. Thus, PoAs lower the threshold for technology cooperation.

A PoA is conducted by a central institution which is responsible for the registration of the project. This can be a company. The respective CPAs may be conducted by various so-called CPA operators, they may be companies as well. The CPAs must resemble each other and transact the same bundles of measures my means of the same technology. Their respective size and volume, schedule and initial point in time, however, may vary. A single CPA is necessary for the registration process. For all subsequent CPAs, there is no registration fee. Default of a single CPA, for example by deviation from substantial criteria, results in exclusion of this CPA, not in failure of the project. A PoA may span 28 years, therefore even if the initial conditions are unfavourable, substantial gains are possible at a later date.

An example - a PoA currently in the process of registration – is the PoA Lighting Scheme „Bachat Lamp Yojana“.[44] This PoA is to exchange ICLs (incandescent lamps) in Indian households for CFLs (Self-Ballasted Compact Flourescent Lamps). The credits generated by the project are to bridge the price difference between conventional lamps and CFLs. Credits are generated based on emissions reductions.

Difficulties that may be serious obstacles in other scenarios or cause costs can be utilized to claim the additionality of such a project and, subsequently, be surmounted. In the case of „Bachat Lamp Yojana“ lack of purchasing power is such an obstacle. Savings due to reduced energy consumption will set free purchasing power once the CLFs are implemented. Lack of knowledge and know-how on site may also be utilized to claim additionality and therefore allow inclusion of capacity building measures in the project.

In the past, conventional CDM projects were frequently a motive for governments of host countries not to conduct ambitious climate policies in order not to endanger the additionality of CDM projects. Although this effect was attenuated by a decision of the CDM executive board in 2005,[45] conventional CDM projects still do not provide enough incentives for ambitious climate policies in target countries. In the case of PoAs that are more development-oriented and more adaptable to specific local needs, governments will welcome their proliferation. Therefore, it is likely that they will conduct policies beneficial for new models of technology cooperation – there

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[40] Environmental Change Institute Oxford, Tyndall Centre for Climate Change Research UK: The Clean Development Mechanism: An assessment of current practice and future approaches for policy, Working Paper 114, 2007 p. 8ff.; European Sixth Framework Porgramme: The Potential of Transferring and Implementing Sustainable Energy Technologies through the Clean Development Mechanism of the Kyoto Protocol (ENTTRANS): Promoting Sustainable Energy Technology Transfers through the CDM: Converting from a Theoretical Concept to Practical Action, 2008, p. 21

[41] FCCC/KP/CMp/2005/8/Add.1 Report of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol on its first session, held at Montreal from 28 November to 10 Dec 2005; Addendum, Part Two: Action taken by the Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol at its first session; Contents: Decisions adopted by the Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol; Annex II: Simplified Modalities and Procedures for small-scale clean development mechanism project activities, pp. 43

[42] UNFCCC: Clean Development Mechanism 2008 in brief, cdm-info@unfccc.int

[43] FCCC/KP/CMp/2005/8/Add.1,pp. 45

[44] Indian Bureau of Energy Efficiency (BEE)/ GTZ/ TÜV Süd, February 2009 http://cdm.unfccc.int/ProgrammeOfActivities/Validation/DB/WOW1YYO9VEFAM3D6H2GJ4BZ4AW9YJL/view.html

[45] Hinostroza, M.; Cheng, C-C.; Zhu, X.; Fenhann, J.; Figueres, C.: Potentials and barriers for end-use energy efficiency under Programmatic CDM, CD4CDM Working Paper Series, Working Paper No.3, 2007, S.7

are a lot of possibilities for correlations between PoAs and other instruments proposed in this paper. The Indian government, for example, is aware of the potential of PoAs.[46]

Sectoral Credit Mechanism (SCM)

- Concise definition: In contrast to project-based instruments driven by emissions trading, the SCM is to encompass whole sectors in a given region. This region may be a country, several countries or a number of regions. Sectors receive a baseline for emission without having to accept a binding obligation. If the sector succeeds in falling short of the baseline, i.e. emits fewer GHG emissions, it gains additional emissions permits for valorisation in the market. The criterion of additionality is omitted for SCM.
- Application for technology cooperation: The Sectoral Credit Mechanism penetrates areas regarding climate protection measures and may bring about bandwagon effects in the same area, i.e, other sectors will conduct SCMs too.
- Achievement potential: Depends on the actual consistency of the SCM in a post-Kyoto regime. Some proposals contain Technology Penetration Baselines which would directly link the generation of credits in a sector with diffusion of climate-friendly technologies.
- Prerequisite for effectiveness: Actual consistency of the SCM that advances technology cooperation. Relevant criteria would be: investment security, stability of CER prices, flexible, practice-oriented structures, low transition costs, low thresholds for participation of SMEs.
- Practical experiences: To a minor degree. A report on a sectoral approach in China will be presented in Copenhagen (COP 15).[47]
- Possible correlations: Instruments for capacity building may provide beneficial correlations with the SCM, particularly if it succeeds in surmounting the concentration of instruments driven by emissions trading in certain regions.

A discussion of the proposals[48] relevant for this new mechanism is not possible in this paper. In contrast to project-based instruments driven by emissions trading, the SCM is to encompass whole sectors in a given region. This region may be a country, several countries or a number of regions. Sectors receive a baseline for emission without having to accept a binding obligation. If the sector succeeds in falling short of the baseline, i.e. emits fewer GHG emissions, it gains additional emissions permits for valorisation in the market. The criterion of additionality is omitted for SCM. Most proposals contain so-called „no-lose targets“, i.e. if the sector does not successfully reduce its emissions below the baseline it does not receive credits, but there are no sanctions. It seems, that otherwise threshold and developing countries are very unlikely to accept the mechanism. As usual, in the sphere of flexible mechanisms, industrialised countries can use emissions reductions achieved by the SCM as a contribution to meeting their reduction obligations.

Regarding technology cooperation, it is auspicious that many proposals include options for host countries to pursue their own development goals in SCMs in which they participate. Thus, the SCM may develop strong traction for technology cooperation. Furthermore, SCMs will probably contribute to sustainable economic development in host countries. Of particular interest are

[46] Ministry of New and Renewable Energy. Government of India: Framework for Programmatic CDM Projects in Renewable Energy (Draft) 2008

[47] Presentation: Ellermann, C.: Sectoral Proposal Templates in China: Overview and initial lessons learnt. Side Event: Testing sectoral approaches in developing countries (climatepolicy.net e. V., 3 June 2009, Bonn)

[48] Vide Höhne, N. et al.: Präsentationen: Sectoral Approaches and Tools (Höhne, N.)., Testing sectoral approaches: Implications for Copenhagen (Vieweg, M.) Side Event: Testing sectoral approaches in developing countries (climatepolicy.net e.V., 3 June 2009, Bonn); Amatayakul, W., Bendes, G., Fenhann, J.: Electricity sector no-lose targets in developing countries for post-2012 – Assessments of emissions reduction and reduction credits, 2008; Amatayakul, W., Fenhann, J.: Electricity Sector Crediting Mechanism based on a Power Plant Emission Standard: A clear signal to power generation companies and utilities planning new power plants in developing countries post-2012, July 2009; Figueres, C.: Sectoral CDM: Opening the CDM to the yet Unrealized Goal of Sustainable Development, International Journal of Sustainable Development, Law and Policy Vol. 2 No. 1, 2006; Höhne, N., Worrell, E., Ellermann, C., Vieweg, M., Hagemann, M.: Sectoral approach and development. Input paper for the workshop „Where development meets climate – development related mitigation options for a global climate change agreement“, commissioned by Netherlands Environmental Assessment Agency, Ecofys, 2008; Ward, M., Streck, C., Winkler, H., Jung, M., Hagemann, M., Höhne, N., O'Sullivan, R.: The Role of Sector No-Lose Targets in Scaling Up Finance for Climate Change Mitigation Activities in Developing Countries. Report prepared for the International Climate Division, Department for Environment, Food and Rural Affairs (DEFRA) UK, 2008

proposals that contain so-called „technology penetration baselines“. Emission of credits would, in this case, be based on technology penetration, i.e. the proportion of climate-friendly technologies implemented in the sector. It should be examined whether these technology penetration baselines could be established as a mandatory complement of baselines that define emissions reductions targets. Thereby, it could be safeguarded that credits would be generated by actual sustainable development instead of „rewarding“ economic slumps or depletion (declining purchasing power of the population) that also bring about reductions of GHG emissions. Also, mandatory technology penetration baselines could mitigate negative impacts stemming from the financial markets on emissions trading, as exemplified by the decline of the EUA price due to the financial crisis. Obviously, such effects curb technology cooperation both by shortage of financial means and by loss of value of credits. If, however, emission of credits would be linked to implementation of climate-friendly technologies, emissions trading systems may become more stable.

There is, however, a possible detrimental effect of the SCM that should be avoided. Due to its area effect, is is even more likely than in the CDM that favourable reduction options („low-hanging fruits“) are assigned to foreign investors. This may force developing countries to transact the more costly measures themselves when they will be obliged to reduce their GHG emissions. This, in turn, will not raise their disposition to accept mitigation targets. It should be considered which regulations would be suitable to prevent this.

New flexible mechanisms - Programmatic CDM/ PoA and Sectoral Crediting Mechanism (SCM) Identified Need for Action

1. Programmatic CDM should be significantly advanced, it can lower the threshold for technology cooperation in poor regions. At the same time, PoAs may serve as transitional form towards sectoral mechanisms.

2. The Sectoral Credit Mechanism (SCK) should be designed in a way to contain country-specific reviews in order to specify in which sectors it should be implemented instead of the CDM. In the long run, project-based mechanisms should fade out in favour of sectoral mechanisms, first in threshold countries, subsequently in the more advanced developing countries. Eventually, the CDM should remain an option restricted to the least advanced countries. Appropriate regulations must prevent double counting of emissions in transition phases.

3. The Sectoral Credit Mechanism (SCM) should be designed to advance technology cooperation as forcefully as possible. Relevant criteria would be: investment security, stability of CER prices, flexible, practice-oriented structures, low transition costs, low thresholds for participation of SMEs.

4. Flooding of the emission trading markets by CERs generated by miscalculated baselines of SCMs must be prevented. Possible measures are Technology Penetration Baselines, price corridors or restriction of the proportion of credits in the total trading volume of a country. Also, „low-hanging fruits“ require appropriate regulation.

5. The founding of a Carbon Market Authority should be considered in which the CDM Executive Board would be absorbed. This Authority should appoint its own expert commission consisting of independent experts. These experts should conduct the monitoring of projects and measures driven by emissions trading. The Authority should analyse and evaluate targets and baselines, supervise CDM and JI, emit credits and allowances and act as arbitrator. The Authority must be enabled to intervene swiftly and directly in case of emergencies.

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