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# Success factors and barriers for technology providers in CDM and JI markets

Summary



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## **Success factors and barriers for technology providers in CDM and JI markets**

### **Summary**

by

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## 1 Background

CDM/JI projects offer numerous possibilities of participation for German enterprises, in particular for consultants in the field of project documentation and/or the development of baseline-/monitoring methodologies, as service provider for financing, as validator of the project documentation and verifier of the monitoring reports, as broker of emission credits, as buyer of emission credits as well as technology provider. Though, no comprehensive information is available concerning the participation of German companies in CDM/JI projects. That applies particularly to technology providers as those are usually not in the focus of CDM/JI market studies and therefore only very aggregated data exist (Forth et. al. 2011). The share of German technology in the CDM market is estimated at 17% in a study for the UN Climate Secretariat (Seres and Haites 2010). Thus, the focus of this study is on technology developers.

The study aims in a first step to draw a picture of the current participation and future possibilities of German technology providers in CDM/JI projects. In a second step, the range of technologies will be limited by applying certain evaluation criteria to identify technologies with a relevant potential for the participation of German technology providers in CDM/JI projects. Within the scope of the analysis, an expert survey will be carried out in order to document the experiences of German companies in CDM/JI projects, especially with regard to success factors and barriers in the CDM/JI market. Finally, it will be discussed on the basis of the conducted analysis and the results of the expert survey how the federal government can strengthen the activities of German technology providers in CDM/JI.

## 2 Methodological approach

German environmental technology will be categorized for purposes of analysis in accordance with the typology commonly used for CDM/JI projects. The categorization serves the comparison of present and future German environmental technology areas of focus with the CDM/JI project types following UNEP Risoe classification. Thus, technologies can be identified that are already registered under CDM/JI, could be potentially registered or are not suited for registration under CDM/JI. The technologies will be initially checked regarding their relevance for CDM/JI, whereby those projects that do not lead to a reduction of greenhouse gas emissions will be sorted out (for example technologies for air pollution control like soot filters or catalysts for the reduction of SO<sub>2</sub> and NO<sub>x</sub>, but also technologies for noise reduction or flood protection). The categorization provides a list of German technology fields for potential use in CDM/JI projects.

The technologies categorized within the scope of a literature review will be limited on the basis of different criteria in a second step. The aim is to identify existing and future potentials regarding the participation of German technology providers in CDM/JI projects, which, however, have not been tapped yet. Those “gaps” describe technologies in which German companies are internationally well positioned or are expected to be and that nevertheless do not participate in the CDM/JI. The suitability for the project-based mechanisms will be analyzed on the basis of the criteria availability of a CDM/JI methodology, post 2012 CDM/JI suitability, potential of German technology provider versus share of the technology in the CDM/JI, world market versus CDM/JI market share of German technology, PoA activity as well as proportion of SMEs.

Already established technologies (for example wind and water power) have been consciously excluded because an already very high share of German technology is used under CDM/JI and hence a CDM/JI specific promotion is not considered primarily necessary. Besides the criteria defined, the results of the expert survey as well as general criteria (not CDM/JI specific, technical and political aspects, scientific expert opinions) have also been taken into account for a further limitation. The analysis focuses on the following technologies: biofuels, sustainable water management, landfill gas, recycling, energy efficiency (buildings), solar thermal energy, deep geothermal energy and rail traffic.

### **3 Expert survey**

The expert comprised an online survey and telephone expert interviews.

The target group of the survey were German technology providers who are already active in the CDM/JI market and thus can assess barriers respectively useful federal support due to their experience. Additionally, actors not yet in the CDM/JI market involved have been approached. The focus here is on reasons for the resistance to participate in CDM/JI or the respective failure. Moreover, this group of companies identifies specific government incentives that could help themselves overcoming existing constraints and participate in the CDM/JI. CDM/JI project developers, validators, certifier, project manager and further actors have been included apart from German technology providers in order to complete the results and to integrate further points of view.

The results of the online survey and the expert interviews show that the only CDM/JI specific barrier is the complexity of the approval procedure. There is a lack of information regarding the existence of the mechanisms in general as well as the requirements and the procedure of the approval process for the implementation of CDM/JI projects. Corresponding government information offers are stimulated. As there are plenty of guidelines and handbooks as well as numerous public information events to this, the ignorance of the respondents must be also assumed in this regard.

Furthermore, the financial support of project activities is in the focus of the perceived barriers. The expansion of guarantees for project investors is mentioned as the supporting measure with highest priority to minimize the risk of activities abroad. It must be stated that BMWi and EULERHERMES have already initiated "Taskforce Carbon Projects" in 2008. The interest from the carbon market was interestingly very limited. Special loan offers for projects are also considered very relevant in the survey, for example a KfW financing for smaller pilot projects. The lack of networks in the host countries was also brought up as an obstacle for the involvement in CDM/JI. Finally, the request for government purchase guarantees for post 2012 certificates has been mentioned.

### **4 Analysing existing funding opportunities**

For this study a focus is on factors that distinguish the barriers for CDM/JI projects from those of conventional investment projects with technology export. Relevant barriers for export sales, such as security or legal situation in the host country, are not considered as CDM/JI specific here. In fact, the most important specific barrier occurring in the context of CDM/JI projects is the complex approval process and the associated transaction costs. These include for example information procurement, in the form of research or feasibility studies, financial expenses

through the contracting of service providers, but also the active support of the validation and registration process. The registration risk of a project is thus of increased importance, since the delay can of the registration process can delay the start of the project.

Generally, the range of potential support opportunities for businesses is very broad in the area of CDM/JI. It includes among other things information services, networking of actors, financing support for project developers or specific measures such as the development of CDM/JI methodologies. Numerous supporting and funding measures have already been initiated or set up by the German government, mainly addressing information services. In addition, activities exist for the CDM/JI project identification. The CDM/JI initiative has one of its main objectives in this area and has already identified more than 100 potential projects. Some initiatives show regional focal points (such as the DENA „JI/CDM-Projektvermittlungsstelle“ in Eastern Europe and Central Asia).

The analysis of the support for the development of methodologies shows that technical and financial support is already provided by German public actors. The GIZ supports the development of methodologies, for example, in particular through technical assistance. Financial assistance is offered by the BMU, for instance via the International Climate Initiative IKI, as well as directly through the CDM/JI Initiative.

Specific financing measures for CDM/JI projects are only available to a limited extent. The focus is on certain types of projects, in particular energy efficiency, renewable energy and methane avoidance. Specific financial assistance is also offered for the development of PoAs and for projects to be implemented in LDCs. The KfW is the only relevant actor in this area with the Carbon Fund and the associated financing facility and with the PoA Support Centre Germany and the International Climate Initiative (ICI).

## **5 Implications of the end of the first commitment period of the Kyoto Protocol**

Any action has to be seen against the background of the end of the first commitment period of the Kyoto Protocol 2012 and the respective implications for CDM and JI have to be considered. CDM and JI have been developed on the basis of the Kyoto Protocol and trading with CERs is closely interlinked with international emission reduction obligations as they are recorded for the first commitment period of the Kyoto Protocol in its Annex B. At the same time the international climate policy currently negotiates the future of CDM/JI without a legal successor to the Kyoto. In this case – or alternatively – parties would have the possibility to conduct offset-projects in bi-or multilateral agreements outside the UN regime and if applicable to declare them as eligible in their national or regional emissions trading systems.

Furthermore the rules of the EU for the European Emissions Trading System have to be considered. According to the current situation CERs from CDM projects validated after 2012 can just be used in the EU ETS, if the projects are located in Least Developed Countries (LDCs). Furthermore from the year 2013 CERs from industrial gas projects (HFC 23 and N<sub>2</sub>O from adipic acid production) won't be eligible anymore in the EU ETS.

Consequently there is an incentive for project developers to have projects and programmes registered before 2013. With an average duration of about 6-18 months from the preparation of the project documentation up to the registration the window of opportunity for developers becomes certainly very small. This is particularly the case considering the limited capacities of the Designated Operational Entities (DOEs) and the UNFCCC secretary.

### **Recommended action 1: Optimization of existing information**

Plenty of internet based CDM/JI information portals that address different group of users exist in Germany. They are facing a big challenge in updating the offered information due to the permanently changing rules at UN level.

Amongst others, the following measures are proposed:

- Implementation of a central CDM/JI information centre (“Helpdesk”) which delivers information via internet as well as by phone through experts.
- For the website the existing offer of jiko-bmu.de or dehst.de could be chosen as starting point and selectively be amplified. The CDM/JI information of all public organizations should be regularly checked regarding their degree of actuality.
- Furthermore all existing host country profiles should be bundled and be linked/ made available on the website of the help desk. Link lists and profiles should be regularly updated if possible. Here the help desk can set up cooperation with institutions which have developed the profiles.

Regarding the post-2012 situation in particular information about the admissibility of project types and host countries after 2012 should be delivered. Ideally the provided information contains a direct link to the according technology inclusively the availability of applicable methods, the estimated amount of CERs and the effort for the registration of projects at the UNFCCC and „best-practice case studies“. In this context sector-specific workshops could be conducted.

### **Recommended action 2: Preparation of technology-specific target market and export analysis**

An important basis for the decision for or against the use of CDM / JI is information on the host country. Therefore the implementation of technology specific target market analysis is recommended, with special focus on the distribution and application of a technology in the host country. These could be funded by the federal government:

- A baseline study of technology specific target markets and export analysis should be conducted. The existing public export initiatives already provide extensive technology and host country specific information.
- In addition, the potential of German technology providers should be determined specifically. Here, existing or planned national programmes and price structures in the host country should be taken into account. In addition and if possible, cross-cultural aspects of countries should be involved.
- In countries with high potential for certain technologies and where German price levels are not prohibitive, a political/operational network (for example, built on a network of foreign chambers of commerce, the gtai or GIZ) should be built. Respectively existing structures should be supported purposefully in order to launch and facilitate matchmaking activities.

### **Recommended action 3: Optimized Matchmaking-Events in selected host countries**

While for interested German companies a wide range of subsidized events and networks are available which can be used for establishing contacts, just few of these networks are specific



enough for implementing concrete CDM projects. Therefore inter alia the following enhancements are proposed:

- Publication of all German network and matchmaking activities with lead times as long as possible on the website of the help desk.
- The German government should approach the CDM host countries that are not yet well represented in the CDM but show a high potential for CDM, especially LDCs. Here bilateral environmental agreements could be applied for example.
- In countries that are dominated by the public sector the DNA could potentially help to identify interesting sectors and domestic companies.
- The relevant local German actors should be informed and involved, e.g. via GIZ country managers (GIZ Ländermanager) or „Umwelt-Area-Manager“ of the Chambers of Commerce. TCDM/JI workshops with technology specific focus in the host countries should be conducted in conjunction with dedicated business missions for German technology providers.
- The international leading CDM/JI matchmaking events as for example Carbon Expo, continental Expos and Carbon Market Insights should be used to carry out matchmaking in a more focused manner.

In countries with a strong competition from other developed countries and a highly active unilateral CDM market the AHKs could be matchmaking actors.

#### **Recommended action 4: Investigation of financing measures**

Most of the German financial support programmes are not focussing specifically on CDM or JI, such as the ICI. Though, there are activities which for example cover components of the CDM project cycle. The KfW is the only institution that offers financing and CDM/JI specific services. However, the focus here is primarily on the acquisition of CERs/ERUs and less on the financing of the underlying project. Remarkable is the low level of knowledge of respondents which have been interviewed during the analysis regarding available financing options as well as missing demand for the few CDM/JI specific financing options which are available at the market.

Therefore we inter alia recommend:

- The publication, explanation and linking of all the financing options on the website for "help desk".
- Realization of an investment fund for CDM / JI lighthouse projects, fed from auctioning of EUAs (e.g. under the ICI). In each case one project of a German key technology can receive a relevant project credit which can be repaid in the form of CERs/ERUs. These projects are then e.g. used for a marketing campaign by the providers of the respective key technology.
- Under the KfW Carbon Fund, an initiative for some specific technology fields which seem to be particularly worth supporting can be started. This can happen especially in combination with the above mentioned financing facility for such technology fields. The aim should be to link the financing and the acquisition of CERs and thus reduce the financing risk.

- Setting up a new HERMES facility that addresses the risk of credit failure for CDM/JI projects.
- Some key technologies as for example recycling cannot be used in CDM/JI so far since baseline and monitoring methods are missing. And since these methodologies are public good, there is little incentive for companies to invest in the development of a methodology. It is therefore recommended to finance the development of methodologies if the technology provides relevant emission reductions, is highly replicable and the CDM/JI revenues help to make the German technology competitive against competitors at the world market. Again, the post-2012 situation has to be considered.

## **6 Analysis of the selected technologies and specific recommendations for action**

Chances and barriers for the individual technologies are derived based on a more in-depth analysis. The strengths and weaknesses of all considered technologies are summarized subsequently. Additionally, recommendations for CDM/JI specific support through the German government will be stated. Besides the evaluation criteria defined above the results of the expert survey as well as general criteria (not CDM/JI specific, technical and political aspects, scientific expert opinions) are also taken into account for the assessment.

### **Biofuels**

Biofuels are liquid and gaseous fuels which are obtained on the basis of renewable resources. Currently, they are the only possibility in the transport sector to make more use of renewable energy sources. Biofuels encompass biodiesel (rapeseed oil methyl ester), vegetable oil, ethanol, biomethane as well as synthetic biofuels, also called Biomass-to-Liquid (BtL) fuels.

The slow development of CDM/JI methodologies has delayed or even prevented the application of CDM/JI in the field of biofuels for German technology providers until a few years ago. However, the standard methodology ACM 0017 is now available since 2009, even though special sustainability criteria have to be considered.

### **Biofuels: Chances and barriers**

- German technology is today well established and positioned, but mainly in the biodiesel and to a lower extent in the bioethanol production. The German industry holds great potentials for the future as they have a great share of patents in the field of biodiesel and moreover the promising BtL technology.
- The big consumers of biofuels like Brazil and the EU are only partially attractive for CDM/JI projects at the moment as legal quotas for the application of biofuels exist and therefore the additionality of projects is difficult to prove.
- However, the demand for biofuels will increase worldwide in the future, even though because an increased demand for fuels can be expected in most of the emerging and developing countries. Fuel requirements are expected to further increase sharply especially in the growing markets of Asia (China, India, and Southeast Asia) as well as South Africa but also Eastern Europe. Least developed countries are so far a rather untapped field for biofuels.

- Particularly in developing countries bioethanol is used so far. The market for biodiesel in developing countries is minor respectively not existent.
- Biofuels are poorly represented in the field of CDM/JI projects up to now. Only one small-scale project has been registered in the biofuel sector. A reason for this is that the existing methodologies have taken a long time until getting approved and are still very restrictive in their application conditions, both caused by the political debate on sustainability of biofuels and CO<sub>2</sub> emissions from deforestation.
- Furthermore, the commitment of German enterprises is mainly limited to Germany and the EU member states where they see their core business. International engagement for example in developing countries is very small.

### **Recommended action**

No CDM/JI specific action for biofuels under the CDM/JI is recommended, as CDM/JI methodologies exist and German enterprises have a strong focus on the German market. Though, it should be noted that the development of sustainability criteria at EU level can also be interesting for international projects. Thus, linking of the EU sustainability criteria to the CDM could lead to a simplification and better understanding of the German (and European) participants since they already must comply with the regulation on the European market.

### **Water and waste water treatment (cleaning procedure)**

The aim of a sustainable water management is the adequate supply of the population and industry with drinking and industrial water. Constituents of water supply are water treatment, which extracts, collects and purifies raw water as well as the construction and maintenance of water supply and waste water disposal infrastructure. Decentralized water supply is considered to be a special field of water management that should reduce process waste water and uses rainwater more intensively.

### **Waste water and waste water treatment (cleaning procedures): Chances and barriers**

- German technology is already very well positioned in the world market. Special attention is drawn to the German participation in the field of water supply and efficient pump systems. However, only few German companies are involved in CDM/JI projects at the moment.
- For decentralized water supply Germany holds a market share of 40%.
- The potential is very high - especially China, Russia and India require larger investments in water and waste water infrastructure and in particular in decentralized water purification, for example with decentralized water purifiers.
- Nanotechnology products in seawater desalination are particularly interesting for countries in the Middle East and North Africa.
- CDM/JI is currently rarely implemented in this field as only a limited number of applicable methodologies are available. They have only recently been approved and are relatively complex in terms of monitoring and at the designing of reference scenarios.

- Another limitation is given by the current potential within the EU (primarily the countries in Eastern Europe). Therefore, German technology suppliers have limited incentives in a further expansion for example in non-European countries.
- The technology is also suitable for PoAs in households with decentralized water purifiers. However, only a small number of certificates can be generated with individual projects.

### **Recommended action**

Further analysis of the potential of German technologies should be initiated especially for decentralized water supply. Here, the focus should be on specific markets (countries, regions) in order to identify special technology requirements and chances for technological components; the eligibility of countries after 2012 needs to be considered. Any market assessment should involve the know-how of the export initiative “energy efficiency” and the “German Water Partnership”.

Also, dialogue and workshops in cooperation with national water authorities should be set up.

The linking of companies in the water industry in Germany should be supported. There is demand for “all inclusive” offers and therefore consortia of German companies (in particular SMEs) should be formed in order to offer a broad range of technologies.

The development of methodologies should be intensified (in particular demand side approaches for end-users). The financing of a methodology can be funded by the KfW. Corresponding pilot measures (“light house projects”), preferably PoAs in LDCs can be put forward by the GIZ.

### **Waste water treatment (methane avoidance)**

A sustainable water management comprises an efficient infrastructure to dispose sewage. CDM/JI projects for waste water treatment mainly focus on avoiding methane emissions.

### **Waste water treatment: Chances and barriers**

- CDM/JI projects in the field of methane avoidance in the waste water sector are already well established. Despite its huge potential German technology is not involved considerably under CDM/JI.
- The largest future potential lies in South East Asia (Malaysia, Indonesia), India, China and Latin America (e.g. Brazil).
- Important methodologies are available for CDM/JI; all of them are relatively easy to apply.
- Though, the focus of German technology providers is currently on the Eastern and Southeastern countries of Europe that have to modernize their waste water treatment due to EU regulations.
- In particular SMEs fear cost barriers regarding overseas involvement.
- Limited possibilities of financing exist for smaller projects.

### **Recommended action**

Further investigation should be undertaken for potential future markets of this technology. Apart from technology for aerobic and anaerobic waste water treatment the focus could be on metering systems and monitoring equipment.

Events should be conducted regularly and repeatedly in target countries, for example workshops which offer potential for networking. Those should focus in particular on future CDM host countries (LDCs). The events should include existing initiatives that have a good access to companies in the field of water resource management, e.g. the German Water Partnership.

Financing models for SMEs should be offered in addition to existing KfW instruments.

### **Landfill gas**

Landfill gas technology comprises a system for capturing methane from landfills in order to avoid a release to the atmosphere.

#### **Landfill gas: Chances and barriers**

- German technology is currently well established in the world market. With a high share of patents Germany is also well prepared for the future. SMEs in the field of capturing landfill gas by specialized technology are also well represented in Germany.
- However, SMEs focus on markets in Europe. Competitors come from almost all industrial countries as well as from host countries. Developing country technology is often offered mostly offer at cheaper rates, however with lower quality (e.g. higher leakage rates).
- A particular high potential for the application of this technology can be found in the emerging and developing countries where up to 70% of the waste consists of organic substances. This is particularly applicable to China and the Middle East. These countries are expected to have further increasing methane emissions from landfills which can also apply as indicator for the CDM potential. Though, after 2012 these regions become less attractive for the CDM.
- There are already numerous projects in the CDM/JI that are implemented in the field of landfill gas technology. The available methodologies allow large and small projects as well as a combination of landfill gas collection and utilization for power generation. There are no barriers concerning the methodologies.
- Problems possibly emerge in the context with actually avoided methane emissions and hence with the amount of certificates. Landfill gas projects generate, on average, less than half of the predicted yield. This can be attributed to miscalculation of the real quantity of organic waste or bad management of the landfill, in particular with regard to seepage.
- PoA activities already exist and will play a more important role in the future. They offer chances to also integrate smaller landfills, respectively waste collection points, into the CDM.

### **Recommended action**

German technology is so far represented only to a small extent under the CDM/JI a fact that is not so much caused by CDM/JI specific barriers. Rather, German technology must be regarded as too expensive compared to international competitors and cheap local technology is preferably used. Here, an option might be offering German technology at lower prices and in return receiving a share of the CER revenues. But it should be mentioned that landfill gas projects under the CDM generally perform under their CER projections, due to excessively optimistic forecasts. Landfill gas projects at active landfills are also considered quite controversial in terms of environmental policy, as CDM / JI projects "fix" the use of landfills as a disposal method for decades and thus prevent more modern methods such as recycling at the introduction into the market. On the other hand, CDM/JI sets incentives to access "wild" landfills which will then be monitored.

### **Recycling**

Under the term recycling a number of technologies are summarized, e.g. collecting, sorting and preparation as well as the supply of various materials for recycling. By reusing a substance the energy consumption can be reduced and thus greenhouse gas emissions can be saved.

#### **Recycling: Chances and barriers**

- German recycling technology is already well represented on the world market and the future position of German companies is expected to be very well. SMEs are also well represented in Germany.
- The market for recycling technologies is growing rapidly worldwide. A rising demand for the technology is expected in Eastern Europe and Russia, Asia and Latin America.
- It should also be considered that the collecting, sorting and recycling of waste in many emerging and developing countries is done by waste collectors, the so-called "informal sector". This can play a central role for the implementation of projects in these countries.
- German companies have been mainly active in the German and Eastern European market, where the EU regulation requires significant action. SMEs limit their activities to Germany and neighboring countries and face barriers to engage in exporting their technology to overseas regions.
- Under the CDM / JI there are currently no projects implemented in the field of recycling. This is due to the fact that recycling has only recently been made applicable under the CDM, as a methodology has been approved. But here the methodological complexity with difficult requirements for baselines scenarios and monitoring constitutes a fundamental barrier.
- Despite the uncertain future of JI, the implementation of projects in Europe is difficult, although especially Eastern Europe is a growing market. This is due to the existing legal provisions in the EU countries that set standards for the recycling of waste and thus considerably complicate the demonstration of additionality for JI projects.

- PoA can play a relevant role in the area of small projects.
- Overall, the interest in CDM/JI is very low in Germany and/or companies are not or only very little informed about the opportunities of CDM/JI.

### **Recommended action**

A comprehensive information campaign should be started to show the potential of the CDM to German companies.

An analysis of GHG mitigation potential of one or more possible recycling materials should be carried out. This can be done for glass, paper and/or batteries. It should not take place at the sectoral level, but rather for specific and exemplary individual projects. The methodological foundations of the CDM have to be considered, particularly the scope of the project. It is important to highlight the potential contribution of CDM to cover the total project costs.

If it turns out that one or more recycled materials have very high GHG reduction potentials or the CDM provides a good contribution to cover the total cost of the technology, a "pilot project" could be conducted with the involvement of methodology development, project registration and implementation. This could, if successfully implemented, serve as an example of success and encourage other projects.

### **Energy efficient buildings**

Energy-efficient building technology is in general well established. The focus of this analysis is especially on the "Heating and Air Conditioning" and insulation. German technology has an outstanding global market position; both in market share as well as potential, but hardly participate in the CDM/JI. In the area of building insulation and window technology Germany also has a good competitive position. However, mainly large companies are active in this sector. German producers act mainly on the domestic and European market so far. Nevertheless, the demand for energy efficiency technologies for buildings, especially in emerging and developing countries is great. Interesting countries - also for CDM activities - are in addition to the major growth markets particularly the Gulf States and Mexico, keeping in mind the limited applicability of the CDM here from 2013 onwards.

### **Energy efficient buildings: Chances and barriers**

- A rather difficult proof of additionality hampers the application of CDM/JI.
- CDM/JI-specific economic attractiveness of individual projects is usually small, since relatively few CERs/ERUs are generated.
- The new large-scale methodology AM0091 simplifies the application for new buildings significantly.

### **Recommended action**

New buildings: Communication of the opportunities that newly developed methodology AM 0091 offers for the new building sector. A standardized approach allows a significantly simplified application.

Existing buildings: the promotion of CDM/JI by supporting further development of methodologies and the availability of standardized baselines could accelerate the

applicability. Furthermore, the monitoring of pilot projects, particularly for PoAs, could enable further activities for German technology.

CDM/JI specific approaches should be accompanied through communication of energy efficiency gains in the building sector which would increase the cost effectiveness significantly.

Subsidized electricity prices are a barrier to the use of energy efficient technology. Hence, corresponding German efforts to reduce environmentally harmful subsidies in general and electricity price subsidies in particular should be continued and possibly expanded. Due to the sensitivity of the issue this must take place with the appropriate diplomatic finesse and in consideration of the (also social) purposes of the subsidies.

The geographic target group comprises in particular emerging countries such as India, China, Brazil or Mexico but also the Middle East. For post 2012 projects the potential of LDCs needs to be investigated.

### **Solar thermal energy**

The solar thermal sector is distinguished in solar water heating and solar cooling. German manufacturers of water heating equipment focus on high-quality flat plate collectors and concentrate their activities mainly in Germany and Europe. They do not participate under CDM/JI, mainly due to insufficient resources. Chinese actors dominate in the international market. They use vacuum-tube collectors, but nevertheless can offer much cheaper. The low reduction potential of individual measures and the often high investments for private households constitute barriers for CDM/JI projects. Solar cooling lacks broad demand so far. Besides, CDM/JI methodologies do currently not exist for solar cooling.

Several measures could help German technology developers, mainly SMEs in the field of solar cooling, to enter the market or to arouse their interest, if the German high quality can compensate for the existing price disadvantage. Especially the PoA area, where is already much activity, will grow significantly.

### **Solar thermal energy: Chances and barriers**

- Difficulties in obtaining credits and a lack of funding hamper an international focus beyond Europe. There is enormous potential for solar cooling in the future. German producers, mostly SMEs, dominate with a share of 50% the global market.
- An appropriate methodology is missing for solar cooling. SMEs alone cannot afford the development.
- Subsidized energy prices hinder the economic utilization of solar thermal energy in many countries.

### **Recommended action**

Assessment of CDM potential of the German technologies and the contribution of the CDM to cover the technology costs, differentiated according to solar cooling and water heating. A consideration of the competitive situation with Chinese suppliers has to take place. Furthermore, the future role of LDCs has to be considered.



Solar cooling: the promotion of a CDM/JI involvement by supporting a methodology development/revision could accelerate the development of this sector.

Solar thermal power could be the core of a campaign in the countries of North Africa and the Middle East region.

### **Geothermal energy**

German companies in the geothermal sector show currently little activity in the international market. German technology has been used in only two CDM/JI projects. The global outlook forecasts a steady growth of geothermal energy in most countries, however, always at the level of a niche technology. Despite this, geothermal energy in CDM/JI should be supported, as German technology developers have a large future potential by international comparison, particularly in the field of low temperature technology. A well-targeted support in CDM/JI could therefore open up new market segments for German suppliers and provide more global growth opportunities. However, individual problems in the fields of geology, national legislation and economic policies have to be expected for each project, which might often represent major barriers for CDM/JI activities. PoAs does not play a primary role but can be used in principle to achieve additional emissions reductions in the small scale sector. The benefits for SMEs are only very limited due to their low participation in this technology area.

### **Geothermal energy: Chances and barriers**

- CDM/JI methodologies are available, application can be carried out relatively simple.
- Significant barriers are found outside of the CDM/JI: lack of framework conditions for geothermal energy utilization hamper approvals, lack of data basis, economic risks of drilling, utilization competition with fossil exploration and in the future CCS hinder project planning and the use of German technology in host countries.

### **Recommended action**

The CDM/JI specific support of deep geothermal energy is not recommended due to the additional complexity of individual projects and the low relevance for PoAs and SMEs.

### **Rail traffic**

German technology in rail transport is internationally relatively well positioned, although Chinese manufacturers are pushing heavily in the market. The global outlook predicts a high potential for German technology development, but the focus is primarily on the West European market. In addition, due to methodological complexity of the transport sector, the technology is difficult to be applied to a greater extent under CDM/JI. Support in the field of standardization and methodology development backed by political support at international level could open up new market segments and allow for more global growth opportunities. Nevertheless, the demonstration of additionality in the field of investment analysis is difficult because large infrastructure projects often have decades of depreciation. In the area of small projects PoAs might provide a necessary option in order to generate sufficient certificates. However, SMEs could benefit only very limited due to their low participation in this technology area, perhaps in niches.

### **Rail traffic: Chances and barriers**

- German technology is currently well positioned and considered to be world leader in the future, but is not participating in the CDM/JI.
- Energy-efficient retrofitting of rail vehicles as part of PoAs potentially feasible.
- Modal shift and rail network expansion: Methodological problems prevent use of CDM/JI, future simplification possible through standardization.
- Maximum CDM credit period of 10 to 21 years economically only very limited compatible with the depreciation periods of infrastructure projects.

### **Recommended action**

A CDM/JI specific support in this segment should be done – if at all – only through the development of methodologies and the promotion of standardized baselines.

## **7 Conclusion**

German producers of environmental technology are holding leading positions on the world market today and are expected to do so in the future. At the same time German technology providers do not play a major role as participants in CDM/JI projects until now; the share of German technology in the CDM market is lower than 20%.

The CDM can support technology providers that want to enter markets outside their home market. This is even more the case since German technology is facing a strong price competition in the world market (e.g. in the fields of solar heating or waste water treatment). The future geographical focus for the applicability of CDM lies particularly on Least Developed Countries. Nevertheless, a reformed JI Track 2 can also cover further groups of countries, but here the political development has to be awaited.

Basically, it should be mentioned that the strength of German environmental technology is linked very strongly with the stringent environmental legislation prevailing in Germany and the EU. Hence, the geographical focus of German suppliers is mainly restricted to Germany and Europe. This can be especially applied for biodiesel, water and wastewater treatment, recycling, landfill gas and rail traffic. This national and regional focus is one reason for a previous restraint in exports and investment in environmental technology overseas, and consequently a reason for the low usage especially of the CDM for the support of projects by German technology providers.

Generally a lack of information concerning CDM/JI as well as especially the regulatory complexity of the CDM/JI approval process and the according transaction costs constitute the biggest CDM/JI specific barriers. Also, as technology providers usually serve as a traditional supplier in the context of CDM / JI projects they naturally have no generic requirement to inform themselves about the possibilities of the mechanisms. The situation for the application of CDM/JI after 2012 contributes to the fact that the already complex instrument seems less predictable and understandable.

In addition, especially missing or only partly applicable methodologies are a core reason for the lacking participation of German technology provider in CDM/JI. This is for example applicable for biofuels, water purification, recycling, solar cooling, and restrictedly rail traffic. Particularly for SMEs the development costs of new methodologies are prohibitive barriers. Also

the uncertain financial viability of project activities is regarded as an important barrier. A lack of networks in the host countries was also cited as a deterrent to the participation in CDM/JI.

The development of methodologies and the set up and funding of pilot projects appear - even against the background of post 2012 limits - as adequate means to overcome some of the barriers in order to increase the use of CDM/JI by German technology providers.

At the same time programmatic CDM (PoA) should be considered especially for the technology lines water purification, energy efficiency in the building sector, solar heating, recycling and restrictedly landfill gas. The development of standardized procedures could improve the applicability of the CDM in the transport sector, in this case for rail traffic, as well as for the building sector significantly.

The German government should check and promote measures for the optimization of existing opportunities and for the overcoming of existing barriers for German technology provider in the context of CDM / JI. These include the optimization of existing information services, the creation of technology-specific target market and export analysis, matchmaking events in selected host countries, the review of financing measures and other technology-related activities such as pilot studies and methodology development.