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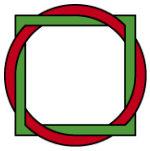

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Benefitting from Carbon Markets?

German Participation in CDM and JI during the first Kyoto Commitment Period

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Summary

The flexible mechanisms of the Kyoto Protocol, namely the Clean Development Mechanism (CDM) and Joint Implementation (JI), have been very successful in generating emission reduction credits at large scale and low costs. In this paper we investigate to what extent German stakeholders have been involved in the flexible mechanisms and whether or not they have benefitted from the scheme. To answer this question, we look into German investments in the two mechanisms and how credits have been used to comply with obligations under the EU ETS. Furthermore, we investigate the role of German consultancies, auditors, financial market players and technology providers.

Germany's participation in both the CDM and the JI can, at least to some extent, be defined as a success story, though activity is limited to certain areas. German investors have participated in 265 registered CDM projects representing only 3.8 per cent of all projects but 16 per cent of issued CERs and in 42 JI projects, 12 of which are located in Germany representing 7.87 per cent of all projects but contributing only 3 per cent of all ERUs. Power utilities including RWE and E.ON were some of the most prolific investors in the mechanisms contributing roughly half of the German CDM and JI projects.

But can this be considered a success? Given the extremely low prices on international carbon markets it is hard to answer this question on a company level. Probably some of the investors could have met their obligations even more cheaply by purchasing secondary market CERs and ERUs. However, this development could hardly have been foreseen. Until the onset of the economic crisis most observers expected high price levels to prevail. In addition, their investments strongly contributed to pushing down the price level. Thus, on an aggregate level, the mechanism has strongly contributed to contain the cost of compliance in the EU ETS.

That is why German companies were also actively involved in the secondary market, that is, buying credits from the open market to use in the EU ETS. The cement and the iron & steel sector made use of a large share of their offset budget during EU ETS Phase II, although unlike the power sector they do not face a shortage of freely allocated allowances.

German auditors, namely the three TÜV groups, were particularly successful and have managed to gain a substantial market share in both the market for validation and verification of projects. To the contrary, German consultancies and financial market actors did hardly engage in the CDM business.

German technology providers as well benefitted from the CDM. They are named as the main technology providers in a number of sectors, most prominently in the wind power sector, which comprises the largest number of projects of all sectors within the CDM.

With regard to the overarching question of this paper, the answer is yes: German companies have benefitted from the flexible mechanisms, but this benefit has differed across Germany's business landscape. Could they have done better? Perhaps. However, with the current situation of carbon prices in general and CER and ERU prices in particular this judgement is very difficult to make. If prices do not recover to a more healthy level, it is unsure whether all investors will be able to return their full investment.

1 Introduction

The flexible mechanisms of the Kyoto Protocol, namely the Clean Development Mechanism (CDM) and Joint Implementation (JI), have been very successful as offset mechanisms. The mechanisms have effectively triggered investment in low-carbon technologies all over the world and successfully harnessed low-cost mitigation potential. By now, the CDM has generated emission reduction credits of more than 1.3 Gt of CO_2eq. in more than 7000 projects. JI has contributed nearly 0.8 Gt of CO_2eq. in roughly 600 projects.

But was this success story also a German success story? In this paper we investigate to what extent German stakeholders have been involved in the flexible mechanisms and how they have benefitted from the scheme. For this purpose we will analyse German participation along the project cycle of both mechanisms.

In chapter 2 we start off with an analysis of German investors and project developers. Who are the most prolific investors and project developers? Where did they invest? What types of project are their favoured investments?

In the following chapter we look into the implementation of projects. Have German certification bodies contributed to the success of the CDM as Designated Operational Entities (DOEs)? To what extent have German consultancies been involved in the development of CDM projects? And to what extent has German technology been used in these projects? Has German technology been transferred to developing countries and have German technology providers used the mechanism to develop new markets?

Subsequently, we analyse the offset use. Which German companies and sectors have made use of Certified Emission Reductions (CERs) from the CDM or Emission Reduction Units (ERUs) from JI to comply with their emissions reduction obligations under the European Emissions Trading Scheme (EU-ETS)? We look specifically at where and what kind of projects these credits originate from.

Our research is primarily based on data from three different sources: the CDM, JI and PoA pipelines prepared by UNEP Risø, the CDM/JI Project Database of the German emissions trading authority (DEHSt) and Sandbag's database on the EU-ETS which is in turn based on data from the EU Transaction Log (EUTL), from the European Commission and the CDM and JI pipeline, complemented by data from their own research. If not specified otherwise, all figures are based on this data. For the question of technology transfer and German technology provision in CDM projects we conducted a review of the existing literature.

2 Who Participates in Projects?

German companies have engaged actively in the two flexible mechanisms of the Kyoto Protocol and contributed to their widespread implementation. However, their efforts have not been distributed equally over the two mechanisms. The CDM has attracted a lot more attention. From early on, German companies participated in the mechanism and have used it both for compliance within the EU-ETS as well as an investment opportunity. Projects with German participation have lead to the issuance of some 222 million credits and contributed to generate some 16 per cent of the market (see **Figure 1**).

The story is somewhat different for JI: Although a few projects were carried out from the very beginning of the mechanism, substantive emission reductions from projects with German participation did not occur before 2011 and Germany also has not managed to become a significant actor on the JI market since. JI projects in Germany have led to issuance of about 12.88 million credits until the end of the first commitment period, which is only 1.6 per cent of all emission reductions credited under JI. JI projects with German investors abroad have been issued only 7.79 million credits, representing only 1 per cent of the market.

In the following, we look into the two mechanisms in more detail. The analysis is based on the CDM pipeline and JI pipeline provided by UNEP Risø. This data was complemented by information extracted from the German Emission Trading Authority's CDM/JI project database, including data on participating companies and German letters of approval.

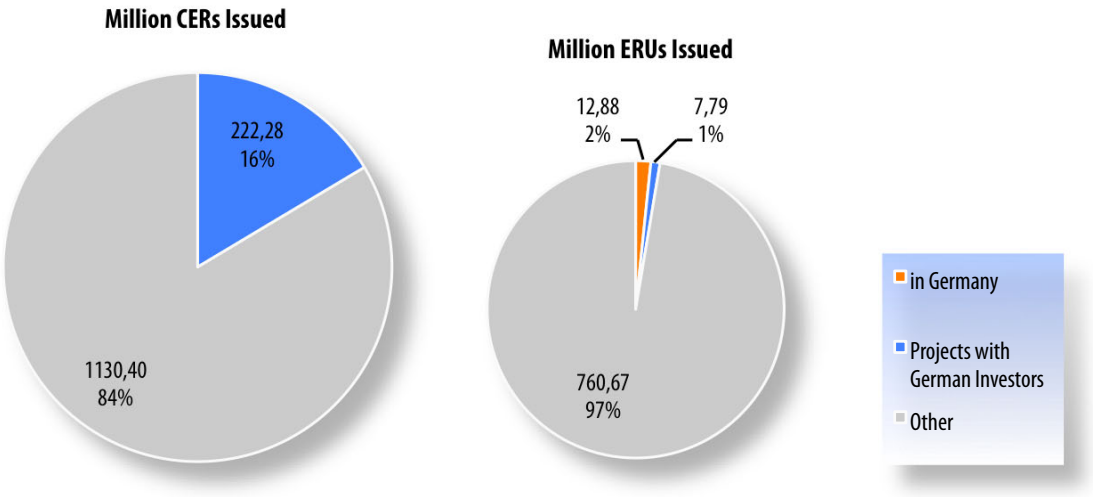

Figure 1: Offsets generated under the CDM and JI in projects with German participation in the first Kyoto commitment period. The scope of the mechanisms is represented to scale by the size of the pies.

2.1 The Clean Development Mechanism

2.1.1 Investors

It is not easy to determine if and to what extent CDM projects can be described as "German" projects. Are they only buying the CERs or are they also involved in the planning and implementing process? Unfortunately, it is not possible from the data to make that distinction.

One possible approach is to look into the data of the respective letters of approval (LoA). CDM projects need a letter of approval of the host country as a prerequisite for registration. Once a project is registered, it can start generating emission reductions and earn the first CERs. A LoA from the investor country is only required if the CERs are to be transferred into a developed country.

From the timing of these LoAs one can draw conclusions to what extent investors have been involved in the planning and implementation of the project (see Figure 2). If a German LoA was signed only after the project requested to be registered, it can be assumed that German investors played a minor role in the planning process, if any. On the other hand, it can be assumed that German investors worked closely together with the project developers in the host country if the German LoA was signed at the same time as the host country's LoA. To take into account the different administrative processes we categorized those projects as truly multilateral projects (coloured blue in Figure 2), whose German LoA was signed not more than one month after the host country's LoA.

Throughout the first commitment period truly multilateral projects where German investors where involved early on remained rare. Only 25 CDM projects with German participation received their respective host and investor country LoAs at the same time.

However, a more robust trend can be recognized when it comes to projects that involve German partners at a later stage. While in the first years of the CDM by far the largest share of projects received a German LoA after the project had requested registration, this trend completely shifted after 2008. In 2012, no German LoA was issued after registration of a project. This data suggests that the engagement of German enterprises has increased over time. In the early years of the mechanism primarily host countries themselves drove investment. After 2007, presumably in conjunction with rising CER prices, German investors started to play a more active role.

The most recent spike in the increase of the number of LoAs can largely be attributed to the deadline the EU set for the eligibility of CERs under the EU-ETS: CERs from projects registered after 2012 are only eligible under the EU-ETS if these projects are located in least developed countries (LDCs).

In the following, we analyse all projects with German participation irrespective of the timing of the respective LoAs.

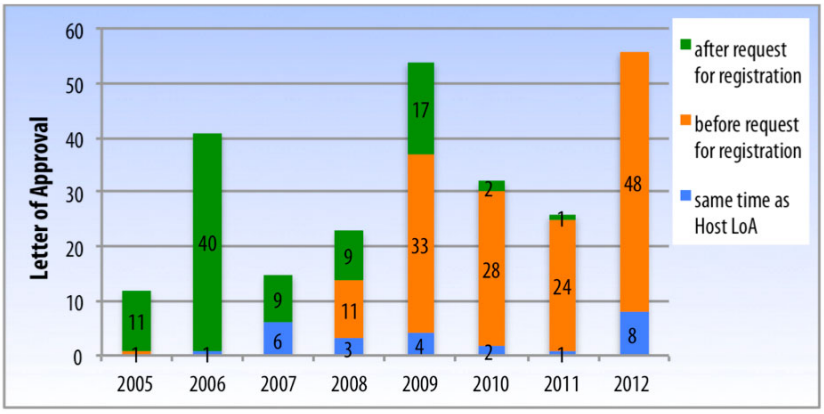

Figure 2: Time relation between host country and investor country LoAs.

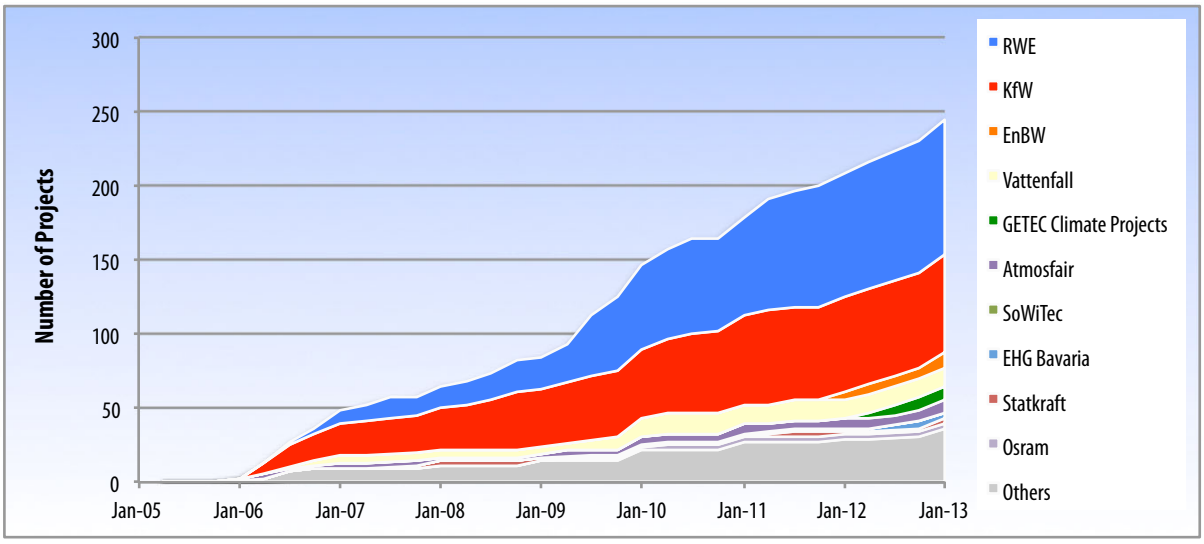

Figure 3: CDM projects with German participation by investor.

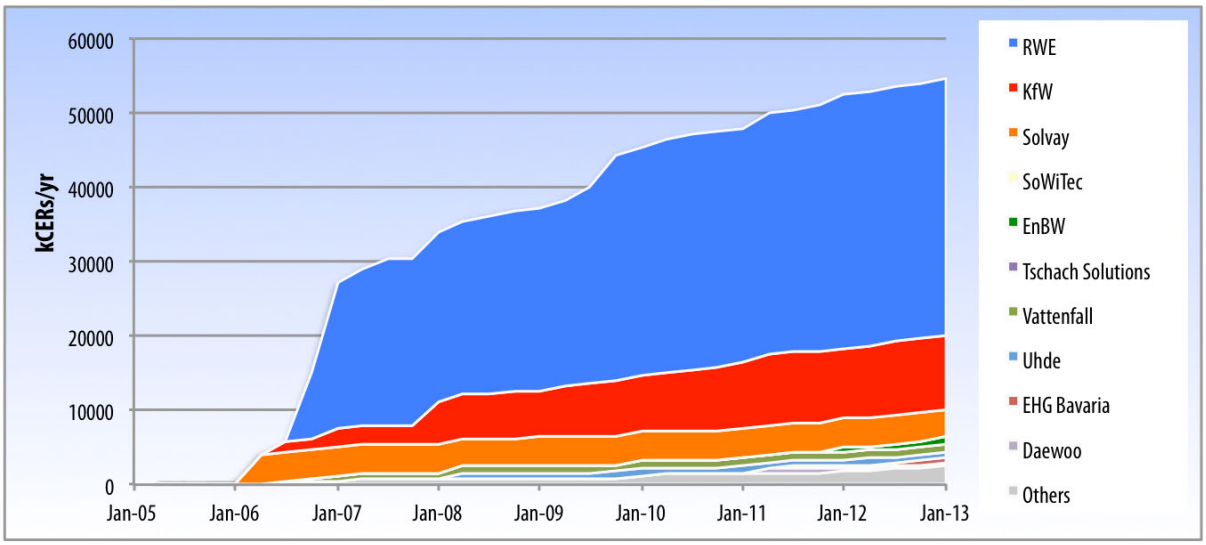

Figure 4: Expected CERs per year from projects with German participation by investor.

German CDM investors come from a wide range of different sectors. Obviously, energy utilities and companies from other sectors regulated under the EU-ETS are among the most prolific investors in the CDM. These companies have a huge demand for emission allowances and can meet part of that demand through offsets generated under the CDM and JI. Examples of such investors are RWE, EnBW, Vattenfall, Statkraft, Electrabel, Solvay and Uhde, which is part of the ThyssenKrupp Group (See Figure 6). Furthermore, the German development Bank KfW through its Carbon Fund has catered for ETS regulated companies who did not want to get involved directly in project development.

However, other investors play a significant part as well: wind project developer SoWiTec, energy service company GETEC and specific carbon market experts such as Tschach Solutions and Emissionshandelsgesellschaft Bavaria. To some extent KfW falls also in this category. With its PoA Support Centre it has supported innovative initiatives in the CDM. Last but not least, climate protection organisation and voluntary offset provider Atmosfair has sponsored a number of CDM projects.

Both in terms of registered projects and CERs generated, the market is clearly dominated by RWE (see box below) with nearly 60 per cent of the total. KfW ranks second.[1]

With regards to Programmes of Activities (PoAs), German investors have been less active. Only three registered PoAs are listed with German credit buyers: One programme for energy efficiency in Nigeria sponsored by Atmosfair and German development NGO Lernen-Helfen-Leben, one programme for hydro power in the Philippines supported by KfW and one wind power PoA in Uruguay by SoWiTec.

For EU ETS compliance investors, such as RWE, Vattenfall and Solvay, that use CERs for compliance in the EU-ETS the investments are likely to have paid off as these projects have delivered low-cost emission reduction units eligible for use against their EU ETS compliance obligations. The story might be different for investors that are not subject to any mitigation obligations but saw the CDM as an opportunity to generate revenue. Due to extremely low CER prices[2] it is not clear if these investors can recuperate their investment.[3]

It is not possible to quantify the investment made by German companies. Only 74 per cent of the projects with German participation report the investment cost of the project. These investments add up to USD 8.9 billion. It is, however, not possible to determine which part of that figure came from German enterprises. Many projects feature more than one credit buyer or investor. In these cases it is not possible to determine the respective shares of the investors and thus impossible to attribute the investment to the respective companies.

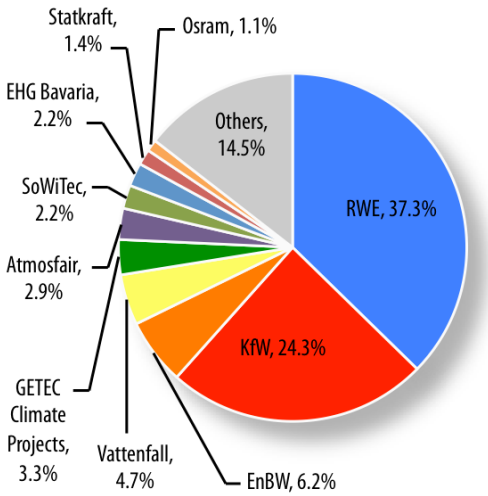

Figure 5: Share of CDM projects with German participation by investor.

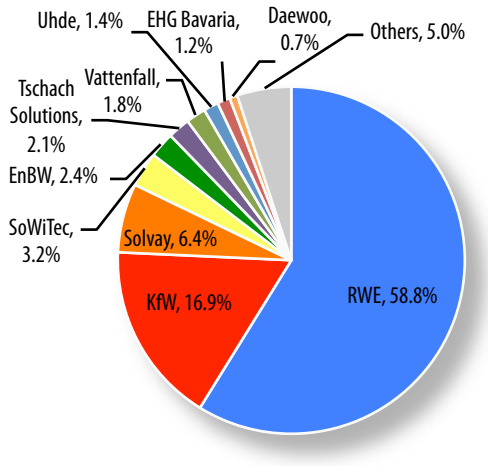

Figure 6: Share of CERs per year from projects with German participation by investor.

[1] Note that projects and CERs might be double counted in the figures in some cases if more than one German investor was involved.

[2] CERs were at €0.59 at time of writing (9th September 2013)

[3] personal communication with Emissionshandelsgesellschaft Bavaria.

RWE: The German CDM Top Performer

German power giant RWE has invested heavily in the CDM and JI, financing projects, providing advice as well as technical support. RWE has been involved in some 103 registered CDM and 8 JI projects located across 24 countries. Unlike many other actors, RWE built up substantial in-house capacity. They played a more active role and worked as project developers in most of their projects. For three of their own projects they even prepared the PDDs without external support.

RWE's CDM portfolio ranges from HFC and N2O avoidance, hydro, biomass and wind projects. The majority of their projects, 56, are located in China; followed 18 in Vietnam and 13 in India. Besides these large-scale projects RWE has also promoted the development of small-scale projects. One example is a cook stove project in Zambia. Collectively RWE's projects have been issued some 178 million CERs until 2012. RWE's JI portfolio broadly covers similar kinds of projects, including biomass and energy efficiency. One notable difference is that it includes projects located in the EU. Of RWE's eight JI projects four are in the Ukraine, two in France and one project each in Germany and Poland.

Credits from RWE's CDM and JI projects have been used by installations in the EU ETS for compliance purposes. Across the EU 91 million CERs from RWE projects have been used for compliance, accounting for 13 per cent of the total across Phase II. Focusing on Germany, credits from 27 of RWE's CDM projects have been used totalling 31 million CERs or 18 per cent of all offsets used by German installations over Phase II. The overwhelming majority of RWE CERs originate from two HFC projects in China, accounting for 48 per cent (or 43 million) and 38 per cent (or 35 million) of their total 91 million surrendered, or 39 per cent (or 12 million) and 26 per cent (8 million) of the total number surrendered by German installations.

0.45million ERUs have been surrendered into the EU ETS from five of RWE's JI projects, 58 per cent from Ukrainian projects, and the remaining 42 per cent from two French projects. The single project in Germany is a PFC emission reductions project at an aluminium smelting facility in Hamburg. No credits from this project were surrendered into the EU ETS during Phase II.

Apart from selling its credits to other market participants, RWE has used the credits it generates for their own compliance. In Phase II RWE installations surrendered 10 million CERs from these projects. These add up to 62 per cent of all CERs surrendered by RWE. With regard to JI the share of ERUs from their own projects is much smaller (2.4 per cent). and 0.4m ERUs from these projects.

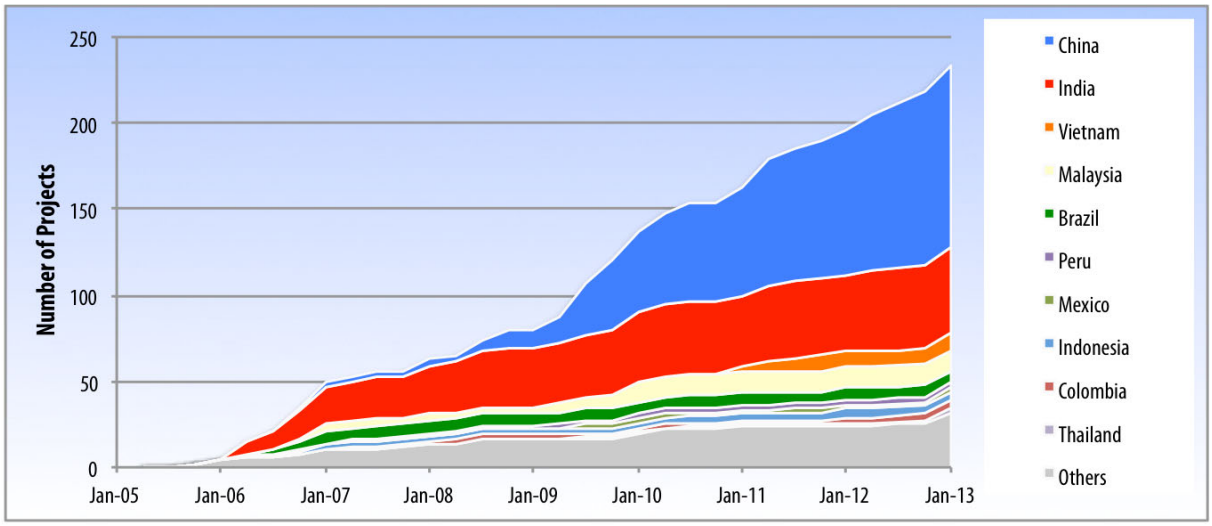

Figure 7: CDM projects with German participation by host country.

2.1.2 Host Countries

The CDM has been repeatedly criticised for its uneven geographical distribution. By far most of the CDM projects have been implemented in China, India and other emerging economies. German CDM projects are no exception. More than half of the German CDM projects are hosted in China or India. While India was the preferred location of German CDM investors in the first years of the CDM, this role was taken over by China after 2009. In terms of CERs generated the share of China is even larger. Projects in China account for 61 per cent of all expected CERs from German CDM projects.

In the first commitment period, projects in low-income countries where CDM projects likely have a more significant impact on sustainable development have remained rare. German investors largely followed that trend. Only four German projects have been realized in least developed countries: two methane avoidance projects in Nepal and two efficient cook stove projects in Lesotho and Zambia.

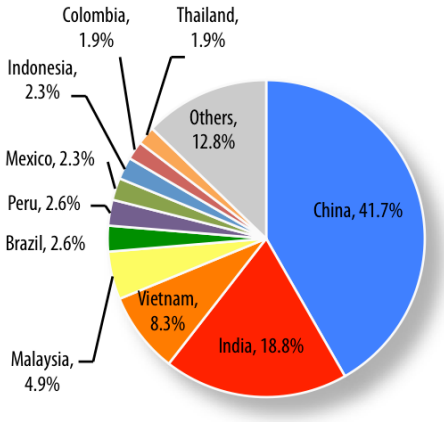

Figure 8: Share of CDM projects with German participation by host country.

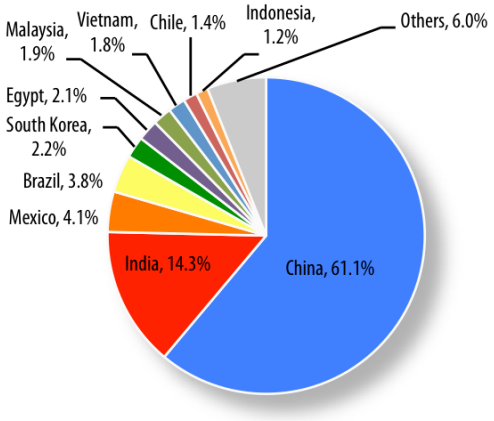

Figure 9: Share of CERs per year from projects with German participation by host country.

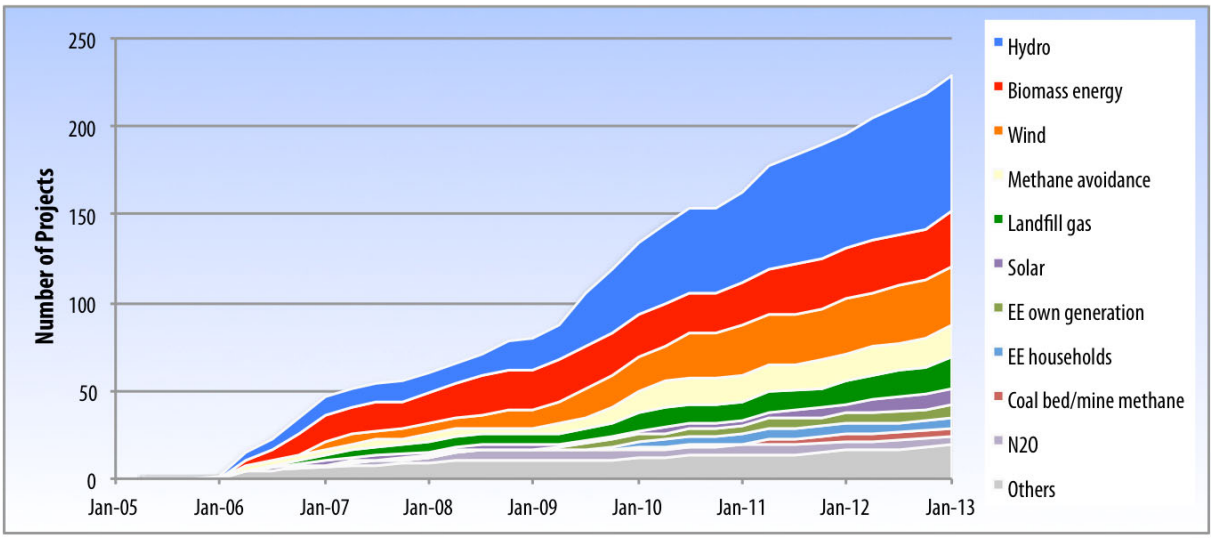

Figure 10: CDM projects with German participation by type of project.

2.1.3 Type/Sector of Projects

Renewable energy projects make up for the largest share of German CDM projects. Hydro power projects account for 32.1 per cent, biomass energy for 15.8 per cent and wind energy for 15.5 per cent. The waste sector is the second most prolific sector with 15.9 per cent of methane avoidance and landfill gas projects.

In terms of expected CERs the picture is very different. Although industrial gas projects (HFC and N_2O) account for only 3 per cent of all projects, they contribute 45.3 per cent of all CERs. The three HFC projects alone account for 39.1 of all expected emission reductions. Similarly, large scale fuel switch and coal bed / mine methane projects account for disproportionally high amounts of credits.

The analysis of the type of projects supports the hypothesis that sustainable development criteria have played a subordinate role in the investment decision. SD benefits of industrial gas projects, fuel switch and even large hydro power projects have repeatedly been questioned.[4] Nevertheless, they make up for a substantial share of the German CDM portfolio.

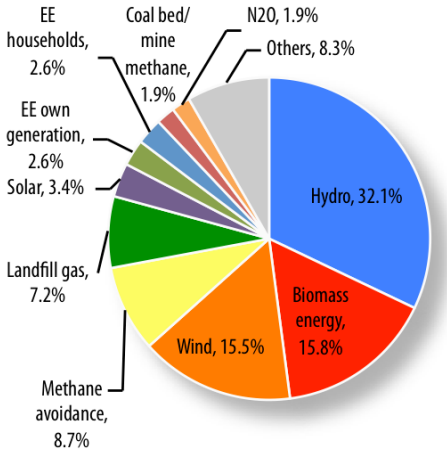

Figure 11: Share of CDM projects with German participation by type of project at the end of CP1.

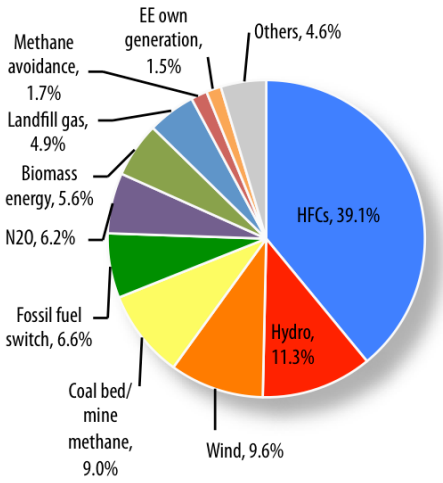

Figure 12: Share of CERs per year from projects with German participation by type of project.

[4] TERI (2012).

Sustainability and Additionality – Issues with the CDM

The CDM has proven to be effective in generating emission reduction credits that can be used to offset emission reduction obligations. It has effectively triggered investment in low-carbon technologies all over the world and successfully harnessed low-cost mitigation potential. Whether the mechanisms have in all cases contributed to sustainable development in host countries has been repeatedly challenged. The CDM has been improved in a learning by doing process. The environmental integrity of the mechanism and the administrative process have improved substantially as the rules and methodologies have been continuously modified and updated. Still, strong criticism remains. It has been repeatedly criticised that CDM project do hardly contribute to sustainable development (SD) in the host country. Industrial projects and in particular large hydropower projects have been highlighted in some case even to have negative impacts on SD (Spalding-Fecher et al. 2012).

To foster SD in the CDM, WWF established the Gold Standard for CERs already in 2003. The standard specifically covers renewable energy and energy efficiency projects and has since been endorsed by more than 80 environmental and development NGOs. Gold Standard CERs can be seen as a distinct category of offsets that gives additional certainty regarding the sustainability standards of UN credits. With this greater accountability comes additional costs, and GS credits sell for a premium compared to standard CERs. Despite the relatively large share of investors with a development background (e.g. KfW and atmosfair) the impact of the Gold Standard has remained marginal in the German CDM portfolio. During Phase II German installations surrendered only 50,000 GS CERs. One company, Fels-Werke GmbH surrounded the majority of these, 37,000. Klingele Papierwerke and Vattenfall were other notable uses of GS CERs, surrendering 5.5k and 3.9k respectively.

Another main critique refers to the additionality of CDM projects. If projects are registered that would have happened without the support of the CDM, the respective credits allow for the emission of GHGs in developed countries but are not backed by true emission reductions in the host country. Such non-additional projects undermine the environmental integrity of the mechanism. A report commissioned by the high-level panel on the CDM policy dialogue (Spalding-Fecher et al. 2012) finds that there is a profound basis for this criticism. *"In summary, should the critiques be warranted, CDM procedures remain largely unchanged and CER projections hold, then the quantity of non-additional CERs could be substantial and lead to a significant net increase in emissions."* (ibid). The authors identify a list of project types and methodologies that are particularly prone to the risk of non-additional projects. These include (large) hydro-power projects, supply-side efficiency fossil fuel projects and even wind power to some extent. Industrial gas projects, which have also been banned in the EU-ETS from 2013 onwards, are deemed to have created perverse incentives as they have generated windfall profits due to the enormous global warming potential of these gases. Collectively, these projects account for a large share of all projects. A range of countries and companies invested in these projects, including German companies (see Figure 13).

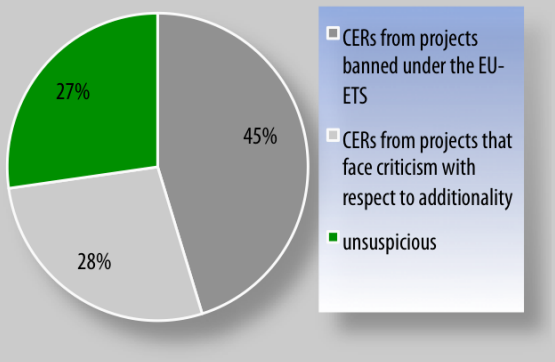

Figure 13: Spread of CERs from project types under criticism. *Source: Wuppertal Institute based on UNEP Risø and Spalding-Fecher et al. (2012).*

2.2 Joint Implementation

In the European Union, the potential for JI projects is limited. Some Member States chose not to allow JI projects at all, such as the UK, while those who did found competing policies, such as the EU ETS and the renewable energy law (EEG), limited its potential. By far the largest potentials for JI projects were found in Russia, Ukraine and other former soviet and eastern European countries that do not participate in the EU-ETS.

2.2.1 JI Projects in Germany

The potential for JI projects in Germany is severely restricted. Projects with direct or indirect overlaps with the EU ETS have effectively been excluded[5], as have projects that are supported through the EEG feed-in tariffs or the combined heat and power law (KWKG).[6] Hence, Germany hosts only 12 JI projects that collectively account for 1.87 per cent of all emission reductions credited under JI.

The majority of these projects focus on industrial gases and coal mine methane. By far the largest share of emission reductions are generated from two projects for decomposition of N_2O in the production of adipic acid. N_2O reduction in the production of nitric acid contributes 25 per cent of all emission reductions (6 projects). In three projects emissions of coal mine methane are being abated. Last but not least TRIMET Aluminium hosts one project for reduction of PFC emissions in Hamburg.

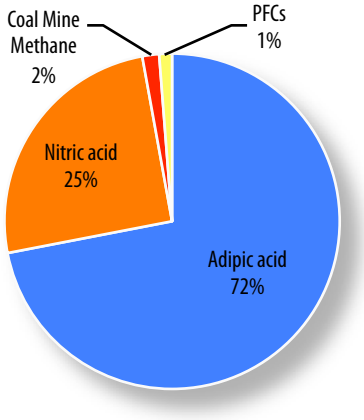

Figure 14: Share of ERUs generated in German JI projects by type of project.

In addition to these JI projects, Germany hosts 28 JI PoAs. These focus largely on energy efficiency in industry, households and services. Furthermore, a number of programmes that promote fuel-switch to biomass and two programmes in the transport sector have been registered.

With regard to the investors in German JI projects, there are three different approaches: Firstly, other European companies invest in JI projects. One example is Evonik who have been involved in the development of a N_2O abatement project at Stickstoffwerke Piesteritz. Secondly, projects are driven by public agencies such as the energy agency of the state of North Rhine-Westphalia (EnergieAgentur.NRW) or the Dutch sustainability agency SenterNovem (now part of Agentschaap NL). Thirdly, companies regulated under the EU-ETS have invested in abatement projects in their own facilities that do not fall under the EU-ETS sectors. Two examples are Yara, Norwegian giant in production of mineral fertiliser, Bayer and BASF (see box, p 27).

[5] ProMechG §5.1 stipulates that such emission reductions shall be counted as part of the baseline.

[6] see ProMechG

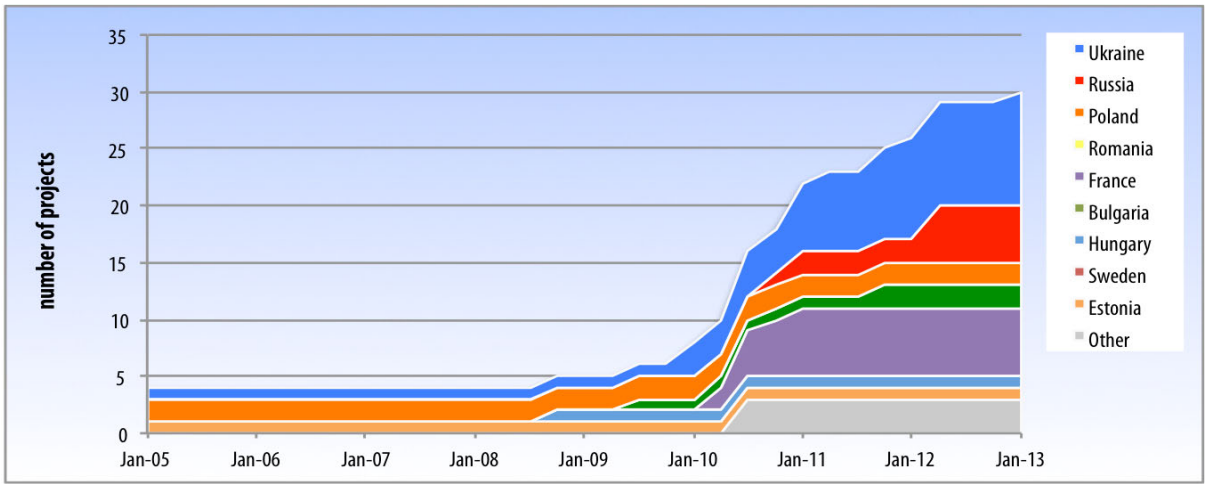

Figure 15: JI projects with German participation by host country.

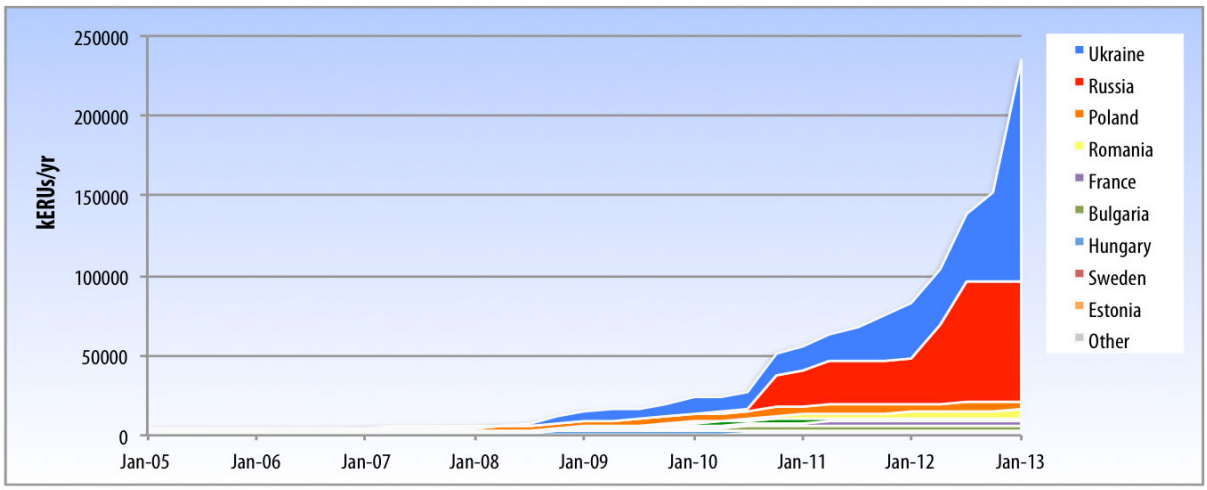

Figure 16: Expected ERUs from JI projects with German participation by host country.

2.2.2 JI Projects Outside Germany

Globally as well as with respect to German investors, JI has lagged behind the CDM in the development of projects. Unlike the CDM, the establishment of the JI regulatory institutions under the Joint Implementation Supervisory Committee could only start after the entry into force of the Kyoto Protocol and JI projects could only start generating ERUs after the beginning of the first commitment period in 2008. Furthermore, Russia delayed the approval of the first JI projects until July 2010.[7] However, after this initial delay, JI managed to generate a substantive amount of ERUs in 2011 and 2012.

German investors have been particularly active in the Ukraine and Russia. The two countries host the lion's share of emission reductions (Ukraine 59.1 per cent; Russia 32 per cent).

Projects with regards to fugitive emissions account for 22.2 per cent of the projects and 47 per cent of ERUs. Other prolific sectors are energy efficiency in industry and N_2O abatement.

Utility E.ON, which plays a minor role in the CDM, is the most prolific German investor together with RWE.

[7] Reuters (2010).

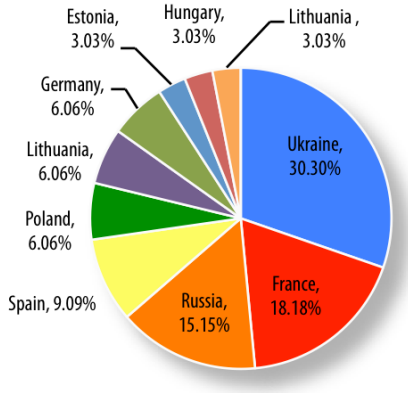

Figure 17: Share of JI projects with German participation by host country.

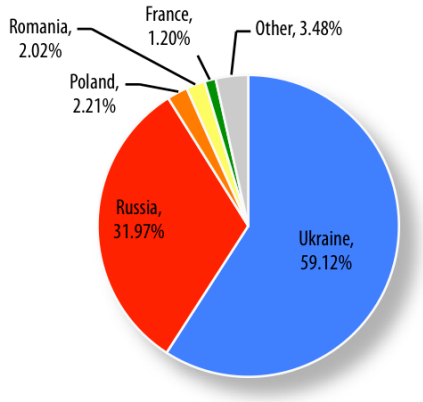

Figure 20: Share of ERUs from projects with German participation by host country.

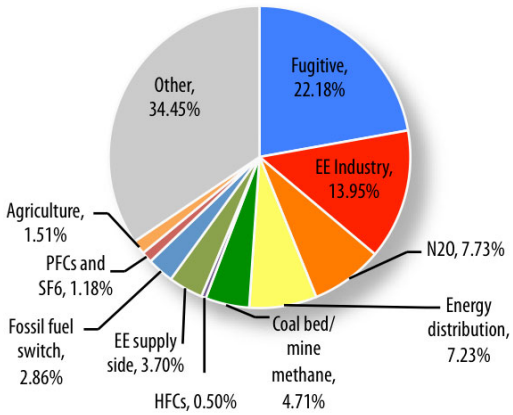

Figure 18: Share of JI projects with German participation by type of project.

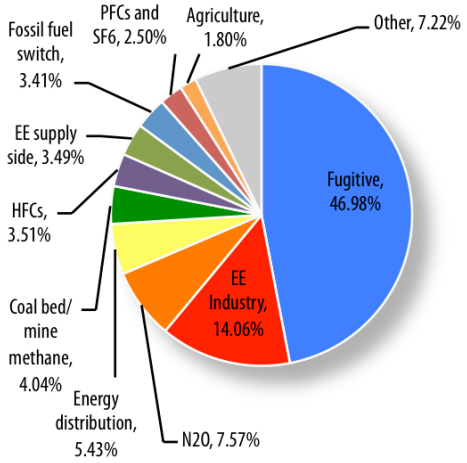

Figure 21: Share of ERUs from projects with German participation by type of sector.

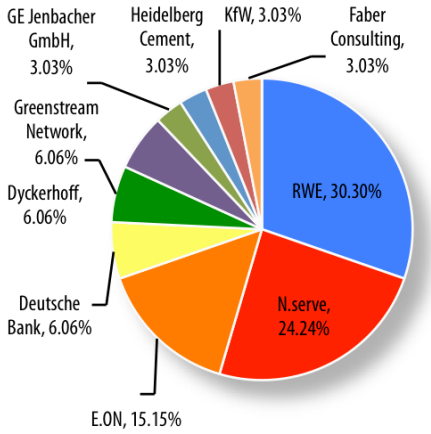

Figure 19: Share of JI projects with German participation by investor.

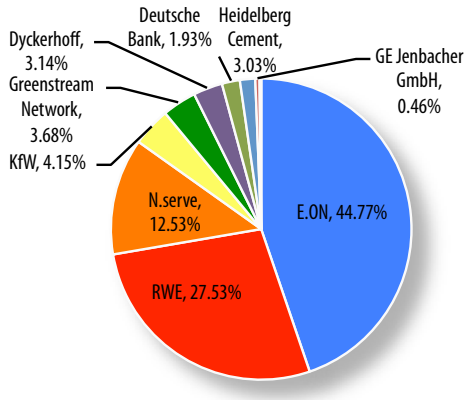

Figure 22: Share of ERUs from projects with German participation by investor.

3 Who is Involved in the Process?

The flexible mechanisms have not only been an opportunity to invest. They have also created a market of their own. The international carbon markets have spurred the development of a whole sector of consultants, project developers and auditors that offer their services to investors and project proponents in the host countries. With its over 7000 registered projects, the CDM is by far the bigger market in this regard as compared to JI's roughly 600 projects. In this chapter we will investigate the role that German companies – specifically auditors and PDD consultants – have played in the CDM.

Beyond that, we investigate how German industries might have benefitted indirectly from the flexible mechanisms, particularly from the CDM. The CDM has spurred investments into "green", low-carbon technologies on a large scale, a sector where German companies have managed to gain a leading role in global markets.

3.1 Designated Operational Entities

German auditors have a leading role in global markets. Likewise in the CDM the German TÜV groups – TÜV SÜD, TÜV Rheinland and TÜV-Nord – have managed to gain a substantive share of the validation and verification markets. Germanischer Lloyd Certification is another German auditor, however, playing a minor role.

Together the German companies account for nearly one third of the validation market and one quarter of the verification market. After Norwegian Validator DNV, the TÜV groups rank 2nd, 3rd and 4th among the validators with the largest market shares. In verification they rank 4th, 5th and 6th (see Figures 23 and 24).

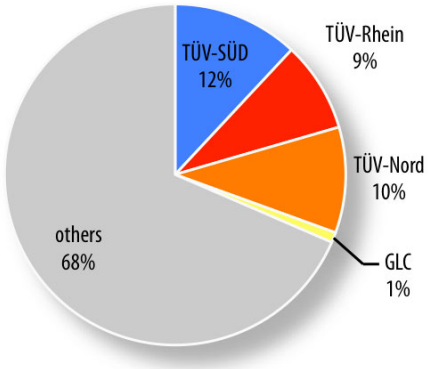

Figure 23: Market share of German DOEs (Validation).

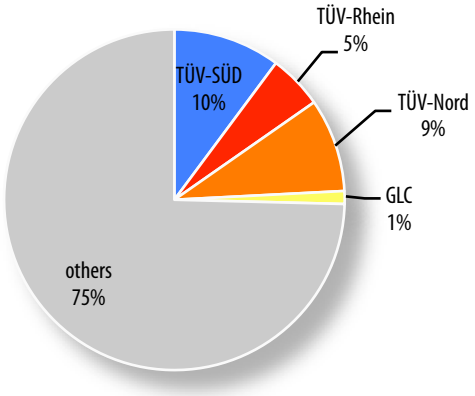

Figure 24: Market share of German DOEs (Verification).

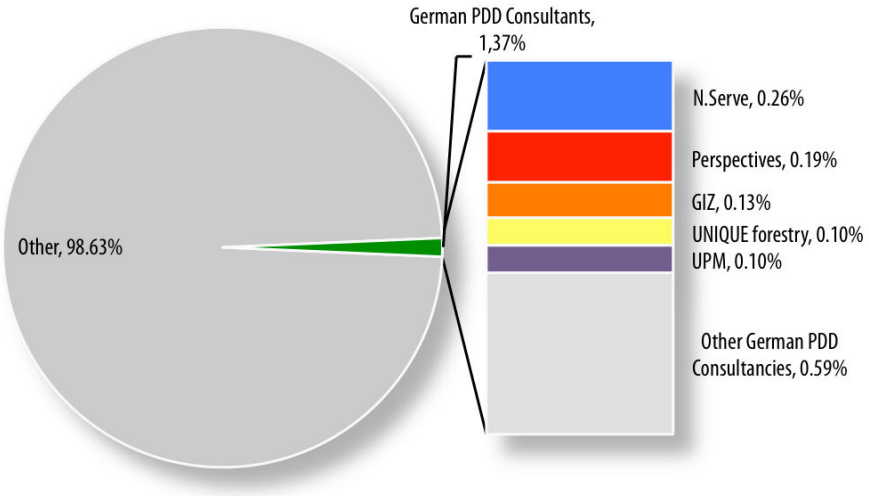

Figure 25: Market share of German PDD Consultancies. *Source: Wuppertal Institute based on UNEP Risø.*

3.2 PDD Consultants

The picture is very different for the market of developing Project Design Documents (PDDs) for CDM projects. In general the PDD consultancy market is much more fragmented than the validation and verification markets. More than 2000 companies have been involved in the market. In many cases, the PDDs were not prepared by dedicated consultancies, but by the project proponents and/or investors from developing countries themselves.

The market is dominated by Irish, British and Chinese consultancies. Even the most prolific company, Dublin-based EcoSecurities, has so far prepared PDDs for only 262 of nearly 7000 registered projects.

German PDD consultancies have only played a minor role. Collectively, German PDD consultants have contributed only 1.37 per cent of all registered PDDs (see figure 25). With 18 registered projects the consultancy N.Serve Environmental Services GmbH, who has also been an active investor in JI, is the most successful German actor, followed by Perspectives Climate Change.

3.3 Financial Sector

With the definition of CERs and ERUs, two new commodities have been created that allow for any kind of trading activity. This has lead to CERs being traded at the European Energy Exchange (EEX). The very fact that CERs are being traded as a commodity suggests that actors from the financial sector also have stakes in the business.

Unfortunately, the data available allows only for a rudimentary analysis of the financial sector's activities: Only two German banks, Deutsche Bank and KfW, have been active in the development of CDM projects. An analysis of the list of participants of trading of emission allowances at the EEX shows that only three more banks (Bayerische Landesbank, Nordea Bank Germany and UniCredit Bank Germany) have been active in trading emission allowances, but not necessarily CERs. Given that CDM and JI mostly follow a payment on delivery model instead of Annex I participants investing upfront in projects, one can probably assume that there has also been little call for bank loans in order to invest in projects.

Additional to these Banks, a handful of dedicated (energy) trading houses have been active. However, the market has been dominated by public and private utilities and other industrial companies that fall under the regulation of the EU-ETS and need emission allowances for compliance.

The analysis suggests that the German financial sector has not made a big business out of the flexible mechanisms in general and the CDM in particular.

3.4 Technology Providers

Have German technology providers benefited from the CDM, or in other words, has the CDM contributed to unlock markets for German technology? In this chapter, we investigate these questions in the form of a meta-analysis of five surveys published between 2010 and 2013 (Seres et al (2010), Murphy et al. (2013), Fecher (2012), TERI (2012) and Marconi & Sanna-Randaccio (2012)).

The five studies focus on the question whether the CDM has contributed to technology transfer (TT) from industrialized to developing countries. However, they can only provide an incomplete picture of TT in the CDM as all five studies are primarily based on the analysis of the Project Design Documents (PDDs). The PDD is, however, a planning document and only gives information about what was planned before starting the project.

Thus, the PDD is not more than an indicator about the technology that is actually used in the CDM projects. Project developers are not obliged to give information whether or not TT was achieved. Analysing 3,949 registered CDM projects (as of 31 March 2012), Murphy et al. (2013) concluded that only 1.282 projects (33 per cent) specified TT through equipment and/or knowledge. 1.967 projects (50 per cent) did not include TT and 700 analyzed PDDs do not mention TT at all. These claims of technology transfer and sustainable development contributions in general are not part of the validation and project participants may have an incentive to exaggerate such claims in

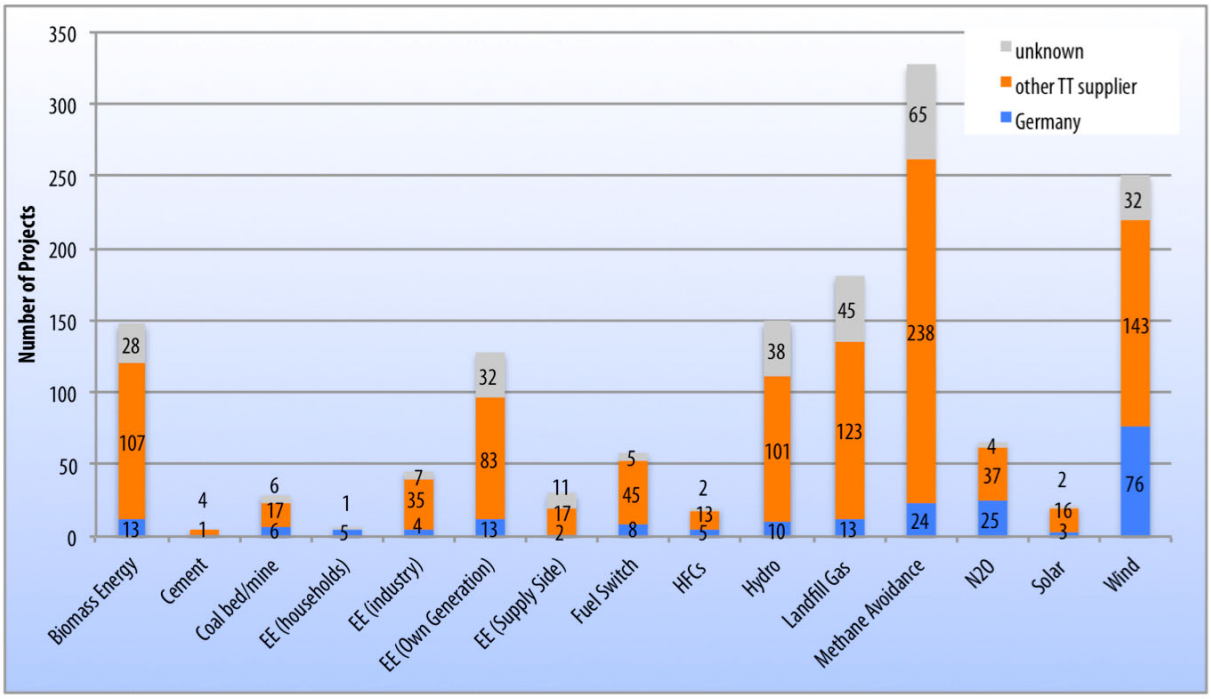

Figure 26: CDM projects with technology transfer as specified in the PDD. *Source: Wuppertal Institute based on Seres et al (2010).*

order to make their projects look better. However, a follow-up survey conducted by Murphy et al. (2013) found that more TT was integrated in the projects than had been specified in the PDDs before registration (69 per cent vs. 60 per cent).

These inherent limitations illustrate that the studies can only give an orientation to what extent technology transfer has actually happened. The question of TT entails a notion of reciprocity, i.e. if and how a technology has been embraced by the host country. A PDD analysis cannot answer this question. To get an exact overview about TT inside the CDM it would be necessary to get information e.g. by interviewing the project developers and to get a realistic picture it would be necessary to analyse the projects themselves rather than only relying on the claims of the project participants. Such a complex survey would yet go far beyond the scope of this study.

The reviewed literature can give a more reliable picture when the question of TT is reduced to the more basic question of technology provision, though. The reviewed literature concludes that next to the United States, Denmark and Japan, Germany is one of the top technology suppliers inside the CDM (see Table 1). The analyzed studies[8] agree that Germany is the leading technology supplier for the following project types: cement, energy efficiency in households, HFCs, N_2O and wind power. The sectors in which German technology providers have a leading role collectively account for 35 per cent of all CDM projects registered in the first commitment period.

German technology providers have the largest market share for projects on energy efficiency in households, supplying 83.3 per cent of all projects that entail technology transfer. While projects in energy efficiency in households, cement, HFCs and N_2O abatement make up for a relatively small share of the CDM, wind power projects are the most frequent project type with 2218 projects registered until 31st December 2012.[9] The leading role of German technology providers in the wind sector is also highlighted by Marconi & Sanna-Radaccio (2012), who analyzed TT to China[10], and Lema & Lema (2012), who specifically investigated TT in the wind sector. German wind turbine manufacturer Enercon is highlighted as being among the top five technology providers inside the CDM.

To go even further and to answer the questions to what extent German companies have ultimately benefitted from the CDM beyond the application in CDM projects, if the CDM has helped to unlock hitherto undeveloped markets, is impossible from the reviewed literature and hence it cannot be judged from this point whether the CDM could help German technology providers to unlock new markets. To answer this very interesting question it would be necessary to interview technology providers and/or market experts and undertake quantitative market analysis in a detailed survey.

[8] Seres et al. (2010), Murphy et al. (2013).

[9] Seres et al. (2010).

[10] only non-hydro projects with foreign technology.

	Biomass Energy	Cement	Coal bed/mine Methane	EE (households)	EE (industry)	EE (Own Generation)	EE (Supply Side)	Fuel Switch	HFCs	Hydro	Landfill Gas	Methane Avoidance	N2O	Solar	Wind	biggest supplier of TT	Overall market share of German technology providers
Seres et al. (2010) Analyzes TT claims in the PDDs of 4,984 projects as of 30 June 2010. Indicates the market share of German suppliers.	9%	20%	21%	83%	9%	10%	7%	14%	25%	7%	7%	7%	38%	14%	30%	**Germany**, United States, Denmark, Japan, China	13,7%
Murphy et al. (2013) Analyzes TT in PDDs from 3.949 projects registered as of 31 March 2012.		+		++					+				++		++	**Germany**, United States, Denmark, Japan, China	19,0%
Fecher (2012) Meta-study on TT inside the CDM.																Japan, **Germany**, United States, Denmark, Italy, United Kingdom	
TERI (2012) Literature review, case study assessment and sample analysis of 202 registered PDDs. Prepared for the CDM Policy Dialogue.																Japan, **Germany**, United States, Denmark, Italy, United Kingdom	
Marconi & Sanna-Radaccio (2012) Focus on TT to China. The analysis is based on a review of 1,355 PDDs.															++	**Germany**, Denmark, United States, Japan, Spain	26,0%

indicating sectors in which German technology providers have a leading role.

Table 1: German Technology Transfer inside the CDM. *Source: Wuppertal Institute based on Seres et al. (2010), Murphy et al. (2013), Fecher (2012), TERI (2012), Marconi & Sanna-Radaccio (2012).*

4 Who Uses Offsets?

4.1 General Picture

Compliance installations are permitted to use both CDM and JI credits in order to meet their emission reduction obligations under the EU ETS. The Phase II (2008 – 2012) and Phase III (2012 - 2020) combined offset budget is set at around 1.6bn[11] credits. This figure is made up of qualitative and quantitative restrictions on the use of offsets imposed by both Member States and the European Commission.

During Phase II Member State set the quantitative limit on offsets by deciding on a percentage limit on credits against installations' free allocations. Member States have allowed a varying degree of offsets by setting differing percentage allowances ranging from a high of 22 per cent in Germany, to more modest level of 8 per cent in the UK and Belgium, with the lowest range being 4 per cent[12] set by Estonia. While Member States set the upper limit, the European Commission has set a lower limit of 11 per cent. Should Member States have set their limits lower than 11 per cent, the difference can be made up during Phase III. No adjustment is made to Member States who choose to set their allowance above 11 per cent. As it stands only eight Member states have set their limit above the 11 per cent threshold.

German installations are the most prolific users of offsets. This is perhaps unsurprising given that Germany is both the largest emitter in the EU and also has the most generous offset allowance. Germany has an offset budget in the region of 441million credits – a figure based on 22 per cent of Germany's Phase II free allowance. During Phase II of the EU ETS German installations have used 303 million offsets (170 million CERs and 133 million JI), or 69 per cent of their total budget. This leaves Germany with 138 million credits still to be used over Phase III.

This analysis is based on all static ETS installations, and does not factor in aviation or New Entrants allowances. Offset usage in the aviation sector will be looked at in section 4.3.2

4.2 Germany's Offset Usage

Offset usage across Member States has varied. German installations have by far and away surrendered the greatest number of offsets, accounting of 29 per cent (or 303 million CERs) of the 1.1billion offsets surrendered across the EU in Phase II. Figure 27 shows the top 10 EU countries surrendering offsets for compliance in the EU ETS. After Germany, Spanish installations surrendered the second greatest quantity of offsets, using 107m (10 per cent), followed by Italy and Poland who used 96 (9 per cent) and 96m (9 per cent) offsets respectively.

It should be noted that while Germany has used the greatest number of credits by volume it has only used 69 per cent of its total offset budget over Phase II. Other countries have surrendered fewer credits, but have proportionally used more of their budget (e.g. Slovenia (94 per cent) and Bulgaria (91 per cent)).

[11] Hermann / Matthes (2012).

[12] Estonia has an offset allowance of 0 per cent up to 2010. For 2011 and 2012 10 per cent allowance was permitted, equating to 4 per cent over the five-year period from 2008 to 2012.

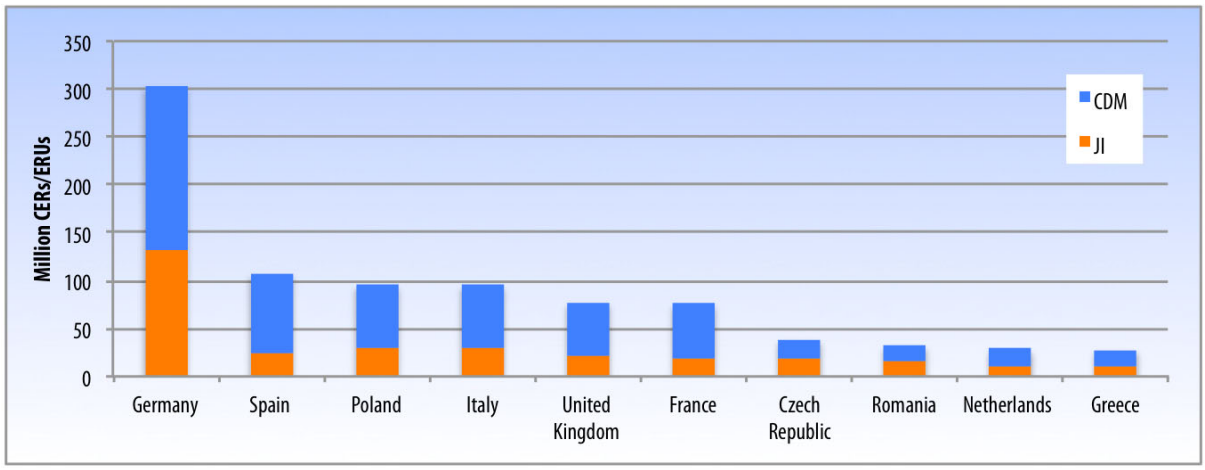

Figure 27: Top 10 Member States surrendering CDM and JI credits over Phase II.

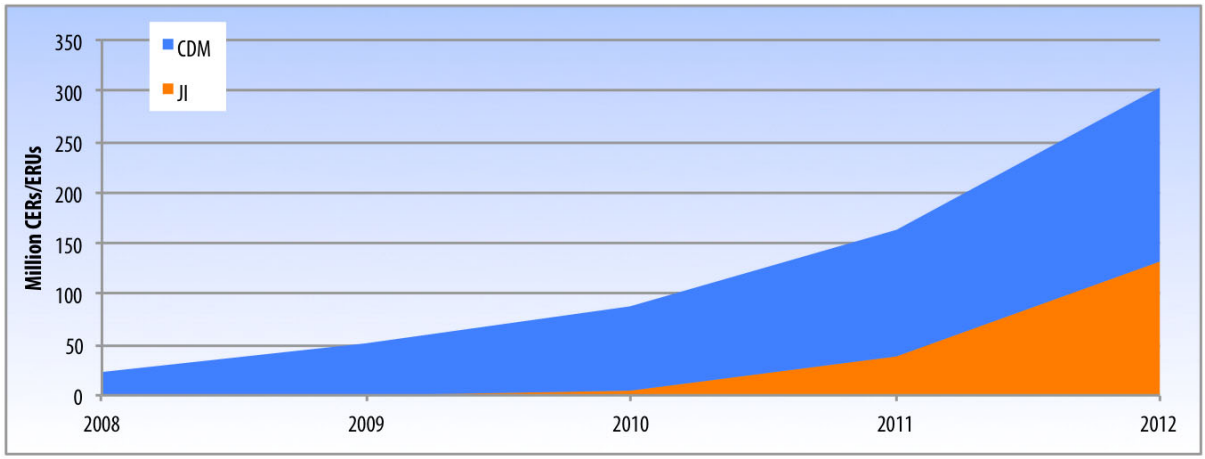

Figure 28: Share of CERs and ERUs surrendered by German installations during Phase II.

Germany's offset usage has increased significantly from 2008 to 2012. Figure 28 shows the increase in both CDM and JI credits surrendered over Phase II. There are a number of reasons for this increase. One might be that over the course of Phase II companies have become more aware and comfortable with the process of offsetting. Secondly, regulatory uncertainty resulting largely from quality restrictions introduced by the European Commission on credits originating from industrial gas projects (HFCs and N_2O), as well as fears that additional restrictions might be placed on other credits types, notably from large hydro-power projects, left companies eager to surrender these credits while they were still eligible. Misunderstanding surrounding Phase III offset entitlements – including additional quality restrictions, credit eligibility and cut of dates – have also contributed to the increase in Phase II offset usage.

The use of CDM credits in Germany has seen steady growth over the phase experiencing a 13 per cent increase from 2011 to 2012. The use of JI credits on the other hand has seen an exponential increase in usage experiencing a 189 per cent growth over the same period. This increase correlates with a large increase in ERUs being issued from Russian and Ukrainian projects.

Interestingly, German CDM and JI investments substantially lagged behind the actual usage. German installations covered only 12 per cent of their total offset budget from projects with

German participation, i.e. CDM and JI projects with German investor and JI projects on German ground. Consequently, German installations must have relied extensively on offsets from secondary markets (see Figure 29).

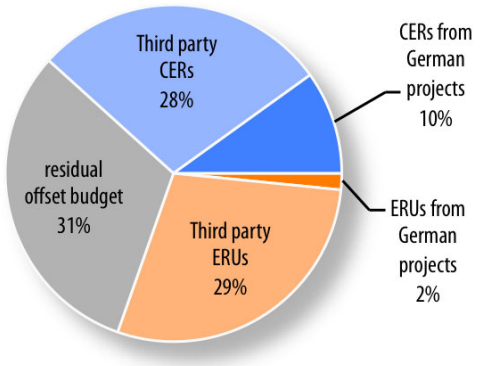

Figure 29: Breakdown of the German offset budget 2008-2012 by type and source of offset.

4.3 Offset Use by Sector

There are two distinct ways of looking at the level of offsets used by certain economic sectors, including by volume and by percentage of offset budget utilised.

All German sectors have an offset budget that is set at 22 per cent of an installation's Phase II allocation. This is not the case for other Member States, some of which split their offset budget between sectors differently. How and when to make use of this budget is determined by individual installations and companies.

4.3.1 Stationary Emission Sources

The power sector has been the most prolific user of offsets, surrendering 178million (106m CERs and 72m ERUs) during Phase II. This represents 59 per cent of the total offsets surrendered by German installations and 10% of total power sector emissions over the same period. This is perhaps unsurprising, the power sector, with total Phase II emissions of over 1.8billion tonnes CO_2, is by far the largest emitting sector in Germany. Furthermore, the power sector has a shortage of free allowances and is thus in the greatest need to purchase additional allowances or credits from the market. The next largest users of offsets are the iron & steel and cement sectors surrendering 58million (19 per cent) and 31million (10 per cent) offsets respectively.

The energy intensive sectors have used up the greatest proportion of their offset budget. The coke ovens, iron & steel sectors have both used

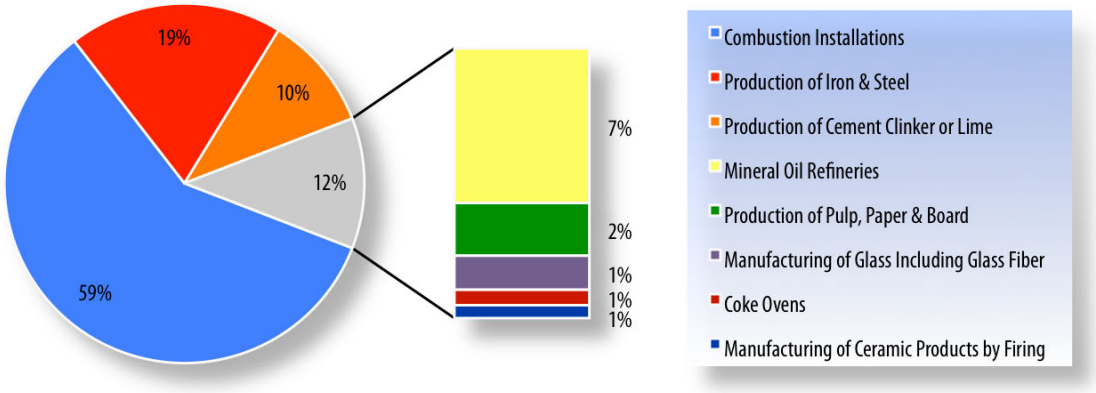

Figure 30: Breakdown of offsets used by each economic sector (CITL 1-9). Other Activities opted-in (CITL 99) have been excluded as they contribute only 0.002 per cent.

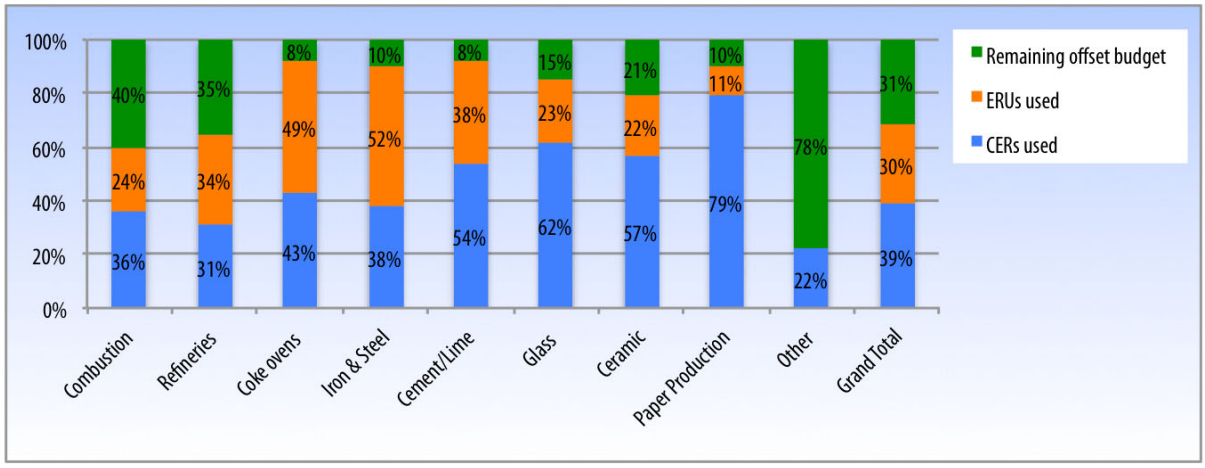

Figure 31: Share of offset budget used by economic sector (CITL Sector 1-99).

92 per cent of their budget while the cement and paper sectors have both used 90 per cent of theirs. These sectors, having been hit particularly hard by the economic downturn in Europe, look to have made use of their offset budget early on in the scheme. Using offsets allows installations and companies to comply using cheaper offset credits, while at the same time retaining or selling the more valuable EU allowances, which they received for free. The power sector has used proportionally less (61 per cent) of its budget than other sectors, although has surrendered 59 per cent (178 million) of all offsets used by German installations in Phase II.

4.3.2 Aviation

Aviation emissions were included into the EU ETS from the beginning of 2012. Due to unwavering international pressure the EU has temporarily modified its legislation to limit the scope of the ETS to only intra-EU flights. It is likely that this derogation remains in place as the EU seeks assurances from the International Civil Aviation Organisation (ICAO) that it agrees on a global deal to reduce aviation emissions by 2016, to be in place by 2020.

As with static installations, airlines are allowed to use offsets to meet compliance obligations.

Rank	Airline Name	CDM	JI	TOTAL	Emissions	Offset Budget	% Budget Used
1	Deutsche Lufthansa AG	38.341	701.502	739.843	4.932.287	739.843	100%
2	Air Berlin PLC & Co. Luftverkehrs KG	350.000		350.000	2.439.688	365.953	96%
3	Lufthansa Cargo AG		188.000	188.000	1.256.311	188.447	100%
4	Germanwings GmbH	5.190	94.796	99.986	666.575	99.986	100%
5	European Air Transport Leipzig GmbH		97.699	97.699	651.332	97.700	100%
6	Condor Flugdienst GmbH		95.605	95.605	638.631	95.795	100%
7	TUIfly GmbH	71.000		71.000	761.092	114.164	62%
8	Omni Air International, Inc.		30.121	30.121	200.809	30.121	100%
9	Germania Fluggesellschaft mbH		28.181	28.181	187.879	28.182	100%
10	United Parcel Service Co	22.169		22.169	147.797	22.170	100%

Table 3: Top 10 of Airlines that have used Offsets for Compliance.

In Phase II airlines are permitted to offset up to 15 per cent of their verified 2012 emissions. Germany's 2012 verified aviation emissions stood at 15.6 million tonnes CO_2, giving an offset budget of some 2.3 million credits.

In 2012 German airlines surrendered a total of 1.76 million offset credits, or 76 per cent of the 2012 budget. Ten companies surrendered the overwhelming majority (1.72 million) of these credits, as shown in Table 2. Eight of the ten companies have used 100% of their 2012 offset budget, choosing to make use of their allowance rather than waiting until later in the Phase. Some airlines had a shortage of free allowances, which meant they needed to buy from the market. It's likely they chose to surrender offsets as a cost effective alternative to EU allowances. Airlines with a surplus of free allowances might have wanted to use their offset budget now so as to save their more valuable free allowances for later in Phase III.

The political uncertainty around aviation's inclusion into the EU ETS might also have contributed to the offset strategy, believing aviation may be withdrawn from the scheme. The unused 2012 offset allowance can be surrendered in Phase III (from 2013 – 2020). In Phase III airlines will be entitled to offset a minimum of 1.5 per cent of their verified emissions from 2013-2020.

4.3.3 Compliance Strategies

Compliance strategies differ when it comes to offset usage and extrapolating a clear pattern across all sectors is difficult. What is clear is that some sectors have been more active in utilising their offset allowance than others, and for different reasons.

There is seemingly a distinction that can be made between those sectors that foresaw an opportunity to be had and invested in the development of projects and those who simply took advantage of their offsetting budget.

The former description refers in particular to power sector participants who have used offsets not only to comply with their ETS obligations, but many have also been involved in developing credit generating projects abroad (see chapters 2.1.1 and 2.2.2). Being a high emissions industry, it was clear from the outset that there would be a great demand for emissions rights from power installations. This demand has been fuelled in part by a significant shortfall of free allowances received by the sector over Phase II, increasing their requirement for alternative options.

The latter description refers more to those sectors who had no need to use offsets due to a healthy surplus of free allowances, but chose to in order to make use of the financial benefits. As large users of offsets the iron and steel and cement sectors could fall into this category. Both sectors, unlike the power sector, have been left with a sizable surplus of freely received EU allowances over Phase II and have not needed to purchase further allowances. Their motivation to utilise their offset budget might come largely from the financial opportunities presented by doing so. Using offsets for compliance frees up EU allowances that can be sold on for a profit, thus providing cash at a financially difficult time for many European companies.

Installations that fall under the *Other Sector* CITL category tend to be smaller sites that do not fit neatly into other categories, such as hospitals and universities. One reason for their low utilisation of offsets might be that engaging with the carbon market is far away from their primary objective, such as providing primary health care or education. Their level of market understanding might be significantly lower than those of larger companies that have in-house trading desks or a dedicated carbon compliance team. Another reason may be that the small scale of emissions, and thus the requirement for offsets, might mean transaction costs cancel out any potential financial benefit.

4.4 Origin of Offsets

4.4.1 The Clean Development Mechanism

During Phase II, German installations surrendered 170million CERs, originating from 26 different countries. The vast majority of these credits, shown in Figure 32, originated from four countries, including China 100m (59 per cent), India 31m (18 per cent), South Korea 22m (13 per cent) and Brazil 7.7m (5 per cent).

Smaller quantities of offsets came from a range of countries including: Vietnam, Nigeria, Israel, Bolivia and Uzbekistan. The only credits to come from sub-Saharan Africa were 100,000 CERs from Nigeria. No credits were surrendered from a least developed country (LDC).

As with the dominance by a small number of host countries, the majority of CERs come from a limited number of project types, and projects. Of the 170million offsets surrendered by German installations over Phase II, 94m (55 per cent) were HFC mitigation, 42 million (25 per cent) were N_2O mitigation and 16m (9 per cent) were hydro credits.

This dominance of industrial gas credits is due largely to the efficiency with which developers sought out the most profitable projects. Industrial gas projects were some of the first to be developed and produced a large number of credits due to the high global warming potential of the gasses (HFCs have a global warming potential some 12,000 times greater than CO_2, N_2O is 310 times greater). Concerns around the environmental integrity and perverse incentives[13] led the European Commission to ban credits from HFC and N_2O (adipic acid) projects from 30th April 2013. This has encouraged holders of these credits to surrender them during Phase II while they were still valid.

[13] European Comission (2011).

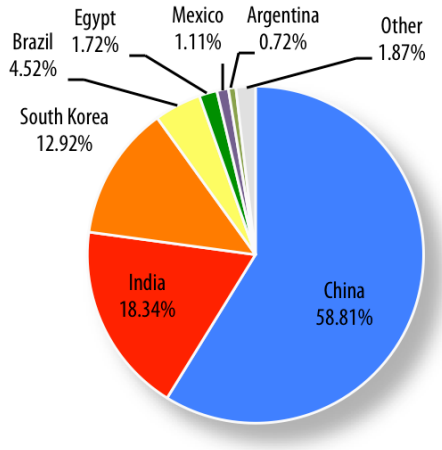

Figure 32: Share of surrendered CERs by host country.

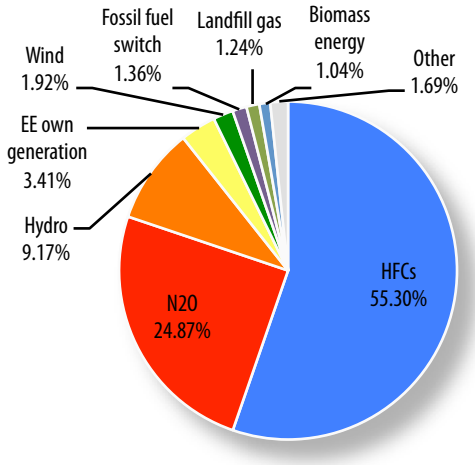

Figure 33: Share of surrendered CERs by type of project.

Over time, a more diverse range of projects has been developed, the credits from which have made it into the EU ETS. Other project types include: fuel switching, coalmine methane, industrial energy efficiency, fugitive emissions, transport, as well as solar and wind.

The range of project types presents an unforeseen conflict. Projects have been developed in sectors that compete with the European market. An interesting example of this conflict is seen in the steel sector. In the CDM there are two principal metal project types, including: *Iron and Steel Heat*, *Non-Ferrous metals* and *non–ferrous metals heat*.

From these two project types German installations have surrendered 5.2 million CERs. Amongst the companies surrendering steel CERs were German steel makers, including Salzgitter, ThyssenKrupp and Trierer Stahlwerke GmbH. This raises interesting questions. It is perfectly logical to argue that the savings provided by surrendering CERs is the primary concern for any company, and it may well be the rational option for companies to purchase CERs from like industries as they would be familiar with the technologies and the processes involved. Yet, at a time where carbon leakage and competitiveness is high on the political agenda, using offsets from international rivals, or like sectors seems odd and potentially short-sighted. Particularly as the CDM market is over-supplied and there are a wide range of credits to choose from.

4.4.2 Joint Implementation

Unlike the CDM, the JI mechanism was intended for economies in transition. This did not prevent other countries from embracing the JI and a number of EU countries, notably Germany, have developed JI projects. Other EU countries that have developed JI projects including the Czech Republic, France, Poland and Romania amongst others.

In Phase II German installations used 132.7 million JI credits for compliance, of that figure 122.4 million (91 per cent) have originated from Russia, the Ukraine and New Zealand. The vast majority of these came from the Ukraine (64 million), and Russia (57 million). The remaining 12 million (9 per cent) ERUs came from a total of 10 EU countries[14], with the majority of these, 7 million, originating from Germany itself. Figure 34 shows a breakdown of credits surrendered by EU versus non-EU host countries.

[14] Germany, Poland, France, Romania, Lithuania, Czech Republic, Bulgaria, Hungary, Finland and Estonia.

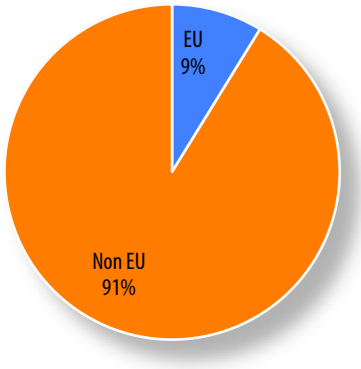

Figure 34: Share of surrendered ERUs from EU vs. Non-EU host countries.

Before considering the type of JI projects, it is important to note the distinction between Track 1 and Track 2 JI projects. The two different tracks refer to the way a JI project can be determined. Track 1 applies when a host country meets the JI eligibility requirements as set by the UNFCCC and gives the control of issuing credits to the host country. Track 2 applies when the host country does not meet the criteria to verify its own emissions reductions. Projects must consequently be assessed according to procedures administered by the JI Supervisory Committee (JISC). This process involves third party verification similar to the CDM. Track 2 projects are broadly seen to be more accountable due to the use of a transparent verification process.

German installations relied heavily on Track 1 ERUs. 97 per cent (130 million) of all ERUs surrendered in Germany originated from Track 1 projects. This is, however, in line with the global trend as 96.9 per cent of all ERUs issued originate from JI projects that went through Track 1.

The different economic makeup of those countries developing JI projects gave rise to a slightly different range of projects types. Though as with the CDM the majority of credits came from a limited number of projects types.

Out of the 133 million ERUs surrendered by German installations 61 million (46 per cent) were from Fugitive emissions projects, followed by HFCs 19 million (14 per cent), EE industry, 17 million (13 per cent) and N2O projects 11m (8 per cent). Figure 33 show a full breakdown of ERUs by project type.

Following the usual, trend the power sector was the most prolific user of JI credits, surrendering 72 million (53 per cent), followed by the steel and cement sectors that used 34 million (25 per cent) and 13 million (10 per cent) respectively.

Like the CDM, there are projects that overlap with the economic interests of Germany. Again, looking at metal production as an example and JI project type *Iron and Steel*. From this project type German installations have surrendered 14 million ERUs during Phase II, 4 million of which have been surrounded by German Steel companies. ThyssenKrupp used the greatest number of steel ERUs, surrendering over 2 million, followed by Salzgitter 0.96 million. These steel ERUs originated in Russia and the Ukraine.

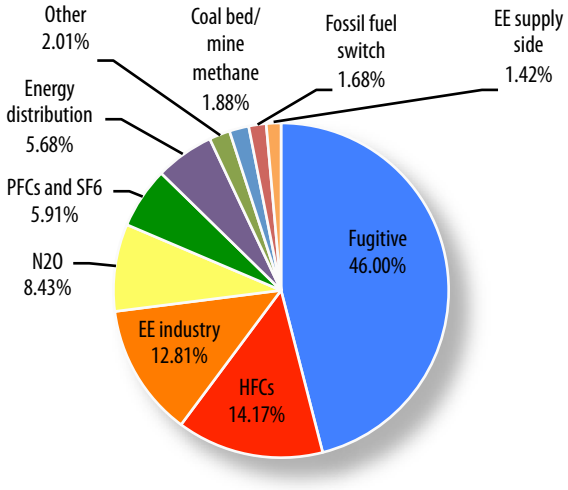

Figure 35: Share of surrendered ERUs by project type.

BASF: A Joint Implementation Powerhouse

Originating in Germany, BASF has grown to be one of the largest chemical companies in the world. It comprises six integrated chemical complexes as well as some 380 other productions sites worldwide. BASF's presence in Europe remains strong and is home to the world's largest integrated chemical complex in Ludwigshafen, Germany. BASF's size and the diverse nature of its product portfolio means it has had to deal with numerous environmental protection challenges, ranging from climate protection, to water conservation and resource consumption.

BASF has been active in the EU ETS and carbon market from early on, developing an internal management system for the EU ETS as early as 2005, creating a team responsible for coordinating GHG activities as well as monitoring the risks and opportunities presented by climate change and ETS policies (Piepenbrink 2010). The result is a company that has actively sought out, used and profited from the utilisation of its assets and knowhow. It has successfully developed Joint implementation projects and used these credits to meet ETS compliance obligations in many of its installations, as well as selling them on the market.

Notable about BASF is the way in which it has generated credits internally to be used against its ETS compliance obligations. Of the 12 million EU ERUs surrendered by German installations, 52 per cent, (6 million) came from BASF's two in-house JI projects, both located in Ludwigshafen. BASF is, however, in a relatively unique position and few companies have been able to make similar investments.

To better understand how BASF has utilised its position one must first look at how N_2O was dealt with in the EU ETS. The ETS covers principally CO_2 emissions, however, the Directive had the option for Member States to unilaterally opt-in non-CO_2 gases during Phase II. N_2O was one such greenhouse gas possible to opt-in. As far back as 2007, before the start of Phase II, the inclusion of N_2O into the EU ETS was seen as feasible, however the N_2O emitters had no common position on the EU ETS. Nitric acid producers where seen to be more supportive of environmental improvements facilitated by market mechanism, such as the ETS. Adipic acid producers were more hesitant, with some favouring a JI approach opposed to inclusion into the ETS (Jenssen 2007). The result was that some countries unilaterally opted in N_2O emissions into Phase II of the ETS, including Austria, the Netherlands and the United Kingdom (DECC 2011), while others, including Germany and France, chose the JI route.

Germany has been active in the area of JI development with 12 projects. Of these projects six have gone on to issue credits that have in turn been used by ETS. Two of which are BASF N_2O projects and account for 60 per cent (7 m) of all German JI credits surrendered into the EU ETS in Phase II. The remaining 40 per cent (4 m) of German credits originated from Bayer, LANXESS and YARA.

Table 3 outlines the three JI projects BASF has been involved in. Two projects are located in their Ludwigshafen complex, the third project is one in which they received a remuneration in the form of ERU for technical assistance. The table outlines for each project the number of ERUs which have already been surrendered into the EU ETS as well as how many remain available.

Project Name	ERUs surrendered to date	ERUs per annum	ERUs crediting period	Remaining ERUs	% ERUs surrendered
Redundant catalytic decomposition of residual nitrous oxide (N2O) from the BASF adipic acid plant in Ludwigshafen, Germany	6.140.713	1.841.310	7.365.239	1.224.526	83%
Catalytic Reduction of N2O inside the ammonia burner of the BASF Nitric Acid Plant in Ludwigshafen, Germany	552.309	288.548	1.442.740	890.431	38%
Catalytic Reduction of N2O inside the Ammonia Burners of the Nitric Acid Plant in Puławy, Poland*	4.681.655	1.582.400	7.912.000	3.230.345	59%

Table 4: JI projects in which BASF has developed or participated directly in.

Of BASF's two Ludwigshafen projects 6.7 million ERUs were surrendered across the EU, 6.1 million by German installations. Of that figure 5.9m (88 per cent) were surrendered by BASF installations to count towards their emissions reduction obligations under the ETS. BASF has perhaps been one of the shrewdest companies participating in the EU ETS.

Since the onset of Phase III in 2013 BASF has no longer been able to make use of emissions reductions generated from its own JI projects. N_2O has been included into the scope of the ETS and JI project in ETS installations are no longer allowed. Since this inclusion of additional elements of the chemical sector into the EU ETS BASF has over 100 installations covered by the scheme.

*As remuneration resulting from the implementation of the projects and as a reserve, which is estimated to amount to 20,000 ERUs for the year 2008 and 312,480 ERUs annually in the period 2009-2012.

5 Conclusions

Carbon markets are complicated political constructions, designed to create restrictions and incentives where there previously were none. As with any market they include a wide range of actors and variables and defining success and attributing benefits to specific actors can be difficult. This paper set out to assess the benefits of the carbon market for Germany and has looked at the full project cycle of the CDM and JI to better understand where German actors have played a key role. In addition, the relationship with the EU ETS – the principle market for the credits generated by the mechanisms – has also been assessed.

Germany's participation in both the CDM and the JI can, at least to some extent, be defined as a success story, though activity is limited to certain areas. German investors have participated in 265 registered CDM projects (3.8 per cent of all projects) and in 42 JI project (7.87 per cent of all JI projects), 12 of which are located in Germany. These projects have so far generated some 222 million CERs, 16 per cent of all CERs issued till the end of the first commitment period of the Kyoto Protocol, and 21 million ERUs. JI projects hosted in Germany have generated 7.8 million ERUs, 22% of the total issued in the EU.

The EU ETS provided a market for both CDM and JI credits by allowing companies to use the credits to meet their compliance obligations under the scheme. German companies were quick to see the opportunity of an alternative, and cheaper, form of ETS compliance. German companies surrendered 303 million CERs using on average 69 per cent of their respective offset budgets.

Power utilities including RWE and E.ON were some of the most prolific investors in the mechanisms. The prominence of the major utilities in the primary CDM and JI market should come as little surprise. As a sector with a large collective shortfall of emissions allowances under the EU ETS the use of offset credits offered an important opportunity for companies to lower their costs. From the outset of Phase II (2008-2012) of the EU ETS power utilities were aware that they would face shortages and planned accordingly by investing in CDM and JI projects. Starting from the early beginning of the mechanisms RWE has registered a portfolio of 103 CDM projects and 10 JI projects, which are to generate some 35 million and 1.6 million credits respectively. E.ON was very active in the JI. Although they invested only in 5 registered JI projects, these were extremely prolific ones and are estimated to generate 2.5 million ERUs annually.

The power sector was not the only sector in Germany to take advantage of the opportunities offered by primary development of projects. BASF, amongst others, has been very active in developing JI projects in Germany, within their own facilities. The credits from which have been utilised by the companies' other installations to meet EU ETS compliance obligations.

Successful Investment?

The activity of German investors is certainly impressive. But can this be considered a success? Given the extremely low prices on international carbon markets in general and for offset credits in particular it is hard to answer this question on a company level. It can be assumed that at least for some investors the investment did not pay out or at least that they could have met their obligations even more cheaply by purchasing secondary market CERs and ERUs.

However, this is a finding made in hindsight. Until the onset of the economic crisis most observers expected continuously high price levels. In addition, the effectivity of the flexible mechanisms to generate offsets credits is a fundamental reason of the current price lows. On an aggregate level, the success of the mechanism that was also fuelled by German investments has strongly contributed to contain the cost of compliance in the EU ETS.

That is why German companies were also actively involved in the secondary market, that is, buying credits from the open market to use in the EU ETS. The cement and the iron & steel sector made use of a large share of their offset budget during Phase II, although unlike the power sector they do not face a shortage of freely allocated allowances.

For the case of power sector companies, early investment in CDM projects seems perfectly rational. Similarly the arbitrage opportunities made the use of offsets financially attractive to other sectors. Companies could sell their surpluses at the secondary market and meet their obligations with even cheaper offsets.

All in all German companies covered only 12 per cent of the offset budget with credits generated in projects with German participation[15]. The vast majority of offsets used for compliance have come from third party projects and been acquired on secondary markets. Have German companies missed an opportunity by doing so ? German investments certainly fall short of what German companies have demanded (see Figure 36), but it might also be naive to think that German and other developed country investors are the only ones to drive supply. Especially in the early phase of the mechanisms it were the host countries themselves who drove investment.

[15] Investors listed in the UNEP Risø CDM Pipeline and/or that appear as applicant of Letters of Approval of the respective projects.

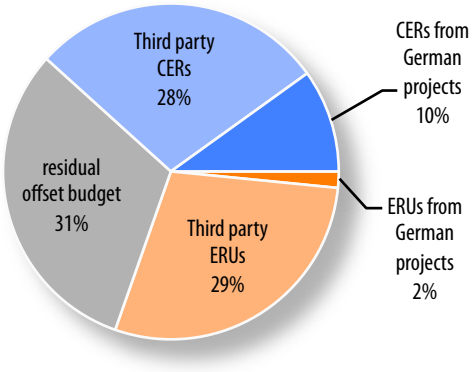

Figure 36: Breakdown of the German offset budget 2008-2012 by type and source of offset.

Project Types and Host Countries

With regards to project types and host countries of the CDM and JI projects with German participation, Germany follows the global trend. By far the largest share of German CDM investments took place in China, India and other emerging economies. Africa and LDCs have largely been neglected. The supply is dominated by CERs from industrial gas and renewable energy projects. Within JI the dominance of a small group of countries is even more striking. Ukraine and Russia contribute more then 90 per cent of the ERUs. Industrial gas projects play even a stronger role here.

The actual usage of offsets in the EU ETS is systematic of global trends. As with the investment, the majority of CERs came from China and India. Despite the relatively small number of projects HFC and N_2O credits dominate. From the JI Ukraine and Russia likewise contribute more than 90 per cent of the ERUs. In contrast to the German investments, the ERUs surrendered in the ETS predominantly stem largely from projects that abate fugitive emissions.

Environmental concerns have repeatedly led to the criticism of the CDM. Some project types, namely HFC and N_2O projects, have created extremely low cost emission reduction credits. This has lead to windfall profits for these pro-

jects and might have caused perverse incentives. Hence, these types of CERs have been excluded from Phase III of the EU ETS, incentivising companies to surrender them in Phase II while they were still valid. Furthermore, concerns with regard to the additionality of some projects have repeatedly been raised. Sectors such as (large) hydropower and to some extent wind power have been deemed prone to this problem. In this context one could ask our overarching question the other way round. Has the CDM benefitted from German participation? The answer is no: Despite strong criticism both German investments as well as German demand have strongly targeted such projects. Only a fraction of German investments were generated in project types which had no environmental concerns.

Auditors, Consultants and Technology Providers

The flexible mechanisms have also created a market themselves. CDM project proponents have relied on the services of consultancies to develop the required documentation, the documentation has to be validated by designated certification bodies and the creation of tradable units has created an opportunity for financial market actors. German companies have embraced this opportunity very differently. German auditors, namely the three TÜV groups have managed to gain a substantial market share in both the market for validation and verification of projects. Collectively they have validated nearly one third of all registered projects and carried out a quarter of all verifications.

By contrast, German consultancies were not able to acquire a substantive market share. German consultancies account for less than two per cent of all PDDs. Similarly, the financial sector did not engage on a large scale. At the European Energy Exchange where CERs and other carbon credits are traded, only three German banks and a handful of dedicated trading houses are registered. Firms that fall under the regulations of the EU ETS dominate trading.

Furthermore, many CDM and JI projects have made use of low-carbon technologies from developed countries. A review of the relevant literature suggests that German technology providers have played a leading role in the CDM. A success story that deserves to be highlighted is certainly the role of German wind turbine manufacturers. More than 2000 CDM wind power projects have been registered to date, making it the single largest project type of the mechanism. German manufacturers have been identified as main supplier of technology in this vast sector.

With regard to the overarching question of this paper, the answer is yes: German companies have benefitted from the flexible mechanisms, but this benefit has differed across Germany's business landscape. Could they have done better? Perhaps. However, with the current situation of carbon prices in general and CER and ERU prices in particular this judgement is very difficult to make. If prices do not recover to a more healthy level, it is unsure whether all investors can return their full investment.

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