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The CLEAN DEVELOPMENT MECHANISM Re-engineered

Abstract

The Clean Development Mechanism (CDM) remains the only instrument that has been capable of delivering cash flow at scale to investments with emissions reduction benefits in developing countries. Although cash flows have largely dried up, the need for earning operational premiums on assets with lower emission profiles than their traditional investment alternatives is intact. Cash flows must not be confused with financing, and although sometimes labeled 'results-based financing' (which in isolation is a contradiction in terms as finance is ex ante while results are ex post), the CDM experience has shown that unless someone guarantees the result – in CDM the 'emissions reduction outcome' – the market will adopt a 'wait-and-see' approach and abstain from participating financially on the basis of prospective cash flows. New mechanisms, like the CDM, that deliver new and untried benefits are therefore at a significant risk of attracting no financing at all. This, too, is true for the new mechanisms established in the Paris Agreement, which is to deliver 'ITMOs' (Internationally Transferred Mitigation Outcomes') yet to be defined (with net mitigation impacts).

The CDM experience provides a basis for engineering such mechanism, or indeed reengineering the CDM itself, to make it a viable mitigation financing tool, providing receipts for payments in the form of certified emission reductions (CER). Two solutions are presented, both of which secure new financing for projects that deliver real and measurable emissions reduction benefits on the basis of prospective revenues from emissions reduction: one introduces up-front securitization of the emissions reductions; the other builds on a defined value of the CERs without the need for a carbon price or a market for trading.

Most of us use simple heuristics as a mental shortcut to ease the cognitive load of making a decision. The problem is once one gets used to a heuristic, it is used to make momentous decisions or none at all — when analysis points to conflict one is at risk of rejecting the obvious in order to stay with the heuristic. The same can be said about the way the CDM has come to be viewed. Its structure can be optimized, but despite the inescapable decline of the carbon market and mounting calls by Parties for change, only surgical changes have been undertaken so far.

Evidence for setting straight the CDM heuristic has been around for a long time. Simply put CERs are not project finance and do not address project capital needs when most needed — upfront[1]. CER based returns are available only after a project is operational. That is why only one third of registered CDM

[1] A small subset of CDM projects, the one-revenue-stream projects that only has income from the carbon market, mainly industrial gasses and landfill gas flaring projects, were sufficiently profitable (IRRs measured in 100s of per cent) to get financed without collateral or risk cover; the industrial gasses projects probably all balance sheet financed.

projects went as far as to get their carefully calculated CERs issued. Despite these fundamentals many staunch believers in the CDM continue to hold on to the idea that 'if only demand could be recreated by establishing a price on carbon all would be good'. Would it really?

CDM demand is on life support at the moment with only a few sovereign and multilateral buying programmes that tender or buy and cancel CERs on the part of philanthropic sponsors. Most CERs change hands at market prices below the cost to issue them and investment board rooms, once hyped on the CDM, go to great lengths to avoid the three letter acronym.

On the other hand the CDM is a unique instrument in the landscape of climate finance — not because of its ability to link to international carbon markets or how it has effectively engaged the private sector in low carbon projects. The CDM is unique because it represents the only 'cash flow instrument' in the climate finance toolbox for emerging economies. Recognized by half of all of INDCs submitted[2], it can complement project financing and directly catalyze (when not then indirectly) a shift in private capital and investment flows toward low carbon development. It does this with internationally recognized high quality measurements protocols and is undisputed in tracking GHGs mitigation outcomes.

This working paper takes an essential look at the CDM and proposes a way to transform it into a true climate finance instrument based on its prospective cash flow. Two elementary solutions to improving the CDM are offered:

1) a 're-engineered CDM' with an securitization model added that allows the cash flows offered by Emission Reduction Purchase Agreements (ERPAs) to function as a project finance instrument, and
2) a 'risk internalization device' that creates up-front securities and frontloads payments for emission reductions, enabling it to contribute to project financing and turns CERs into “receipts for payments” in a true 'results based finance' model.

A really short story of the rise and fall of the CDM

The CDM was the surprise of the Kyoto Protocol almost 20 years ago. With no guidelines except a few enshrined principles, policy details were drawn up in what became the Marrakech Accords in just under four years. With just a few institutions doing CDM implementation and a tiny secretariat, experimentation and learning-by-doing was the implementation model that turned policy into operation where even the methodologies for calculating emissions reductions were developed by market players.

In every respect it was a learning experience, and the CDM Executive Board (EB) and its technical panels were learning with the market, expressing its newly learnt experiences in a flow of guidance and clarification and methodology revisions to help prospective project developers produce ‘correct’ estimates of their projects’ emissions reduction effect. Unintentionally, the CDM-EB created undue

[2] Synthesis report on the aggregate effect of the intended nationally determined contributions http://unfccc.int/resource/docs/2015/cop21/eng/07.pdf

uncertainty in the market by constantly adjusting the rules, fuelling perceptions of registration and issuance risks. Conversely, the financing of CDM projects was left entirely to development banks and the market in general to deal with. Furthermore, through no ill intent the CDM-EB incrementally unloaded operational risk, such as quality, eligibility and performance onto third party verifiers, national country representative's and project financiers. From a funders perspective the CDM became a complex asset creation process, where the carbon price provided the only incentive for using it.

At the same time, projects were supposed to deliver CERs to a newly created international carbon market. This market became de facto the EU Emissions Trading System (EU-ETS). The EU-ETS had its own challenges in auctioning allowances, with generous allocations (and surplus Assigned Amount Units emerging from Eastern European countries) and definitions of "supplementarity" that set limits (or not) on the use of CERs.

As noted above, as a cash flow instrument that does not directly address capital investment needs, the CDM needed an instrument to transform future cash flow into present investment capital, in effect frontloading payments for emission reductions. Hence the frontloading had to be delivered "externally" via advance payments, sometimes in the form of supplier's credit lines. However, due to defaults, poor project performance and uncertainty in the earliest days of the CDM it did not take long before buyers hard coded 'payment-on-delivery' into most Emissions Reduction Purchase Agreements (ERPA): nobody paid for CERs before they were actually issued by the CDM-EB. The accumulation of CDM risks made an ERPA practically worthless as collateral.

The entrance of China in 2005-2006 to a CDM market that was then dominated by India was probably the start of the decline of the CDM as supply of CERs grew significantly to finally outstrip demand. China quickly became the source of two thirds of CERs on the market churning out 100 new projects a month. When Lehman Brothers preempted the financial crisis in 2008-2009 the ensuing recession caused emissions to fall further reducing demand for emission allowances in the EU-ETS such that supply outstripped demand for all carbon units. Within a short period CER prices once 18 euro per ton, fell to just short of 'zero' at 0.16 euro in 2011-12. Meanwhile, China had started to absorb some of its own CDM projects into its pilot emission trading schemes, expected to be operational at national scale soon. Other project developers were less fortunate and a huge potential supply of CERs (corresponding to 6,600 Mt CO2e) to 2020 awaits an investor with an unusual appetite for arbitrage. Realistically, and without him, effectuated issuance will at the most be 10 times lower[3].

In less than a decade the most revolutionary, internationally recognized baseline and crediting mechanism ever developed under a multiparty context was conceptualized, operationalized, expanded to a global flagship, and then practically wiped out before the end of the first commitment period of its founding Kyoto Protocol, leaving behind an industry and infrastructure that had developed around it with an uncertain future and no exit strategy.

But it wasn't just the market…

[3] State and Trends of Carbon Pricing, World Bank 2015

It is tempting to regard the demise of the CDM as only attributable to a once-in-a-lifetime global financial crisis and resultant disappearance of demand for emission allowances. But unfortunately the CDM suffered from a couple of other ills too. Designed to help realize new investments that were otherwise not financeable, the value of the ERPA was supposed to make a difference to project finance. The positive shift in project internal rate of return (IRR), as a carbon revenue calculation exercise, was supposed to bring the unviable venture into viability. But it did not make the project bankable. Very few were interested in checking, if the prospective additional CER-based cash flows (paid on delivery only) made financiers and bankers excited – as the additional investment finance needed for the CDM project was supposed to come from the same bankers anyway.

In all the visionary experimentalism that characterized the CDM, commercial and development lenders were implicitly supposed to deliver their part of the deal by providing additional investment capital to CDM projects. They were expected to attach a value to an ERPA, but seldom got the mandate from their internal fiduciary oversight to do so. Project developers therefore had to find financing for their investments, largely disregarding the prospective value of the CERs in the financing plan. The term 'icing on the cake', became a widespread term for the CDM. Banks may have behaved differently had this novel international market for immaterial products, the demand for which was secured only via a fluid political process in one corner of the globe, been in line with good fiduciary duty. Buyers of CERs implicitly expressed their distrust by insisting on the payment-on-delivery terms, lumping all the system risk (on top of the project risk) on the developer – and his banking partner, should it have accepted to play along. The intended functionality of the entire system ultimately depended on a handful of banks willing to accept the risk for a new commodity in a new trading system, which they did not fully understand, while those who did understand didn't care or dare, or didn't want to!

To improve energy efficiency in schools a small upfront payment is made by a financier. The schools are to impose behavioral changes (as opposed to investments), for instance to keep windows closed to save cooling. If it works (probably only if the upfront payment is spent on hiring a 'window closer' who gets his salary and therefore sees his interest in closing windows) energy consumption is reduced, the result is achieved and RBF is released. If there is no requirement on the usage of the RBF (parallel to the payments for CERs) the pupils (and the window closer) will get ice cream (and the head master some icing on the cake). But in this case the RBF is predestined to be used for double glazed windows to reach the next level of energy efficiency.

If the two steps are reversed, nothing will happen. If the idea is to install the windows first (for which the upfront payment is far from sufficient), where are the funds going to come from? A supplier credit? The bank? The public budget? RBF will always require bridge financing from another source that believes in the result – as opposed to the supplier of the RBF.

Text Box 1. Results-based financing example

The cash flow

CDM's core challenge is to function as a results-based financing mechanism for emissions reduction investments. Without a collateral value placed on the ERPA the mechanism produced a cash flow that arrived at a time when project financial barriers were long since overcome. The financial contribution from the CDM simply arrived too late to support the financial structuring of the investment.

In defense the CDM at least got it half right. In traditional project finance future cash flows are capitalized through the intervention of finance institutions – banks or equity investors. Otherwise, project finance

would not be feasible as there are no assets to use as collateral. In such structures the certainty of future cash flows is paramount. The large majority of CDM projects that are based on energy production produce long term 'safe' cash flows through Power Purchase Agreements (PPA). An ERPA is comparable to a PPA as payment is on delivery of the product - the difference being that a PPA´s product is material (electricity), while an ERPA is an intangible tradable right to emit GHGs. The demand for the first is certain and backed by one hundred years of delivery. So banks are willing to regard it as collateral. The demand for the ERPA´s product is uncertain, immaterial and has comparatively no track record making it insufficient for the banks to treat as collateral.

Here is where the CDM failed – only one third of registered CDM projects attempted to realize the carbon finance they chose the CDM for in the first place. When a project was established and a financing plan put together, a typical project developer would sign an ERPA with a reputable CER buyer. But unfavorable ERPA terms and conditions (tight timelines and unilateral termination, replacement CER requirements and relative pricing) on top of a lengthy approval process, additionality uncertainty and questionable issuance performance (delays, lower issuance rate) for CDM projects in general, and all contributed to making the ERPA a high risk low value financing instrument. As a result, banks, most of which were local and not familiar with assessing CDM project risks effectively never accepted ERPAs as collateral on projects balance sheet – despite that carbon finance was supposed to prove project additionality (see CDM financial additionality requirements).

The CDM is therefore an example of how the principles behind 'results based financing' should *not* work – or it serves to conclude that 'results based financing' is only relevant in situations *where no investment is needed* and thus not a viable financing principle for the large majority of emissions reduction projects – unless, as suggested below, the principle is tweaked. In actions that aim at influencing behavior only, 'financing' is in fact only a reward. It is not needed to finance anything, unless there is a specific requirement to use the finance for a specific future purpose (but not for the purpose that created the result). Akin to payments for CERs that had no predefined investment destination imposed by buyers and therefore could be speculated. Only if 'results based financing' contracts are understood and accepted by banks as collateral can they be effective in structuring the financing of an investment. If a bank regards the contract as too risky, it should walk away from the deal. In CDM it did.

On the whole 'results based financing' is an illogical label for the CDM-ERPA model. It is a simple promise to purchase CERs on delivery, thus constituting only the prospect of a result to base a future payment upon.

Solution number one – risk guarantee

Guarantees are a type of “insurance policy” protecting banks and investors from the risks of non-performance and have been the mainstay of financial markets for many decades. They are a promise of indemnification up to a specified amount in the case of default or non-performance of an asset. When used to back projects they have shown to provide much needed security for mobilizing risk capital.

The CDM assets (the CERs and ERPAs) have been parked outside, not making the threshold for bank due diligence, but not making it to the insurance market either.

Part of the reason why no risk-cover has been established has been a general unwillingness, by the regulator, its oversight and support structure, to take on risk. This stems from a perceived "unmaterialised" or "contingent" liability[4] , even though realistically the regulator would never come in a situation where it would actually have to pay monetary penalties, as it would always be able to indemnify itself through the issuance of CERs.[5] In other words, as the risk concerned is an issuance risk, and the regulator is in charge of the issuance, it can never come in an 'issuance shortfall' situation and thus never become liable to pay up reparations. In those few situations where the project fails on its core activity (commonly power production) and thus also fails on the emissions reduction, the issuance of guaranteed CERs would become an environmental liability and not a monetary one.

Therefore, an obvious solution is the elimination of the inherent CDM risk. For CDM this means project registration and CER issuance risks must be eliminated. However, guaranteeing project registration is tantamount to 'opening the floodgates' – any project would become a CDM project, but it would entail nothing more and achieve nothing. Therefore a more amenable solution is to guarantee the issuance of CERs, which is the core of the banks' requirement – the cash flow (after which the financing can no longer be said to be results based). The past 10 years of operation of the CDM has accumulated a large information base of project characteristics and factors. Emission factors from CDM projects are used by practically all international finance institutions for ex-ante loan due diligence and technical assistance. If a wind turbine project is constructed, there is a significant probability that it will issue about 84% of the expected CERs. Similarly for a waste heat recovery project, there is a known chance that the project will deliver 79% of the expectation once constructed. This statistical base can be used in a 'reverse engineering' of the approval process for the CDM.

Removing the contingent liability means that all that is needed for granting *a guarantee of CER issuance* based on statistically derived expectation of CER issuance is a digital application that internalizes the complexity of the CDM – the user simply checks boxes and chooses from lists of options (similar but more extensive than the digitized methodologies under development) that reflect project characteristics, the level of detail depending on the statistical basis for differentiation. To provide the regulator with a control gate, a sliding scale[6] 'conservativeness premium' on the amount of CERs guaranteed could be subtracted. That would take care of the environmental liability of projects that default on their core activity as mentioned above.

[4] A contingent liability is an obligation to cover payment that depends on the outcome of a future event: thus, the timing and the amount of any payment cannot be known when the contingent liability is assumed.

[5] which is a matter of environmental integrity. It has been demonstrated, however, that the current system has environmental integrity issues with projects that materialize and have been registered without the 'documented' financial contribution from CERs.

[6] probably reflecting the variance in observed issuance success of similar operational projects

An issuance guarantee is also the de facto registration of a CDM project, thereby eliminating the registration risk. At the same time there is built-in certainty on the amount of emissions reduction that is awarded to a project, which eliminates the verification and issuance risk.

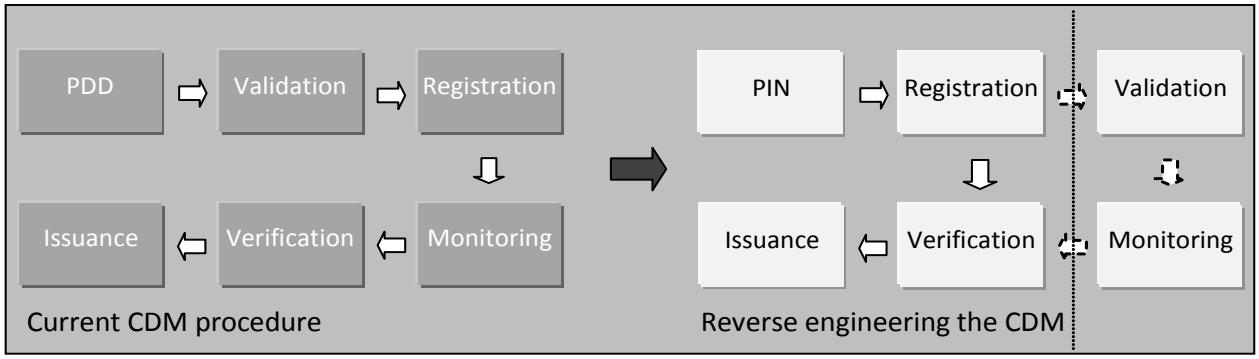

Figure 1. The idea of a reversely engineered CDM was first presented in 'Financial Engineering of Climate Investment in Developing Countries (S. Lütken, 2014) from where this illustration is borrowed

With an elementary process flow swop, putting what used to be at end up front, the CDM becomes an actual climate finance tool. With absolute certainty of issuance, all that remains is for the lender to assess is the fiduciary quality of the buyer. This is a process that banks are familiar with. If buyers are reputable, as has often been the case in ERPAs, the ERPA might become AAA rated collateral; its product, the CER, achieving a value at par with the electricity of a PPA.

Another advantage is that in principle the only condition the project developer must fulfill is that the project has to be built. This is the same condition that any other financier will pose, releasing funds when financial closure or specific engineering, procurement and construction (EPC) milestones are reached. As the emissions reductions remain a marginal benefit to the core investment – wind turbines are built to produce power; waste heat recovery projects are built to save energy – finance can be released against the CER guarantee on a pro rata basis agreed between the project developer and the leading financier.

Additional control systems are not required as the transparency framework of the CDM allows other stakeholders with a higher stake in the project to see what is going on. As the interests of the asset operator and the CDM regulator are aligned the latter can adopt a minority stakeholder role and issue the guaranteed CERs, for example on an annual basis, upon proof of operation.

The tenor of the issuance the guarantee can be determined in several ways, with the most pragmatic being to set a maximum number of years and a maximum percentage (15%) of the typical investment, whichever comes first. In Table 1 two technologies are presented on the basis of average generation of CERs and the value of the CERs after 3, 5 and 7 years as a percentage of the investment assuming a set price of 10 US$ per CER.

Technology	average issuance %	years of issuance	average CERs/ investment $	% of investment @ 10$/CER

Wind	84% (819 projects)	3 years	0.004706	4.7
		5 years	0.007843	7.8
		7 years	0.01098	11.0
Waste heat	79% (85 projects)	3 years	0.02111	21.1
		5 years	0.035184	35.2
		7 years	0.049257	49.2

Table 1. Potential investment contribution from CERs

Table 1 shows that the investment contribution from CERs for waste heat projects already before one year of operation exceeds a 15% investment guarantee limit (at an assumed price of 10 US$/CER). The percentages reflect the actual CER generation and not the amount claimed at project registration. Wind energy is the least cost efficient technology in terms of investment per generated CER[7] and requires significantly longer time to produce any noteworthy investment contribution. However, even for wind energy projects only 6-7 years of guaranteed CERs can have a positive impact on the financial structure of a project. For example in Text box 2 a wind project receives 6 years of issuance guarantee so that the resulting 720,000 CERs minus a conservativeness premium of 100,000 CERs effectively close the finance gap. The guarantee corresponds to 7.5% of the investment, thus remaining below a 15% limit on total investment.

50 MW wind energy
Investment 80 million US$
Expected annual issuance: 120,000 CERs
CER price: 10 US$
Equity secured: 24 million US$
Loan secured: 50 million US$
Gap: 6 million US$
Annual CER value: 1,200,000 US$

The wind project has secured sufficient equity (30% of the investment). 62.5% loan capital has been raised. 7.5% is missing, which can be covered by 5 years of expected CER generation (6 million USD). One more year is added to the guarantee tenor as conservativeness measure; hence 720,000 CERs will be issued for the first 6 years of operation, guaranteed.

Text Box 2

Securing the integrity of the system

Critics of re-engineering the CDM will point out that projects will underperform and be rewarded with too many CERs - a relevant concern. As the approach is based on average CER issuance per invested dollar – some will over-perform and others will underperform. On average, it balances out – hence it is only the individual project developers whose projects are over-performing that may be unfairly treated. Underperforming projects that lose core business cash flows may in fact need additional support to keep reducing GHG emissions. It appears fair in such cases to reward the risk willingness of investors who invest in technologies that also result in high quality emissions reductions, also when conditions do not pan out

[7] See the working paper 'Penny Wise, Pound Foolish', S. E. Lütken, UNEP Risø 2013

as planned. The proposed 'conservativeness premium' from all issuance guarantees is intended to cover those situations.

Others will point to the risk of non-additionality of projects that are already too profitable compared to the IRR benchmarks for additionality. Such criticism would not be justified. Applied benchmarks are in any case arbitrary and have never been proof of additionality. Most importantly, however, the fact that the ERPA can now be used as collateral for financing is more likely to prove additionality. Assuming that all available investment collateral is currently employed, the arrival of additional collateral (in the form of CER guarantees) will also result in additional investment. In this light the current approach to determining additionality is highly questionable, whereas the guarantee approach is effectively a replacement of additionality testing.

Costs savings on simplified approval procedures are significant – project documentation (PDD), validation, registration, monitoring and verification all fall away. This benefits smaller project developers in particular and makes the CDM a more competitive instrument. The current illogical disregard of CDM related administrative costs in the calculation of project IRRs would no longer occur.

There is no need to abolish the current CER or project approval process - it runs as is. If project developers wish to include the entire potential CER production of their projects they apply for the full emission reduction via the usual application procedure with full PDD, validation and full-registration and verification. The initially determined eligibility for issuance is not re-visited, but there is a risk of losing a share of the guaranteed CERs to balance the potential gains from registration. Any potential deduction from the guarantee, however, would be adopted as an *actual* deduction by a bank accepting the ERPA as collateral. Therefore, such a deduction should be capped to 10% in order for the full registration to have any appeal. In other words, developers who think they can deliver more than the statistically based and guaranteed CERs can opt for traditional registration and if doing so they adopt the risk of losing 10% of the guaranteed CERs, while their upside (in the form of not guaranteed CERs) is open ended (i.e. they can over-perform by any percentage if verified following current procedure).

Without being able to assess exactly how many non-additional projects will sail through the system with only a guarantee is difficult to say, but there will probably also be a number of additional projects that will settle for the guaranteed issuance and not proceed to the full cycle CDM. These two opposite drivers may well equalize each other out. The question is simply what is better: an illusory additionality test or abolishing stringency in favor of entrusting the banks to provide additional finance on the basis of guarantees that the regulator is in the best position to provide and control.

What about demand for these CERs and lack of data?

There are obviously challenges related to those types of projects that so far have not established any issuance record and therefore cannot produce performance data upon which a CER guarantee or loan can be established. This could be taken care of through a particularly risk willing guarantee or loan structure

The model presented here may further not be needed for relatively 'capital-light' project types such as methane / industrial gas flaring. Also projects that scale continuously such as distributed household technologies (cookstoves, solar home systems) may not need a full guarantee and be financeable on an actual results-basis, assuming revenues from early results are re-invested into scale up. Therefore these project types could/should probably be addressed separately – e.g. using a put-option ERPAs model like the one currently experimented with under the World Bank Pilot Auction Facility.

Allowing the CERs a real role in the financial structuring of projects by establishing an issuance guarantee described above does not recreate demand for CERs. Its success therefore depends partly on restored carbon prices, possibly driven by international governmental organizations (IGO´s) and INDCs, many of which already indicate a need for off-sets. Also the Paris Agreement establishes a mechanism that seems to resemble the CDM. But even in a CDM positive scenario a buyer for the latent surplus of supply from existing CDM projects has to be found. Exactly this is not required in solution number two.

Solution number two – receipt for payments

In the current setting most CDM project developers choose to prove the additionality of their projects by producing a financial argument that makes a non-viable project viable through the prospective CER-revenues. This is a quite fictitious exercise as it is not related to the actual financing of the project. Therefore the developer has a certain flexibility in setting both construction cost, expected project performance and the carbon price in order to arrive at plausible figures in terms of proving that the carbon revenues are decisive for the investment decision. Due diligence is not performed by a bank, but by a validator who has comparably little at stake if the figures do not add up in the end, - whereas a bank lending money to the venture cannot afford to be quite so lax. This is not to say that the validators do not do their job, and do it well, but their job is not, and was never supposed to be financial due diligence. Had the approval system been closer related to the actual financing of projects, i.e. the banks' lending operations, the current CDM validation step (prior to registration) might have been abolished altogether.

This assumption is the basis for solution number two. When banks offer to finance projects, they do so on the basis of thorough due diligence that beyond the numbers and the expected IRR, mostly look at risks and risk cover. The only difference for a CDM project is that banks also have to assess the risk on the carbon revenues – which is what solution number one takes care of. In solution number two the bank absorbs the carbon revenue risk by offering to accept CERs as receipts for payments.

It should be kept in mind that the CDM project is one and the same as the investment project. That means that all data to support a financial due diligence will already have to be retrieved and analyzed. In this process the bank would consider if the finances in e.g. a renewable energy project match up. Commonly this could be due to established feed-in tariffs – in which case the projects are unlikely to be additional (which, however, in the current setting has not prevented CDM registration). In the cases, where it does not, the host country may not have an established feed-in tariff system or does not offer sufficiently attractive PPAs, both of which is altogether reasonable for strained developing country budgets. In these cases the CERs may be a source of additional income – exactly as the CDM was thought out at the outset,

but if the CER revenues are to make the difference they must be risk free, i.e. the carbon market risk, the registration risk and the issuance risk must be eliminated.

This would effectively be the result if the bank provides the option for the developer to repay part of the loan with CERs – and if CER issuance is automatized on the basis of the aforementioned performance data from already operational CDM projects (although there may be a need for an issuing entity in order to avoid risks of double counting). In this way CERs become a means of repayment of loans issued in monetary currency on the basis of a predefined carbon price.

It is a simple amortization structure – funds are disbursed upfront as a project based construction loan, part of which may be repaid with CERs, which are then cancelled (or retired). This is obviously not viable for private sector banks seeking sound return-to-risk-ratios, but it would be a useful delivery mechanism for finance provided through e.g. the Green Climate Fund Private Sector facility.

Assuming an annual amount of 100 billion is to be raised it would be beyond any logic to deploy all of it as loans, although this appears to be the currently expected modality. The only logical deployment mechanism is the provision of grant elements related to investments, much along the 'incremental costs' principle employed by the GEF, but with a smarter delivery mechanism, which through solution number two directs the funds towards the most latent financial gap in the current climate finance landscape, namely the emissions reduction related cash flows that so far have only been provided through the CDM.

In this solution, the current registration system for CDM projects is maintained. In place of market based ERPAs is an offer from selected AEs affiliated to the GCF, which on the basis of the same statistical base employed in the first solution, provides a loan of up to 15% of the capital investment effectuated upon registration of the activity as a CDM project. A simpler registration procedure without validation is certainly possible, but for lending bank comfort and for the 'additionality proof' of registered projects, the CER-based loan component must be linked to other monetary lending from the same financial institutions, ideally integrated in the basic loan structure.

A CER loan document replaces an ERPA. It effectively also replaces the market, but in place of it must be defined a fixed price on carbon. A logical source of a non-market based carbon price could be the GCF Board or an advisory function to the GCF that determines a fixed price on e.g. biennially and on the basis of scientific (cost of carbon) and/or market/investment related criteria. This price will be the conversion factor for lending arrangements, i.e. a max. 15% financial participation in an investment is converted into a number of CERs that need to be surrendered to the AE. In practice, the AE draws the cash on the GCF, and repays GCF in CERs when they are cancelled by the UNFCCC.

A scheme like this emulates governmental purchase of CERs on an upfront payment basis, which in the original CDM led to fraudulent behavior of developers that never developed the projects they were already paid for. But in this case fraud is grossly prevented by linking the carbon revenues to fundamental project finance. If fraud is intended it is much more severe for the 85% of the loan that is in monetary currency than for the 15% that refers to a carbon revenue. It would be equal to any other fraudulent behavior in lending arrangements, which banks have been dealing with for centuries and therefore not particular to the emissions reduction element of certain types of projects. There is simply no reason to

treat the emissions reduction element separately from the traditional financing arrangement. Any fear of jeopardizing environmental integrity is also called to rest as the CERs are cancelled directly after issuance by the CDM-EB, hence there is no off-setting of emissions elsewhere.

As the lending is based on the shortfall of cash flow to service the debt, it can of course not be excluded that such shortfalls are created – in the sense that host countries would offer PPAs less advantageous than they otherwise would be inclined to with the prospects of the GCF ultimately shouldering the additional costs. Partly, however, this could be said to be in conformity with the purpose of the GCF. Should such circumventions become obvious, the ultimate victims are the contributors to the GCF, who risk achieving less GHG emissions reduction. The GCF, however, would be in a good position to enforce prudence among its beneficiaries through its financial involvement in other low carbon development strategies and policies of countries hosting CDM projects and financed through the suggested loan arrangements.

The amortization model supplements tariffs offered on PPAs or general feed-in tariffs, but does not replace it. Neither can a feed-in tariff replace the amortization, because the risk structures are complementary. The feed-in tariff holds a regulatory risk (retroactive tariff regulation, against which the CER functions as a (limited) insurance, because it now is as a stable price element in the revenue streams due to the fixed CER price agreed for amortization.

The simple (partial) repayment by CERs of loans paid out in monetary currency may also be structured in other ways that are closer to a market based model. For instance the bank could act as liquid guarantor by acquiring the CERs at a fixed minimum price matched to a loan at prescribed intervals or offer the difference between an agreed price and the actual market price at the time of delivery.

An innovative approach could also be to convert future CERs into an upfront equity contribution through specially created venture funds that offer equity in return for future CER delivery. Shareholder agreements would allocate monetary profits to traditional investors while CERs are allocated to the 'CER equity investor'. Such arrangements serve as risk mitigants by improving debt/equity ratios (increasing the equity) and bringing down the cost of capital. Ironically, this could have been the way in which the CDM originally had functioned, had emission constrained entities within the EU (following the national allocation plans) interpreted the CDM in the same way as negotiators did originally after COP7 in Kyoto. CDM was thought of as providing 'where-flexibility', i.e. providing flexibility for companies with a cap on their neck to reduce emissions where it would be least costly. While few, if any, emissions constrained entities interpreted it in this way, they could have chosen a lesser radical option to at least co-invest in assets with emissions reduction benefits up to the amount corresponding to the activity's CER generation capacity (e.g. until the end of the first commitment period).[8] In effect, this would have been following the above suggested principle of equity investments in return for CERs.

[8] This is discussed at length in 'Corporate Strategies and the CDM' (Lütken & Michaelowa, 2008)

Conclusion

The models presented here provide a way to ensure that GHG emissions reductions of low carbon projects are rewarded through a steady cash flow supporting the operation of the asset. This is the prime virtue of the CDM and was supposed to be the way it should function. The challenge with the CDM is that it carries far too much uncertainty and risk for future CER cash flows to function as collateral when the project sponsor raises investment capital for the project.

The solutions presented here deliver securitized cash flows upfront and can function separately or together. The guarantee model can revitalize the carbon market if such be desired, whereas the loan model can function in the absence of a carbon market altogether in a receipt for payment (loan or equity) approach. The equity variant can work in both settings. All three models serve to turn the CDM into the climate finance tool it was supposed to be and which is still in need in the market, as documented by requests in over half of all INDCs submitted to date. With the gradual operationalization of the GCF it is almost too obvious that a reengineering of the CDM could become one of its easiest and immediately realizable instruments.

Should countries having submitted INDC with built-in import of offsets chose to wait for the ITMOs (because the Paris Agreement documents that no CDM-affiliation is desired) they must be aware that unless the bitter sweetness of the CDM experience is heeded in the design of new mechanisms a bottle of ITMOs may very well end up tasting remarkably equal to a bottle of CERs.