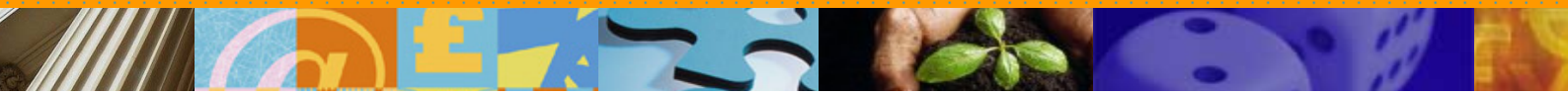
Module 3:
Carbon Finance



Lesson 10: CDM: Risks and opportunities for financial service providers

UNEP Finance Initiative (UNEP FI) e-Learning Course on
Climate Change: Risks and Opportunities for the Finance Sector

in collaboration with

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Lesson 10 Contents:

Objectives

This lesson provides in-depth review of the CDM. The focus lies especially on the specific risk structure of CDM projects. CDM projects contain additional risks that are usually not assessed by a common project due diligence process. The main CDM risks refer to the complex and time consuming registration process, to the dependence on unforeseeable decisions by national and international authorities and to the performance of the project in terms of achieved emission reductions.

Furthermore, this lesson introduces various risk mitigation instruments for CDM projects. These instruments are embedded in case studies to illustrate different options available with special emphasis on the financial structuring of CDM projects.
The main questions addressed in this lesson are:

1. What are the specific characteristics of CDM projects compared to 'common' projects?
2. What are the particular risks of CDM projects?
3. What are the options to mitigate CDM risks?
4. What instruments can financial institutions employ to address CDM risks?

Differences between CDM projects and 'common' projects

As outlined in lesson 9, CDM projects should generally be regarded as 'normal' business ventures. Nonetheless, it was also made clear that certain additional challenges exist when implementing a CDM project. The CDM project cycle was introduced as a procedure with an uncertain outcome that can take 1-2 years and that generates costs between EUR 50,000-250,000. On the other hand, the additional income stream from certificate sales generates significant benefits.

The following table provides an overview of the specific aspects of a CDM project that differ from the common project development and implementation processes:

CDM Project Development	
Additional documentation	The development of the PIN and the PDD leads to increased transaction costs. Whether or not a project succeeds in being registered as a CDM project highly depends on the quality of the project documentation.
International regulation	The CDM process is embedded in international climate protection policies. This leads to a very complex and time-consuming registration procedure at the UN Climate Secretariat's CDM Executive Board.
National regulation	In addition to the usual legal premises for foreign investment projects, a CDM project has to comply with specific national regulations that are supervised by the Designated National Authorities (DNA). Each country can define national criteria that a project has to fulfil for national approval.
Third party review 1	The PDD can only be submitted to the UNFCCC after validation by an accredited validator (DOE).
Time management	The development of the CDM component of a project may take 1-2 years or even longer. Implementation and financial closure can only to a small degree be pursued in parallel, because the evidence for the project's additionality would otherwise be obstructed.
Additional operating expense	The project activity has to be constantly monitored in order to assess the exact amount of emission reductions. Depending on the technology, this can lead to considerable costs and expenses.
Third party review 2	The monitored results of the project activity are again subject to third party review (verification) to be conducted by a DOE (other DOE than for validation procedure).
Additional contracting	In the Emission Reduction Purchase Agreement (ERPA) the transfer of the reduction credits is outlined. The ERPA also defines the allocation of risks between the seller and the buyer. The certificate price depends mainly on the risk distribution.

Specific risks of CDM projects

A CDM project is subject to conventional project risks like any other business venture:

- market risks: e.g. relevant fuel price increase
- counterparty credit risk: e.g. risk that the technology provider becomes insolvent
- underperformance risk: e.g. non-achievement of anticipated performance
- risk of exceeding costs: e.g. the employed technology needs costly repairs or the construction of the project is delayed
- currency risk: e.g. high inflation levels
- force majeure risk: an event beyond the control of the involved parties occurs, e.g. earthquake

The conventional risks are often aggravated in developing countries, where the legal and political situation may be unstable. CDM by definition takes place in developing countries.

Additional risks due to political instability are:

- Risk of confiscation, expropriation and nationalisation
- (Civil) war risk: e.g. risk of riot, strike and civil commotion
- Contract repudiation/frustration: risk that a contract is rendered invalid e.g. by a parliament introducing new legislation
- Enhanced credit risk: in particular risk of host country insolvency
- Further administrative barriers: e.g. host country requires various administrative procedures that delay the project

On top of this, the CDM process itself contains additional risks that derive from its complex and still changing political design. CDM risks can be grouped into five categories:

1. Registration risks
2. Host country risks
3. Delivery risks
4. Ownership risks
5. Post-Kyoto Protocol risks

Registration risks

Registration risks are related to the non-approval of the project at the Executive Board (EB), and thus its failure in the CDM registration process. Since the profitability of a CDM project usually depends on the CERs and since a considerable amount of time and effort goes into the project development before submission to the EB, this risk can be crucial. The two main reasons for failure in registration are improper application of a baseline methodology and lack of additionality.

EcoSecurities, one of the largest CDM project developers, estimates that more than 50% of the certificates in its portfolio would not reach the market due to regulatory complications within the registration process. This means that many certificate vintages will lapse because of delayed or dismissed registration.

Risk mitigation strategy:
The best way to mitigate registration risks is through a very thorough development of the project documentation. The application of a baseline methodology is a complex and highly technical procedure. In principle, there is an incentive for the project developer to calculate emission reductions as favourable as possible in order to harvest more certificates, but a trade-off should be accepted between less certificates and better chances in the registration process. In fact, the amount of certificates can turn out smaller when the baseline is applied too optimistic, because entire vintages of certificates might be lost due to time consuming revisions at the CDM EB. Also, factors that are not under the direct control of the project developer can cause failure, like the withdrawal of an already approved methodology.

At first sight, the concept of additionality may seem rather bewildering. The need to prove that a project would not be feasible without certificates creates a somewhat perverse incentive to display a project's financial structure weaker than it actually is. However, the argumentation of additionality should be done with great accuracy. It is important to note that this is not just a measure to underline the aspect of development cooperation, but it is seen

as a guarantee against misuse of CDM and it can be a serious barrier to implementation. In fact, the lack of additionality is the most frequent reason for non-registration.

Host country risks

The CDM specific host country risks refer to the national CDM regulations and the quality of the DNA. Only few countries have specific legal constraints to CDM. China is a prominent example, because the People's Republic demands taxes on CERs (the rate depends on the project type), it prescribes that every project must be to 51% owned by Chinese companies and it has introduced a minimum price of 8 Euros per certificate. In other countries the CDM process is obstructed for example by an inefficient DNA or by very high standards for host country approvals (HCA). The Brazilian DNA for example, was reported to have asked the EB to reject projects that it had previously approved itself, because of some inconsistencies in the project documents. The Thai DNA has hardly been operational at all until end of 2007 because no functioning structures and processes had been designed due to general political instabilities.

Risk mitigation strategy

The project participants usually have little influence on the national decision making process. The DNA procedures should be examined as closely as possible to see where the national priorities lie and what aspects should be especially considered. Projects developers should be in close contact with the DNAs.

Delivery risks

Since the calculation of emission reductions is a very complex procedure that is based on hypothetical assumptions and future prognosis, there is always a risk that the project will not deliver the anticipated amount of certificates. This can seriously impact the financial planning of a project. The risk of underperformance gains additional weight, because CER transactions are mostly based on forward contracts.

Risk mitigation strategy

The baseline calculation should be done very thoroughly using conservative figures. The buyer has to assess these figures before concluding the ERPA. In the end, the risks must be distributed between seller and buyer via the arrangements in the ERPA. The degree to which a seller gives a delivery guarantee has a great impact on the certificate price.

Ownership risks

The CER ownership rights are not always easy to determine. The host country could even nationalise CERs and claim full rights to the certificates. Even when the ownership is clear, a risk arises from the ERPA. If the credits will not be directly issued to the buyer, the seller may be tempted to maximise profits by selling credits at a higher market price, rather than delivering them pursuant to the contract.

Risk mitigation strategy

This risk can be best addressed by a thorough design of the ERPA. The buyer should try to include strong penalties for non-delivery.

Post-Kyoto risks

The binding emission target of industrialised countries set out in the Kyoto Protocol will expire in 2012 and the difficulties of agreeing on a treaty for beyond 2012 become apparent in the current political debate. The change in the US administration has brought hope for a continuation, but many issues remain to be resolved before an international agreement is reached. While the binding targets expire in 2012, CDM is set to continue. There is certainty that the EU will buy credits beyond 2012 but uncertainty remains on what type of credits will be accepted in the EU. Thus trading with post 2012 vintages of certificates remains very thin.

Since many CDM projects have a long life span, the certificate vintages that remain between the date of registration and 2012 may not be sufficient to secure profitability of the project.

Risk mitigation strategy

Market participants may be able to influence the political decision making process by actively participating in the climate policy debate. Buyers should concentrate on energy efficiency and renewable energy projects, which are most likely to be eligible in the EU also post 2012.

How can financial service providers address CDM risks?

For a financial institution, getting engaged in any type of project is always a question of how to identify, allocate and assign the project risks. Generally, financial service providers and investors are used to dealing with conventional project risks and country risks using risk assessment and mitigation tools (e.g. insurance/reinsurance).

CDM process risks are relatively new to financial institutions but are gaining ever bigger importance. Uncertainty around regulations to curtail global climate change tops a list of business risks published in March 2008 by the consulting firms Ernst and Young and Oxford Analytica. Comprehension of the risks requires a detailed understanding of the political and legal framework of the CDM, and, for European players, also of the EU Emissions Trading regime and its link to the CDM. There are only a few CDM experts available in the financial sector at present, hampered further by a limited history of how to mitigate CDM process risks, and which strategies to employ successfully.

The modalities of the CER transaction are defined in the ERPA. Its design determines the allocation of risks and the certificate price. There is always a trade-off between taking few risks and getting low prices. This means that strong penalties for non-delivery of the CERs are, on the one hand, a promising way to mitigate the risk of CER shortfall, but on the other hand they will increase the price. The ERPA provides room for flexible solutions (e.g. fixed price vs. price that is linked to the EUA price). In addition to this, the seller has different options in view of whether or not a delivery guarantee shall be provided.

Most importantly, insurance and non-insurance risk management instruments for CDM projects are becoming available in the market, e.g. provided by AIG, Carbon Re, Munich Re and Swiss Re. A carbon delivery guarantee is an insurance product where the re/insurer acts as guarantor for future CER delivery, and financial compensation to the buyer of the certificates is paid in case CERs are not delivered according to agreed terms and conditions.

There are also different options for non-insurance risk management. The buyer may request collaterals from the seller in order to guarantee compensations in case of non-delivery of carbon credits. Collaterals may be in form of first demand bank guarantees, letters of credit, parent corporate guarantees, or pledges of an escrow account. The buyer may also propose to open a margin account where the seller will regularly place the positive change in the contract value measured by the difference of contracted price and change in the market price. The intermediary buyer can, in his turn, provide delivery guarantees for clients that purchase CERs from him by entering into a back-to-back carbon delivery guarantee with another sponsor, or aggregate a pool of project participants that offer a diversified CER/ERU portfolio. Risks can also be diversified by investments in carbon funds as described in Lesson 9.

Case Study 1: Bii Nee Stipa Windpower Project – Mexico

Project description:

The Bii Nee Stipa project consists of the installation of 200 MW wind power capacity in the Oaxaca province of Mexico. About 200 wind turbines will be installed in three project phases: 50 MW in 2006; 50 MW in 2007 and 100 MW in 2008. With an expected average load factor of 42%, the project will produce 730 GWh of electricity per year. As the first wind power project in Mexico, Bii Nee Stipa has an important pilot function for the development of renewable energy technologies in Mexico.

Project structure:

The project is developed under a joint venture agreement, signed by *Gamesa Energía* (Gamesa) and *Cableados Industriales SA* (CISA). Gamesa is one of the world leading producers of wind power technology, based in Spain. CISA is a Mexican developer of energy service and telecommunication projects. Gamesa and CISA have created a special purpose vehicle (SPV) for the project. The shareholder structure is 90% Gamesa and 10% CISA. The SPV is seeking construction and loan financing commitments from investors.

Financial planning:

Total investment (USD)	270,000,000
Annual generation (MWh/year)	730,000
Average price (USD/MWh)	63
Annual income from energy sales (USD)	45,990,000
Project duration (years)	20
IRR without CER sales	11.67%

Impact of CERs on the IRR:

Price (USD/tCO_2e)	5	7	10	15	20
IRR impact	+0.6	+0.8	+1.2	+1.7	+2.3

Emissions reduction:

Wind energy is a zero emission technology in its use phase, thus the project emissions are zero. Nonetheless, emissions that are caused by construction and maintenance have to be considered (e.g. transport, energy consumption etc.). To define the baseline emissions, the emission factor of the substituted energy mix was assessed (tonnes of CO_2 caused by the generation of one MWh in Mexico).

Expected emission reductions:

Annual average 2007-2012: 288,222 tCO_2e
Total until 2012: 1,729,331 tCO_2e

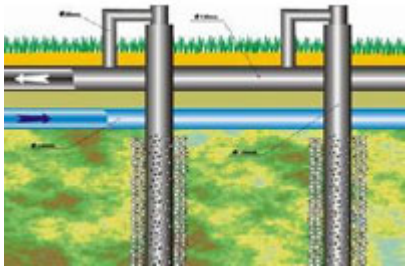
Additionality:

To demonstrate the additionality of the project an investment comparison was conducted on basis of the equity IRR and the investment costs per MWh. The investment of USD 1.35 million per MWh is higher than that of conventional power plants or other renewable sources. Thus the activity is not regarded as the economically most attractive option.

The IRR without CER sales of 11.67% was also estimated to make the project unfeasible. The impact of CER sales on the IRR is 0.6 to 2.3 percentage points, depending on certificate prices. This pushes the IRR sufficiently to make the project feasible.

Case Study 2: Meizhou Landfill Gas Recovery and Utilization – China

Project description:



The Meizhou Landfill project aims to reduce GHG emissions by capturing methane at seven landfills in the Meizhou district and using it for energy generation through the installation of gas collection systems. The treated landfills add up to an average waste amount of 1.160 tonnes per day. The project activity implies the implementation of 2MW energy generation capacity, as well as flaring systems.

Project structure:

The developer, owner and operator of the Meizhou Project is Shenzhen PhasCon Technologies Co., Ltd. (PhasCon), a Chinese-Canadian joint venture, specialising in energy efficiency service, renewable energy utilisation and GHG mitigation. PhasCon is in charge of the design, financing, implementation and operation of the project.

The technology provider is Comcor Environmental Services of Canada (Comcor), a Canadian company specialising in landfill gas recovery and utilisation. Comcor provides technical assistance in design engineering, training of personnel, safety and operational reviews with the aim to build local capabilities to conduct all aspects of the project activity.

The owner of the landfill sites is Meizhou Environment and Sanitation Administration Bureau of Guangdong (MESAB). MESAB is a government agency responsible for the waste collection and disposal. In 2004, PhasCon signed a 30-year contract with MESAB for the introduction of collection and utilisation technologies for eight landfills in Meizhou. MESAB will provide the necessary construction tools for landfill ground cover works.

The Austria JI/CDM Programme has signed an ERPA with PhasCon to purchase the CERs from this project.

Financial planning (in US$):

Investment + operation and maintenance:

Start up	330,000
Flaring equipment	620,000
Gas refining plants	1,232,000
2MW generation system	2,072,000
Grid connection	45,000
Pre operational costs	370,000
Total investment (USD)	**4,669,000**
Project duration (years)	20

Income from electricity sales:

Annual generation (MWh/year)	15.8
Average price (USD/MWh)	671
Annual income from energy sales (USD)	**1,056,000**

Income from certificate sales:

CDM programme costs	264,000
CER price (USD/tCO_2e)	5
Annual average CERs	286,525
Annual income from CER sales (USD)	**1,432,625**
IRR with CER	**40.45%**

Emissions reduction:

The emission reduction of the Meizhou project consist has two components: the mitigation of methane emissions from the anaerobic process in the landfill, and the replacement of conventional energy generation by a zero emission renewable source.

To estimate the expected emission reduction, a complex calculation of the methane generation potential of the treated waste was conducted. On the other hand, the monitoring of actually achieved reduction can be done by measuring the gas flow in the electricity generators and the flaring systems.

The reduction by replacement of energy generation from fossil sources is estimated in the same way as described in Case Study 1. Due to the small amount of reductions and the considerable expense for calculation and monitoring, PhasCon will not claim these reductions for the first crediting period.

Expected emission reductions:

Annual average 2006-2012: 286,525 tCO_2e
Total until 2012: 2,005,675 tCO_2e

Additionality:

The current uncontrolled dumping can be seen as business-as-usual and hence as the realistic baseline scenario (there have been national regulations for waste treatment in China that would prevent the emission of methane, but these regulations have never been enforced). Landfills are mostly managed by municipalities and, particularly in developing countries, the municipalities have few financial resources to improve the waste management systems. Additional technological barriers make the implementation of improved waste treatment extremely unlikely. Furthermore, in absence of CDM, the only income stream of

gas utilisation systems is the sale of electricity, which will only cover a small percentage of investment costs.

The additionality of the project was shown by applying a benchmark analysis to compare the project IRR with the rate of return of Chinese national bonds. The return rate for bonds was 4.44%. Since the project's IRR without certificate sales is negative, it is lower than the bond rate and the project can be regarded as financially additional.

Case Study 3: N_2O Emission Reduction in Onsan – Republic of Korea

Project description:

N_2O accrues as a by product in the production of nitrous oxide (NO_x) which is used in industrial activities, like nylon production or the production of synthetic fertilizers. N_2O is as GHG even more potent than methane. It has a GWP of 310. Rhodia Polyamide Co. Ltd (Rhodia) has an adipic acid plant in Onsan, South Korea. NO_x is used in adipic acid production process and thus the plant emits a large amount of N_2O in its exhaust gases. The current Korean regulation does not impede N_2O emissions, since they do not have a direct negative impact at the local level.

The project activity consists of the installation of a high temperature thermal decomposition facility to convert nitrous oxide into nitrogen and thus avoids N_2O. A boiler for steam generation will also be installed to use the high-temperature flue gas coming from the thermal oxidizer.

Project structure:

Rhodia Energy SAS in France, the mother company of Rhodia Polyamide Co. Ltd has chosen a unilateral approach for this project. The development, implementation and operation are conducted through its affiliates Rhodia Energy Korea Co, Ltd and Rhodia Japan Ltd. For the transfer of certificates, Korea Energy Management Corporation (KEMCO), a local public entity, was integrated as a local partner.

Financial planning:

Total installation costs (EUR)	**6,500,000**
Total Operation costs (EUR/year)	**6,750,400**
electricity consumption	120,600
gas consumption	6,210,700
steam consumption	189,100
maintenance	230,000
Operation time	30 years
Revenue form steam generation (EUR/year)	**6,549,600**
Estimated revenue from CERs (EUR/year)	**45,750,000**

Emission reduction:

The maximum adipic acid production capacity of the plant is 415 tonnes per day. Typically, about 0.3 kg N_2O is generated in the production of one kg adipic acid. Through the project activity, N_2O is decomposed almost completely (>99%). The decomposition process uses very high temperatures of about 1,300°C. This leads to considerable energy demand. The emissions caused by the energy generation have to be subtracted from the project's emission reductions. Net emission reductions have been estimated as the following:

Annual average 2007-2012:	9,150,000 tCO_2e
Total until 2012:	54,900,000 tCO_2e

Additionality:

There is no economic incentive to avoid N_2O emissions besides the CDM. Also national regulations do not restrict N_2O emissions in any way. Thus, the installation of N_2O decomposition facilities without CDM would not be economically viable.

Key Terms

- Emission Reduction Purchase Agreement (ERPA)
- Carbon Delivery Guarantee
- Due diligence
- Risk mitigation

Wrap up

The broad utilisation of the CDM in different regions of the world and in diverse economic sectors is the best evidence for the success of the mechanism. The reason why it is the instrument of choice for so many parties lies in its two-fold nature: it helps to foster technology transfer and foreign investments in developing countries and it provides cost efficient emission reduction opportunities for industrialised countries. In addition, it creates various business opportunities. It has taken some time for financial institution to see the potential in CDM investment. However, financial service institutions are starting to show more interest in CDM projects and emission certificates, and, increasingly, financial services and tools are being provided.

Despite some of its successes, one must bear in mind that the CDM still carries many risks on top of the usual project risks, and that very careful due diligence is a must. Some suggestions and tools for risk mitigation have been presented. However, it must be pointed out that the main risk is lack of a policy framework beyond 2012. The window of opportunity for new CDM projects is half closed already today.

Additional Reading

- Deutsche Bank (2008): Investing in Climate Change 2009
- Institute for Global Environmental Strategies (2006): CDM and JI in Charts
- International Emissions Trading Association (IETA) (2004): CDM Emission Reductions Purchase Agreement
- International Emissions Trading Association (IETA) (2008): Greenhouse Gas Market 2008
- International Emissions Trading Association (IETA) (2006): State and Trends of the Carbon Market 2006.
- Michaelowa, Axel / Koch, Tobias (2001): Glossary of International Climate Policy Terms
- The Gold Standard: Premium Quality Carbon Credits
- The World Bank (forthcoming): Clean Energy for Development Investment Framework: Progress Report on the World Bank Group Action Plan
- United Nations Development Programme (UNEP) (2008): Increasing access to the carbon market
- United Nations Development Programme (UNEP) (2008): CDM PDD Guidebook: Navigating the pitfalls
- United Nations Development Programme (UNEP) (2004): Legal Issues Guidebook to the Clean Development Mechanism
- United Nations Framework Convention on Climate Change (UNFCCC) (2001): The Marrakesh Accords and the Marrakesh Declaration.
- United Nations Framework Convention on Climate Change (UNFCCC) (2006): CDM Project Design Document Form

Related Links

CD4CDM:
http://cd4cdm.org/

Climate Action Network:
http://www.climatenetwork.org/

Environmental Finance – Climate Change:
http://www.environmental-finance.com/online.htm

IEA:
http://www.iea.org/Textbase/subjectqueries/keyresult.asp?KEYWORD_ID=4124

IETA:
http://www.ieta.org/ieta/www/pages/index.php

Joint Implementation Network:
http://jiq.wiwo.nl/

New Carbon Finance:
http://www.newcarbonfinance.com/

PointCarbon:
http://www.pointcarbon.com/

United Nations Environment Programme (UNEP): Risoe Centre on Energy, Climate and Sustainable Development
http://www.uneprisoe.org/

UNFCCC:
http://unfccc.int/2860.php

The World Bank Carbon Finance Unit:
http://carbonfinance.org/

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