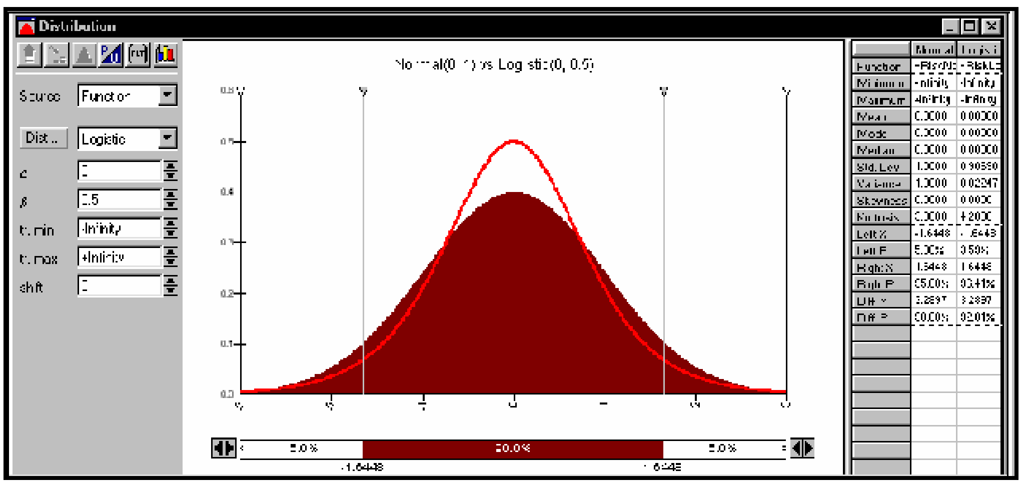
6 DSM and CDM risks and sensitivity analysis



This chapter identifies and analyses the various risk factors associated with the DSM and CDM project development. Where possible the weight or impact of a specific uncertainty is determined and the risk associated with it is quantified according to the severity of the consequences.

6.1 Introduction

Risks must be measured, assessed, evaluated and managed. Without understanding the effects that risks could have on an organization, all decision-making will be random instead of concrete. This chapter promotes sound decision-making to executives by means of historic data analysis and the quantification of risk factors.

An endless number of attributes could be incorporated into a quantitative risk model for completeness and even more for further refinement. Unfortunately, a fine detail analysis of a diverse and dynamic market such as the CDM, will only lead to paralysis within a decision-making framework.

The scope of this chapter is narrowed down to the study of only three risk sectors within the energy-efficiency project development domain:

1. Technical and feasibility risk of an energy-efficiency intervention;
2. DSM procedural risk; and
3. CDM procedural risk.

A fourth risk factor is the selling price of CERs or Megawatts. Although the price of CERs falls outside the project development domain it is still crucial to the feasibility thereof and the main driver behind it all. This is also the price that Eskom and other utilities would be prepared to pay for a unit (typically MWhs) of energy saved from DSM interventions. The energy efficiency price deferential between Eskom DSM funds per MW and CERs will ultimately determine if the ESCo opts for the DSM or CDM route.

6.2 ESCo risk profile

The type of project chosen should be in line with the company's supporting technologies, core business competencies and experience. An ESCo's track record within a certain field is the perfect key performance indicator to quantify the probability of a successful implementation.

The ESCo's track record will usually reflect how the project performs in relation to contractual targets:

- Whether the developer/ESCo will gain finance to design and implement the project activity, and
- Whether the plant will operate as foreseen in the project plans and the expected number of CERs that are issued to it.

HVAC International has 20 projects running in the industrial DSM sector throughout various gold and platinum mines. The graphs of Figure 68 show an over-performance of MW savings on HVACI's projects. Note that the graph is very smooth for long periods, for example May 2004 to March 2005, and more irregular for January 2007 to January 2008. This can be accounted for by irregular procurement processes at Eskom DSM. It further strengthens the need for a new DSM business model as proposed in Chapter 3.

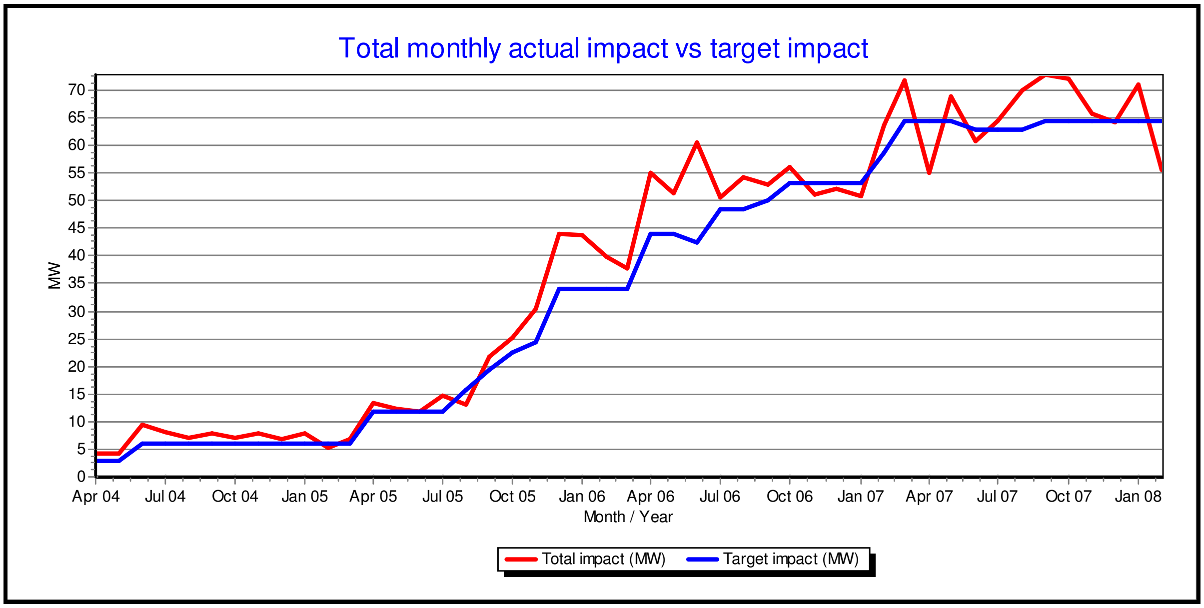


Figure 68: HVAC International's delivery performance

The ESCo risk profile can play a significant role within a bilateral CDM ERPA. A good track record will give the ESCo as a developer more leverage to negotiate a better price for their CERs. The guarantee of delivering the right number of CERs at the right time is proportional to the ESCo's performance. Eskom will certainly look at past performing DSM projects before they even consider engaging in another contract from an ESCo.

HVAC International over-performs with 7% on their actual and cumulative impact performance targets as seen in Figure 68. This over-performance on the HVAC International's DSM projects is a good indication that there is a high level of confidence that project targets will be met. If a developer's track records shows only a 90% performance relative to his target, the probability of a successful project is only P=0.9.

For HVAC International the probability of successfully engineering and implementing an energy-efficiency solution is P=1. Note that "P" is the statistical probability between 0 and 1 of a certain event occurring. It will be shown later in this chapter that the probability of a successful DSM project for all ESCos is more in the range of P=75 when the ESCo's track record is ignored.

6.3 DSM risks

6.3.1 Project approval time risk

The procurement of DSM projects at Eskom is a lengthy process and not without risk. The following risk contributors could occur during the waiting period:

- Currency variations could affect software and hardware pricing, resulting in outdated quotes from subcontractors and consequent resubmission of the proposal,
- The client's baseline could change, resulting in a scope change and resubmission to Eskom DSM, and
- ESCo overheads could have cash flow implications.

Figure 69 shows the normal distribution of time spent on 40 HVAC International projects from submission to contractual approval and signing of the NEC (New Engineering Contract). This bar graph shows the number of projects approved within the range of 0-800 days. Most of HVAC International's projects took between 500 and 600 days to approve.

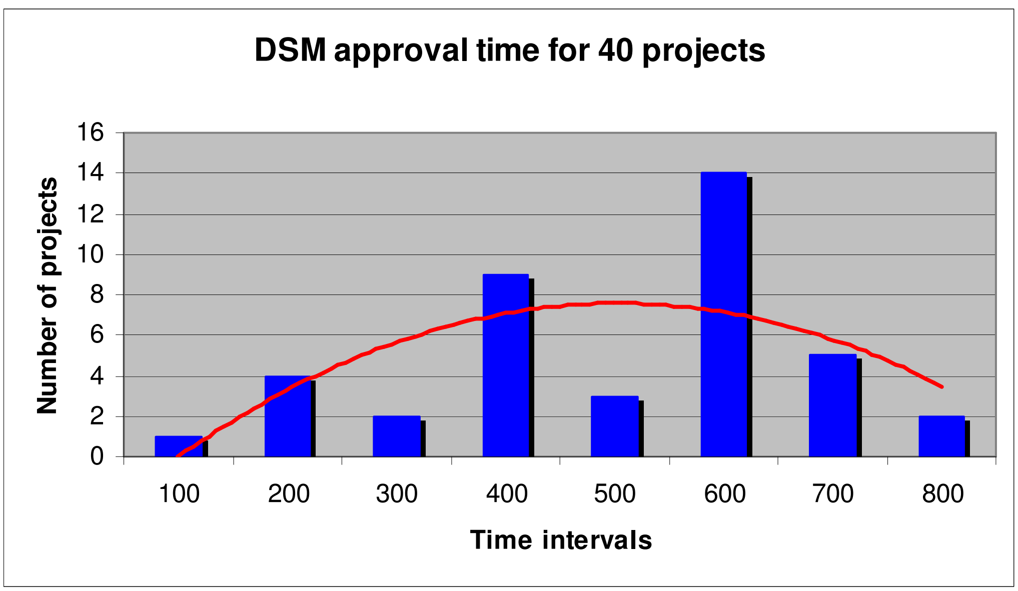


Figure 69: Eskom DSM approval times

On average Eskom DSM takes 443 days from submission to when the NEC is signed. This places a lot of strain on an ESCo's financial carrying-capacity and increases the risk of undertaking DSM projects.

6.3.2 Liquidated damages

Very few ESCos acknowledge the risk of penalties the client faces when the DSM project under-performs. This risk could be shared if both client and ESCo agree upon a maintenance contract. This maintenance agreement stipulates that the ESCo will be responsible for ensuring that the performance measures are met as submitted in the DSM agreement. The client and ESCo enter into a burden-sharing agreement through which the ESCo is also held liable for any penalties imposed on the client.

After a period of 3 calendar months from the commissioning date, an assessment shall be conducted by the M & V entity (typically the University of the North West or Cape Town) to determine whether the DSM savings are achievable [1]. In the event that the actual DSM savings are not comparable to the contracted DSM savings by any variance in accuracy of more than 10%, the ESCo shall be penalised by Eskom as per the NEC.

During the DSM savings period, the customer shall be held fully responsible for the operations and maintenance of the DSM measures. If the DSM savings correspond within an accuracy of at least 90% of the contracted DSM savings, the customer shall not be liable for any liquidated damages.

6.4 CDM risks

6.4.1 Approval of new methodologies

When a new methodology is proposed, the CDM EB can accept, reject or cancel this methodology, resulting in CDM registration or immediate cancellation of the CDM process. To quantify the risk of successfully approving a new methodology, this section will study past trends.

The time from submission of the new methodologies until a decision was taken by the EB was calculated. The green column on Figure 70 gives the accumulated number of new methodologies approved up until that submission round. The red column gives the accumulated amount of new methodologies rejected or cancelled and withdrawn from the registration process. The final columns show the total number of methodologies approved, rejected and still pending at this moment.

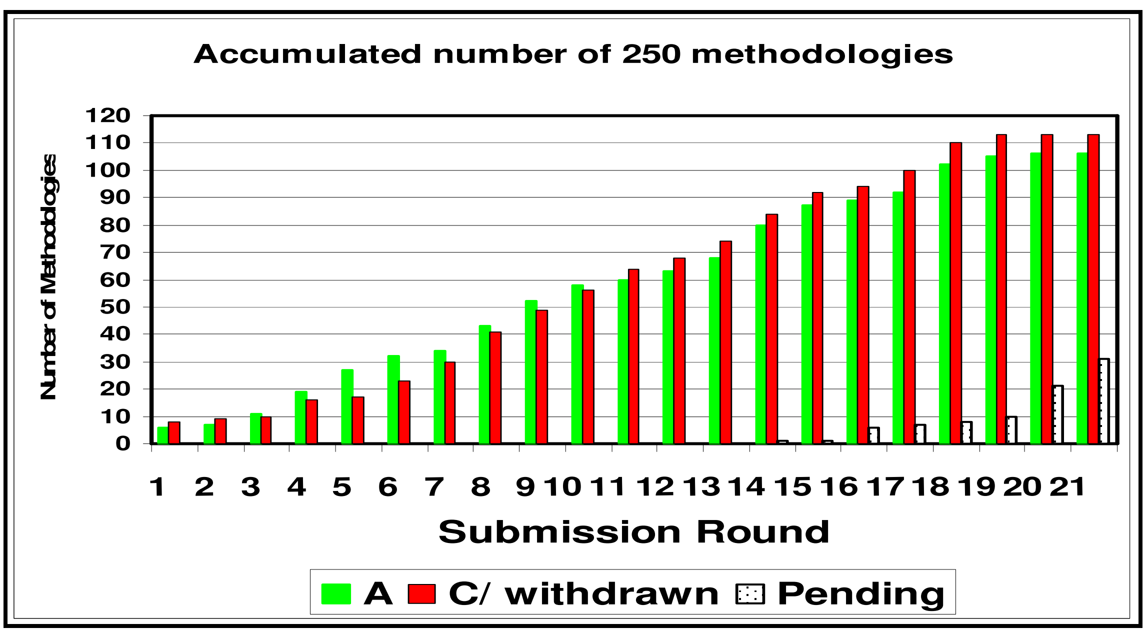


Figure 70: Accumulated number of 250 methodologies

Figure 71 shows for each submission round, the time elapsed between the deadline for submission in the round and the end of the EB meeting where the final decision was taken.

On average it took 217 days to approve a methodology and 305 days to reject the methodology as shown in the last column of Figure 71 [2].

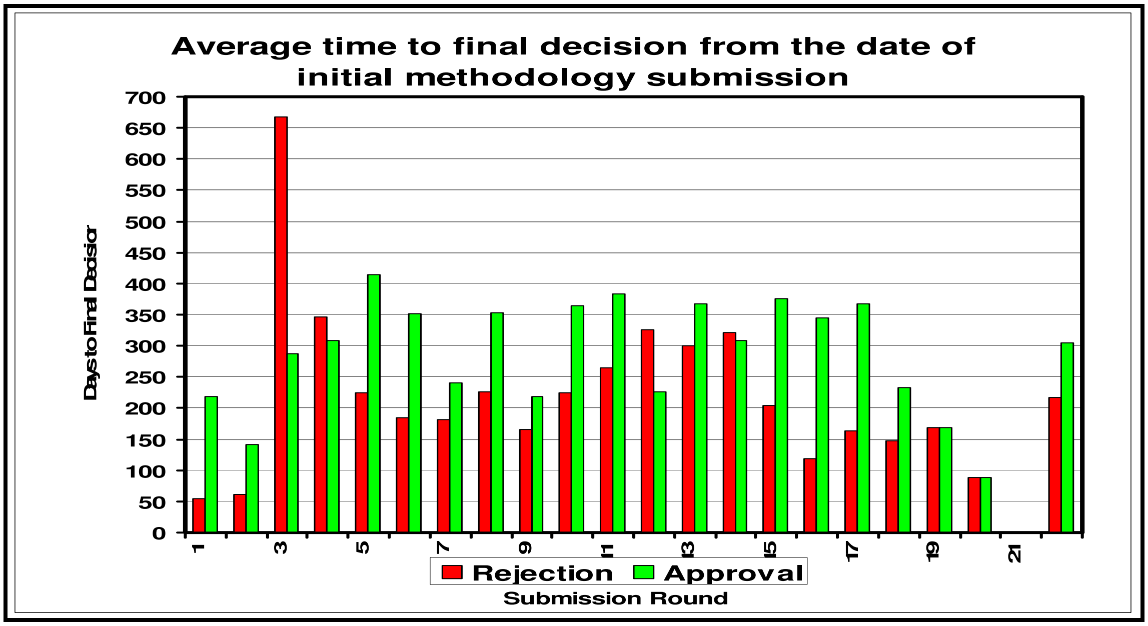


Figure 71: Average time for new methodology outcome

The chances of getting a new methodology approved increases considerably when the new methodology is very similar to an existing one. The newly developed methodology in this study is closely related to the small-scale CDM project activity: Demand-side energy-efficiency programmes for specific technologies. This is a Type 2 small-scale project activity and falls in the energy-efficiency improvement projects with savings less that 60GWh per annum. Table 14 shows the various categories and number of registered projects.

Small-scale CDM project activity categories	Number
A. Supply side energy-efficiency improvements - transmission and distribution	1
B. Supply side energy-efficiency improvements – generation	16
C. Demand-side energy-efficiency programmes for specific technologies	15
D. Energy efficiency and fuel switching measures for industrial facilities	95
E. Energy efficiency and fuel switching measures for buildings	15
F. Energy efficiency and fuel switching measures for agricultural facilities and activities	3
G. Energy efficiency measures in thermal applications of non-renewable biomass	0

Table 14: Type 2 Small-scale CDM projects activity categories

This new methodology is also very similar to approve baseline and monitoring methodology AM20: Water-pumping efficiency improvements under energy-efficiency services category. Demand-side energy-efficiency programmes for specific technologies only makes up 10% of the total number of Type 2 small-scale projects, whereas fuel switching measures contribute up to 65% of the projects.

From the above information it can be concluded that the proposed new methodology, although new, is closely associated with an existing methodology making a successful approval highly probable. The developer can expect a delay of at least 217 days.

6.4.2 Host country risks

NuPlanet managing director, Anton-Louis Olivier recently said that the scope for CDM projects in South Africa was great, but that there was "no incentive in South Africa to go the CDM route. It was project developers and consultants that were approaching industry and driving CDM projects” [3]. This is largely because the fundamentals, in particular cost, that would drive greenhouse–gas abatement projects, are not present in sub-Saharan Africa, because of low energy prices.

South Africa is clearly lagging behind other developing Annex 2 countries under the Kyoto Protocol. Lwazikazi Tyani, director of the Department of Minerals and Energy's Designated National Authority (DNA) confirmed that South Africa had 13 CDM projects out of 3035 world-wide registered with the UNFCCC. The 13 CDM projects in South Africa are listed in Table 15.

The paltry total of 25 projects throughout the entire African continent, compared very unfavourably with 581 registered projects in the Asia-Pacific region, representing 61% of all projects. Latin America and the Caribbean have 330 registered CDM projects or 34.9% of the projects worldwide [2].

Title	Status	Type	ktCO2/yr
Kuyasa low-cost urban housing energy upgrade project, Khayelitsha	Registered	EE households	6.6
Rosslyn Brewery Fuel-Switching Project	Registered	Fossil fuel switch	101
Lawley Fuel Switch Project	Registered	Fossil fuel switch	19
Durban Landfill-gas-to-electricity project – Mariannhill and La Mercy Landfills. A review was requested.	Registered	Landfill gas	69
PetroSA biogas to energy	Registered	Biogas	30
Tugela Mill Fuel Switching Project	Registered	Biomass energy	56
Omnia Fertilizer Limited Nitrous Oxide (N2O) Reduction Project	Registered	N2O	473
Mondi Richards Bay Biomass Project	Registered	Biomass energy	185
Sasol Nitrous Oxide Abatement Project	Registered	N2O	960
Transalloys Manganese Alloy Smelter Energy Efficiency Project	Registered	EE industry	55
Project for the catalytic reduction of N2O emissions with a secondary catalyst inside the ammonia	Registered	N2O	117
EnviroServ Chloorkop Landfill Gas Recovery Project.	Registered	Landfill gas	188
N2O abatement project at nitric acid plant No. 11 at African Explosives Ltd. (AEL), South Africa	Reg. request	N2O	265
Bethlehem hydroelectric project	At validation	Hydro	33
Emfuleni Power Project (115MW)	At validation	EE own generation	608
Durban Landfill-gas-to-electricity project – Bisasar Road Landfill	At validation	Landfill gas	350
Star Diamonds Methane Capture Project	At validation	Coal bed/mine methane	13
Beatrix Methane Capture Project, South Africa	At Validation	Coal bed/mine methane	376
Alton Landfill Gas to Energy Project	At Validation	Landfill gas	37
Kanhym Farm manure to energy project	At Validation	Biogas	27
Ekurhuleni Landfill Gas Recovery Project	At Validation	Landfill gas	238
Fuel switch project on the Gluten 20 dryer of Tongaat Hulett Starch Pty (Ltd) Germiston Mill	At Validation	Fossil fuel switch	8
Humphries Boerdery (Edms) Bpk, piggery methane capture and electrical generation	At Validation	Biogas	11

Table 15: 25 South African CDM projects in the pipeline

Although the DNA's function is regulatory in South Africa it was decided that the organisation would also play a promotional role. The director, however, admitted that the promotions sub-committee had recently been dismantled. The director said it has been found that other interested parties were promoting the development of CDM projects in South Africa.

Another disappointment for CDM in South Africa was the fact that although there were only 13 projects in the country, the first of which was registered in 2005, only 3 of these projects had their emission reductions certified. Of these 3 none have had their certified emission reductions (CERs) verified yet.

NuPlanet’s director emphasised that although cleaner production was becoming an industry norm, there was still a lot of underestimation of the risks and costs involved in the CDM procedures. He however, warned that a project should not be forced into the CDM, and maintained that voluntary emission reduction schemes should also be investigated. These were often less competitive, reduced transaction and monitoring costs, and provided attractive options for projects with smaller volumes.

6.4.3 CDM sector risk

In section 6.4.1 it was shown that demand-side energy efficiency for specific technologies contributed only 10% within the Type 2 small-scale category. When compared to all categories, small and large scale, demand-side energy efficiency contributes only 5% of the total CDM projects. This is illustrated in Figure 72.

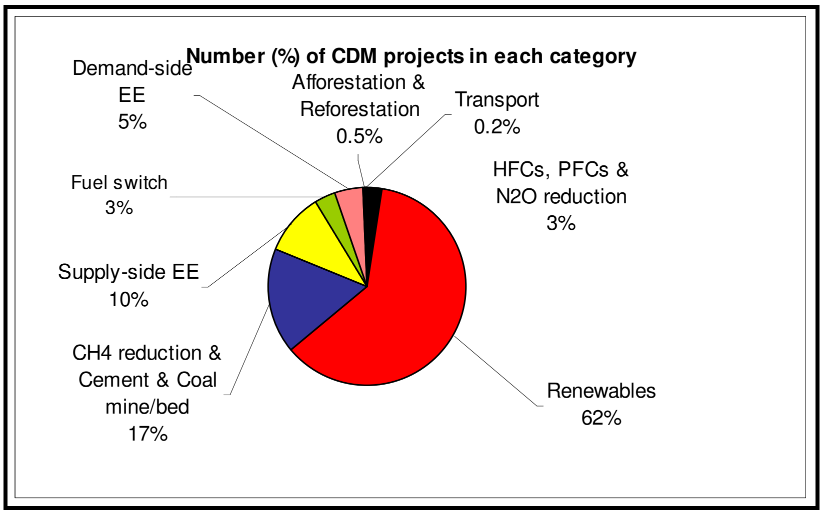


Figure 72: Number of CDM projects in each category

The total cumulative CERs that can be expected until 2012 for demand-side energy efficiency is only 1% of the total expected CERs, as seen in Figure 73.

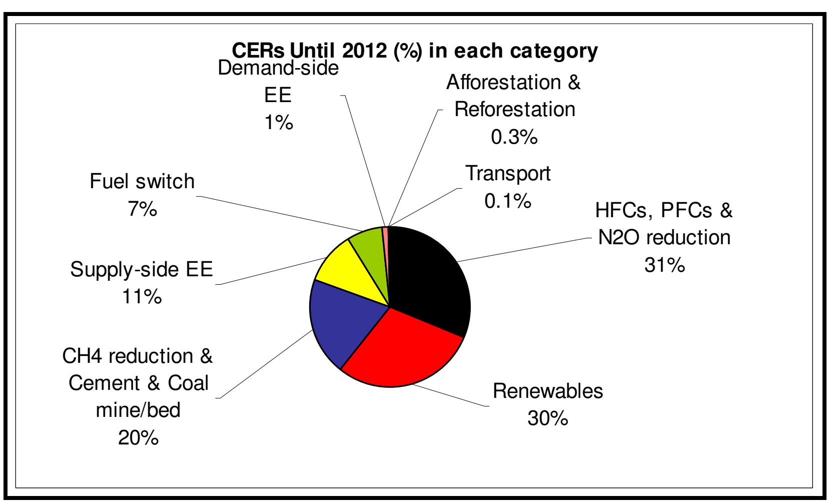


Figure 73: Cumulative CERs expected until 2012

The approved baseline and monitoring methodology, AM20, under the energy-efficiency service category has only one project running, namely: Water pumping energy-efficiency improvements. This methodology is closely related to the new proposed methodology in this study and is worth investigating. The issuance success for energy-efficiency service category is only 63% as seen in Table 16.

CDM projects in the pipeline (numbers, CERs & issuance)	**CDM project with CERs issued**		
Type	Projects	Issued kCERs	Issuance success
Afforestation			
Agriculture	35	2794	45%
Biogas	5	298	83%
Biomass energy	80	7689	90%
Cement	5	781	80%
CO2 capture			
Coal bed/mine methane			
Energy distribution			
EE households			
EE industry	9	410	83%
EE own generation	16	7327	98%
EE service	1	2	63%
EE supply side	2	30	83%
Fossil fuel switch	10	1166	86%
Fugitive	1	553	97%
Geothermal	2	125	33%
HFCs	12	62030	99%
Hydro	48	3492	90%
Landfill gas	14	2889	37%
N2O	4	21658	123%
PFCs			
Reforestation			
Solar			
Tidal			
Transport	1	59	51%
Wind	43	2791	76%
Total	288	114095	93.4%

Table 16: CER issuance success

The small-scale category for demand-side energy efficiency does not look very promising for new investors with no previous CERs issued yet. From Table 16 it can be seen that HFCs and N_2O reductions are by far the preferred choice for project activities, with 74% of all CERs allocated towards them.

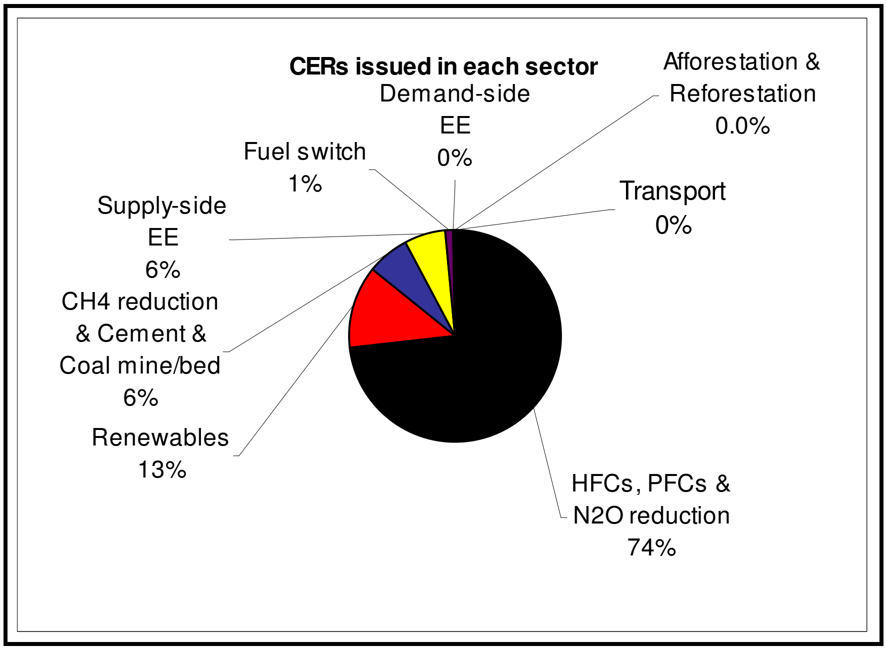


Figure 74: Type 2 Small-scale CERs issued

Industry players obviously do not view demand-side energy efficiency as "easy to capitalise on" projects, considering that no CERs have been issued yet. One reason could be the high development cost compared to savings. Demand-side energy efficiency has the highest sector risk of all CDM activities.

6.4.4 Project-approval time risk

Similar to the DSM approval process, the CDM registration process is also a very long and bureaucratic process. Figure 75 shows the cumulative average number of days between the start of the 30-day period for public comment, and the request for registration.

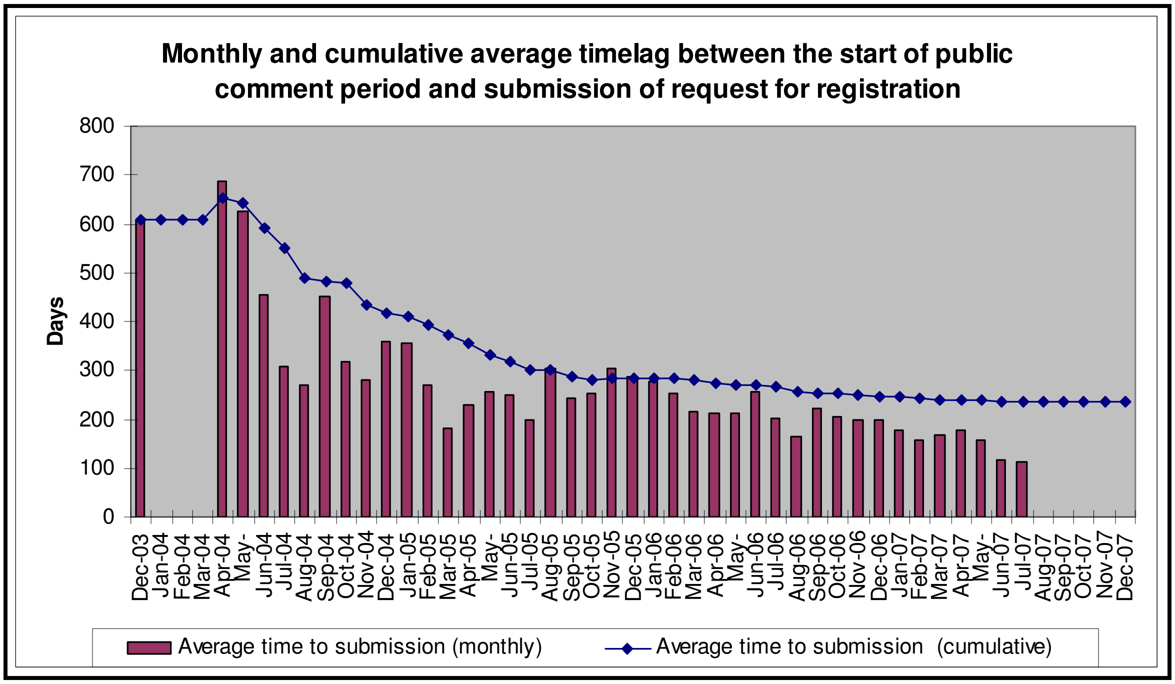


Figure 75: Time lag between public comment and request for registration

On average the time lag between public comment and request for registration is 273 days. Once the developer has requested registration for his project activity a lead time of 84 days could be expected as can be seen in Figure 76.

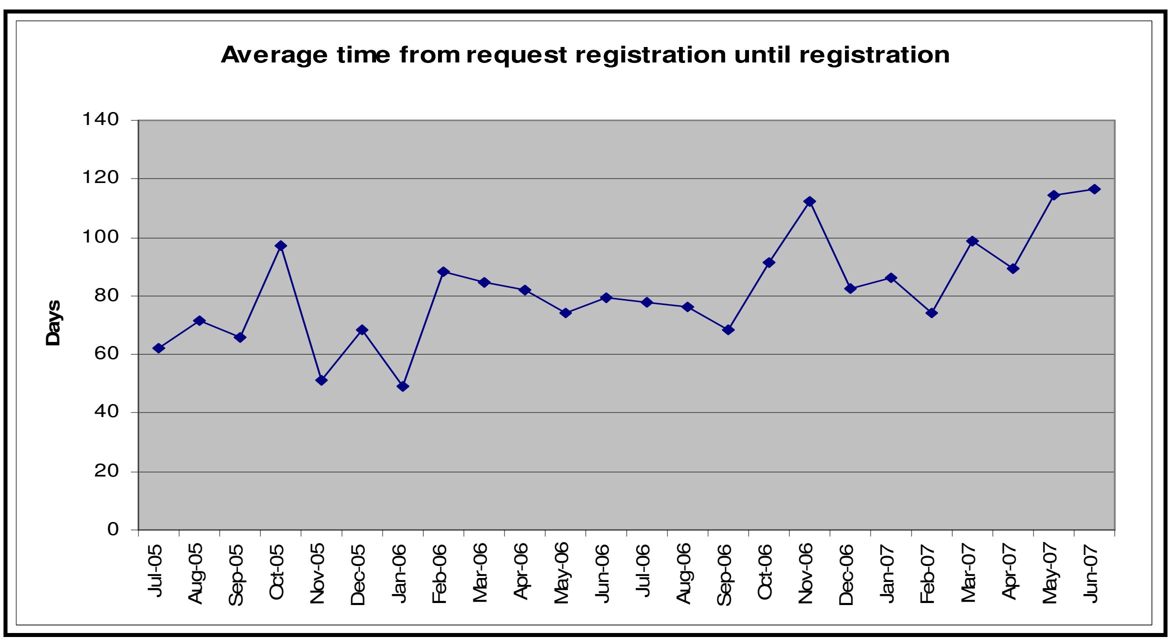


Figure 76: Time lag from request for registration until registration

To conclude, the total CDM registration process including the approval lead time of a new methodology will take on average 574 days (217+273+84). This relates to 410 man days which is 290 man days more than the CDM EB suggested in Chapter 3.

6.5 Carbon price dynamic risks

6.5.1 Primary and secondary CER markets

The primary market refers to the initial transaction between the project developer and the investor. It is the transaction that carries the CER, the commodity in question, from the project in the developing country to the international market.

The contract to transfer ownership of a CER from seller to buyer is known as an Emissions Reduction Purchase Agreement (ERPA). As the initial CDM contract is much like project finance, ERPAs vary from case to case. Typically, however, the price agreed in most primary ERPAs is a function of the apportionment of the various risks inherent in generating a CER and delivering it to the buyer.[5]

Point Carbon categorises ERPAs according to the risk that the seller assumes. This is usually expressed as a sanction on the seller, if it fails to deliver as agreed:

- ERPA category 1. The seller does his utmost to deliver a flexible or non-firm volume, while the buyer commits to buy if the seller delivers, even if they turn out not to be eligible for CDM. No sanctions are stipulated for non delivery;
- ERPA category 2. The same as above, but contract is only valid on a set of preconditions (CER contract). No sanctions are stipulated for non delivery;
- ERPA category 3. The seller commits to deliver a firm volume and commits to replacing CERs if the contract's underlying project fails to deliver as planned; and

- ERPA category 4. The seller guarantees to deliver a firm volume and the buyer guarantees to buy it. The seller must give compensation if the buyer does not receive the agreed amount of CERs.

Due to the low risk involved in categories 3 and 4, they overlap in their price ranges. The secondary CER transaction also falls somewhere in this price range.

Each CER in the primary market is therefore worth a different amount, reflecting the risk profile of each individual project, depending on various factors, including:

- the risk inherent in each project, and how that risk is apportioned between buyer and seller;
- what stage of development the project has reached when the ERPA is agreed;
- the risk profile that project type, host country etc offer; and
- other contractual details of each individual ERPA, e.g. whether it covers the first 30% of the CERs to be generated, or the last 30%.

The secondary market refers to any further transaction after the primary transaction. This is the onward sale of the CER until eventually it is bought by the final consumer who will submit it to meet their target. Typically, the buyer in the secondary market carries much less risk, as the CER is either already in existence, or its delivery is guaranteed in some way with replacement or compensation for non-delivery written into the ERPA. As a result, the buyer pays much more for the secondary CER.

The buyers for this more expensive, low-risk secondary CER tend to be European companies that face their specific target under the EU ETS. The secondary CER market has developed as an offshoot of the EU emissions trading scheme and prices are often quoted as a percentage of the price of EUAs as seen in Figure 77 [5].

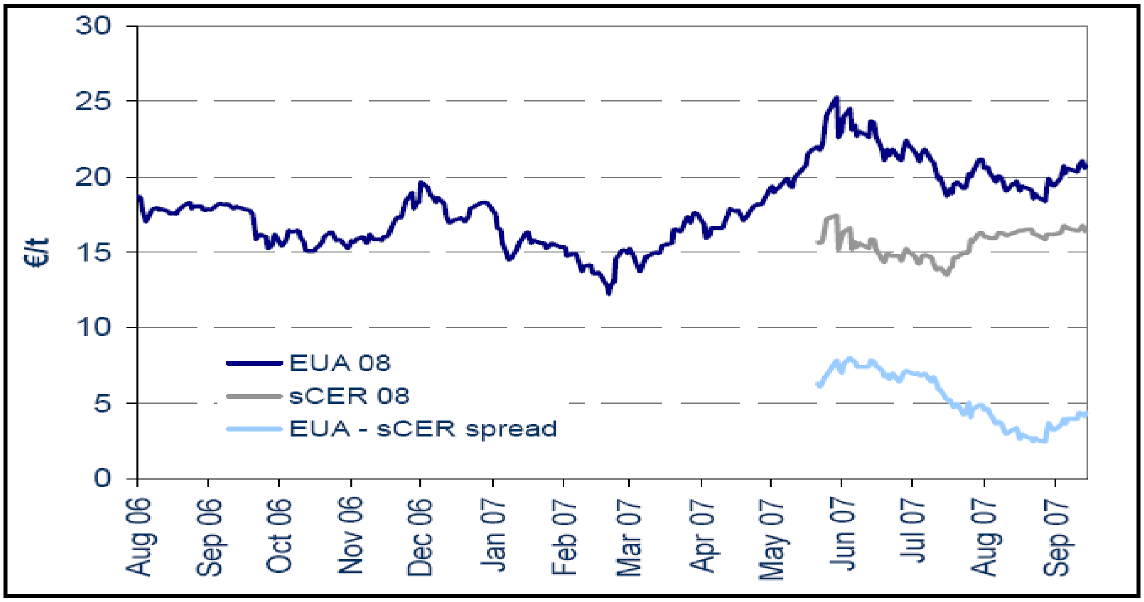


Figure 77: Price spread between EUAs and CERs [5]

The EU emissions trading scheme does provide a constant, long-term source of demand for Kyoto credits such as the CERs from the CDM and eventually ERUs from JI. Over the longer term, a greater shortfall in the EU market therefore implies demand for CERs and upward pressure on CER prices generally. It is reasonable to expect the supply of CERs to increase in response to such price signals, stabilising international prices. Table 17 shows the EUA spot price for 17 September 2007 as well as the ERPA price ranges for the same day.

Contract type	Price or price range (€/tCO_2e)
EU allowance (EUA) for delivery on 1 December 2008	20.61
Secondary CER for delivery on 1 December 2008	16.35
Primary ERPA for CERs, category 1	6-8
Primary ERPA for CERs, category 2	8-14
Primary ERPA for CERs, category 3	14-16
Primary ERPA for CERs, category 4	15-17
Primary ERPA for ERUs	5-12

Table 17: CER prices on 17 Sep 2007 [5]

6.5.2 Policy and regulatory issues

Like other environmental markets, the carbon market is created through political decisions and has to be framed in law. Similar to other commodity markets, such as the oil, gas and power markets, decisions concerning framework conditions and operating guidelines could potentially have a key impact on market and price developments.

Anyone aiming to analyse and forecast market and price developments therefore needs to understand the role and potential impact of policy choices. For the carbon market in particular, this means that market participants need to monitor and assess issues such as the National Allocation Plans (NAPs), the “linking” directive, banking, as well as the future status of the Kyoto Protocol. [4]

Until recently, analyses of the carbon market have focused on the 5 years between 2008 and 2012, consistent with the first commitment period of the Kyoto Protocol and Phase II of the EU-ETS. However, a longer term view of the fundamentals, looking beyond 2012, is crucial to the success of the market in order to provide certainty for investors whose asset lives extend over 10 or 21 years.

If an international agreement on future emission reduction targets is put in place, this could see the global market for carbon credits from developing countries, increase to two or three times the levels expected in the period 2008 to 2012. This would require substantial additional levels of investment compared to the amount being deployed today.

Given the significant progress that has been made at the federal level, in the US and Australia, in developing proposals for climate change legislation, New Carbon Finance sees some form of international agreement the most likely scenario at this time. NCF research shows that there would certainly be sufficient credits available to meet this higher level of demand, and that these credits could indeed be provided at substantially lower cost compared to the cost of abatement in Europe.

Guy Turner, Director of New Carbon Finance said,”We always expected the EU to take a firm stance on the import of carbon credits from developing countries. With the EU having set out its stall, this analysis confirms just how sensitive the global carbon market will be to the decisions of the other major developed countries, notably the US and Japan”. He adds, “A firm response by these countries is needed not only to build a consensus for action on climate change at the political level, but crucially to ensure that the flow of private sector money into the global carbon market is maintained and increased.” [4]

6.5.3 Market fundamentals

Market fundamentals, similar to other markets, concern demand and supply. The supply of allowances to emit one ton of CO_2 will be fixed by governments through the National Allocation Plans (NAPs). In brief, governments in Member States will first determine the total quantity of allowances to be allocated (the ‘cap’), and then allocate the allowances to installations in energy-intensive industries (e.g. production of iron and steel, building materials, pulp and paper) and the power and heat generation sectors. The demand for allowances is in turn a function of the level of production by the companies, and installations covered by the scheme.

In general, CO_2 production depends on a number of factors, such as weather data, fuel prices, carbon prices, and economic growth. Among these factors, weather has a double effect. Firstly, cold weather increases energy consumption and therefore CO_2 emissions through power and heat generation. Secondly, rainfall and wind speeds will affect the share of power generated by non-emitting sources and emission levels. This is of course particularly important for countries and regions relying on hydro- and/or wind power to any significant extent.

Weather can cause a swing for power producers and flip their position vis-à-vis its cap from short to long and back, during a season. Similar to power markets, weather could become a key price driver in the short-term and possibly increase volatility. For instance, the combination of a cold winter and a warm summer could cause power consumption and emissions to soar, which would provide a clear bullish signal.

Figure 78 lists the most important factors to contribute to the short-term price drivers for the EU ETS.

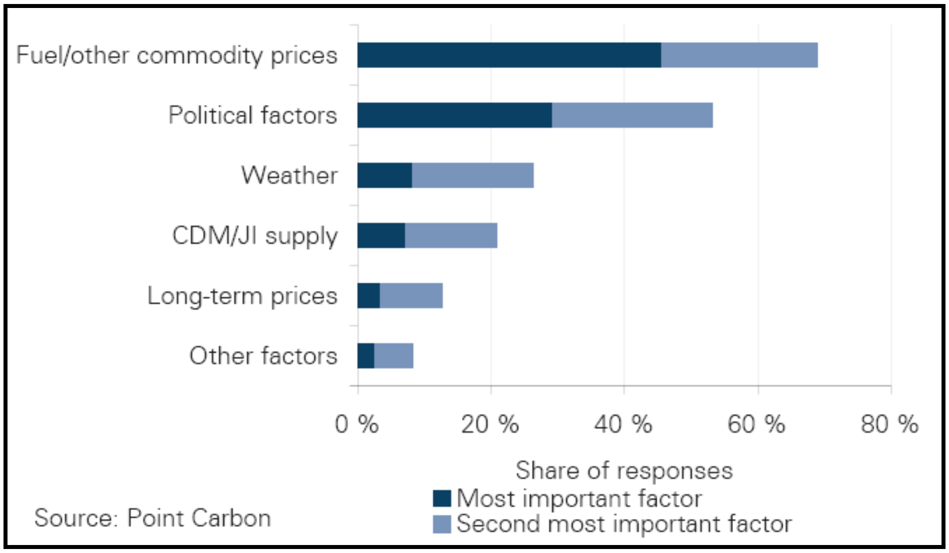


Figure 78: Short-term price drivers in the EU ETS [8]

While the marginal CO_2 abatement cost might in the long run direct investment towards abatement projects, fuel switching from coal to gas for power and heat production is probably the single most important measure in the short-term. This is in the first place because the public power and heat sector is the largest in terms of emissions for most of the existing Member States.

Figure 79 illustrates that public power and heat represent more than 70% of total emissions covered by the EU ETS in Denmark, Ireland and Greece, and about 60% in Germany and the UK, representing the two single largest emitters.

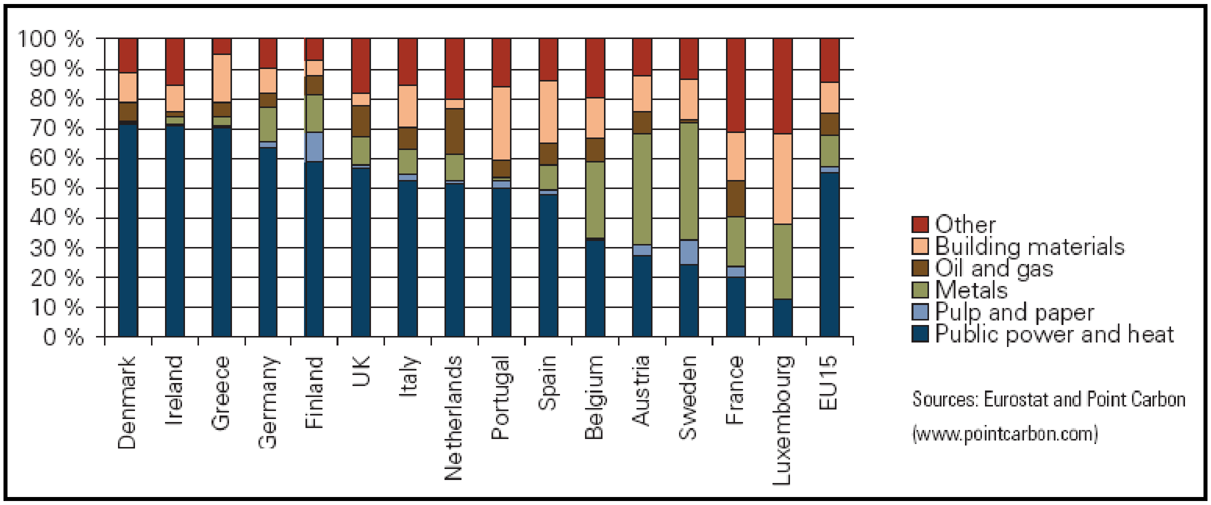


Figure 79: Public power and heat energy consumption

Secondly, and even though burning any fossil fuel creates CO_2 emissions, coal causes about twice that of natural gas per consumed unit. Figure 80 shows that solid fuels (hard coal, lignite) accounted for about 70% of total CO_2 emissions from public heat and power stations in existing Member States (less Luxembourg, EU14) in year 2001.

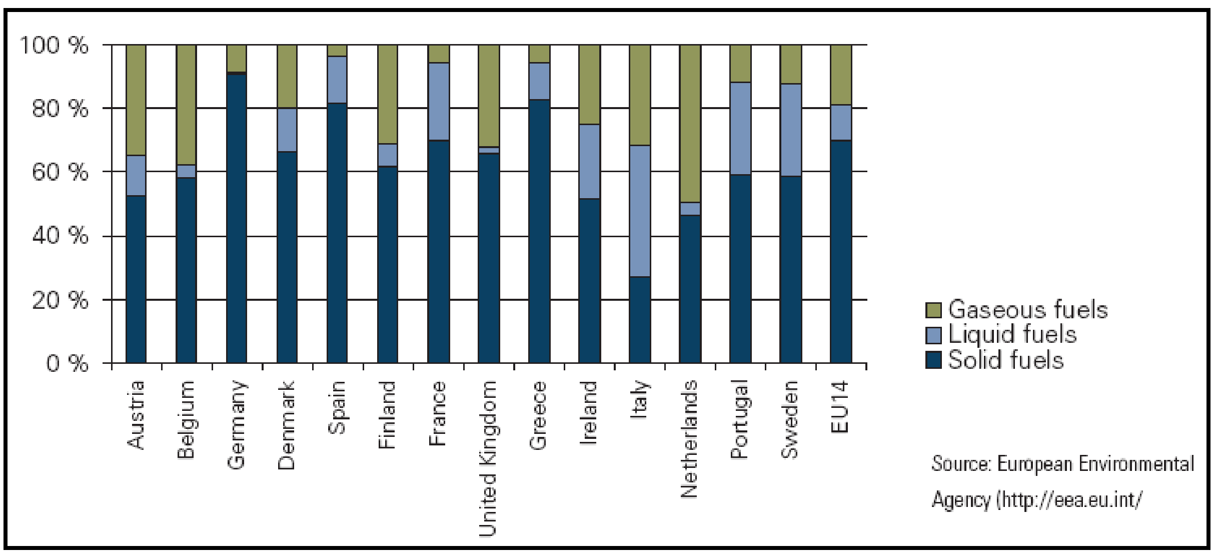


Figure 80: Emissions by fuels

Figure 80 further shows that the share of emissions by fuel varies between countries, depending on factors like resource endowments, fuel prices and state subsidies/taxation. For instance, solid fuels accounted for almost 90% of emissions from thermal power stations in

Germany, but only about 26% in Italy. In comparison, natural gas is an important fuel in countries like the Netherlands, Austria, Belgium and the UK. There is a considerable scope for switching from coal to natural gas and other liquefied fuels in several Member States, most notably Germany and Spain.

Hence, in order to forecast CO_2 emissions into the future, it is also important to monitor developments in fuel prices and assess its potential impact on fuel switching.

6.5.4 Historic prices

There has been considerable price volatility in the EU ETS market during Phase 1 (2005-7) with EUA prices reaching €31.6/t in April 06 and falling to €0.08/t in September 07. Whilst prices are not expected to collapse in this way in Phase 2 (2008-12), due to the ability to bank EUAs into Phase 3, there are significant price risks that will need to be managed.

Trading of EUAs is split between an over-the-counter (OTC) market and numerous exchanges. In 2007 exchanges have had approximately 30% of the market share, with the European Climate Exchange (ECX) taking over 80% of the exchange volume. Several exchanges have now set up contracts that mirror the secondary CER market, for delivery in 2008 through to 2012. This has provided the CER market with more transparent price discovery and allow participants to simultaneously trade both EUAs and CERs on exchanges.

The total volume EUAs traded in 2007 was 980,780,000 tons CO_2, as seen in Figure 81.

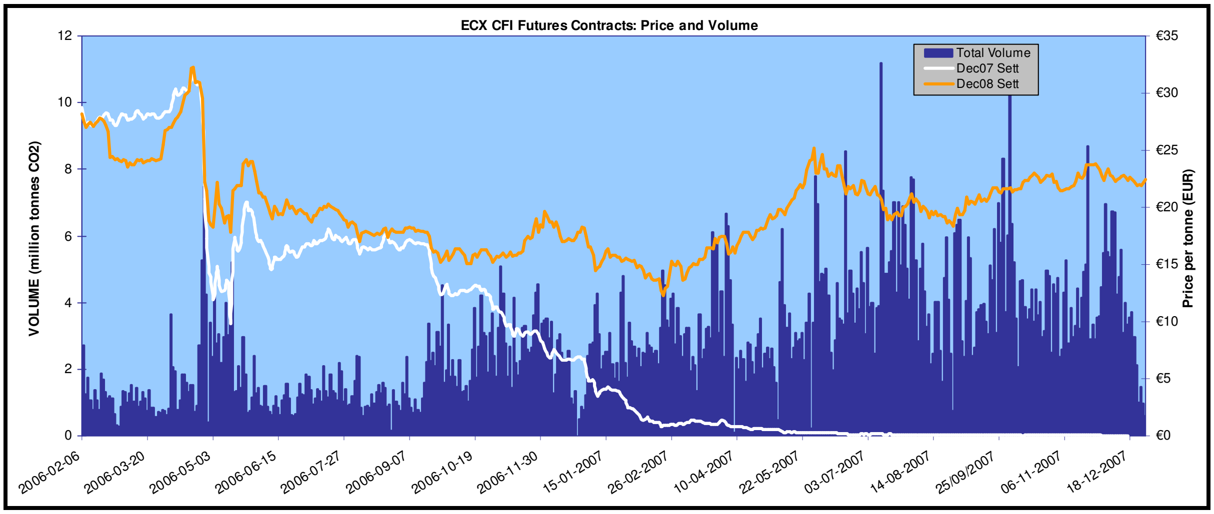


Figure 81: Trading volume for 2007 [6]

The CER prices on the European Climate Exchange saw an average price of €16 from 14 March to 17 April 2008, as seen in Figure 82. The European Climate Exchange (ECX) recorded its biggest daily volume 10 April 2008, with 16,786,000 tons of EUAs and CERs traded on the ICE platform.

Total volume for the day was made up of 10 million tons of EUA futures, 5.1 million tons EUA options and 1.6 million tons CER futures. CER Futures trading has reached an average daily volume of 924,000 tons in its first three weeks of trading, and open interest levels passed the 10 million ton mark. EUA futures and options open interest stands at 226.1 million tons.

Patrick Birley, Chief Executive of ECX, said, “It is encouraging to see how fast this market is developing and we believe deeper liquidity will encourage further participation in carbon trading” [7]. The latest available prices are shown in Figure 82, from 14 March to 17 April 2008.

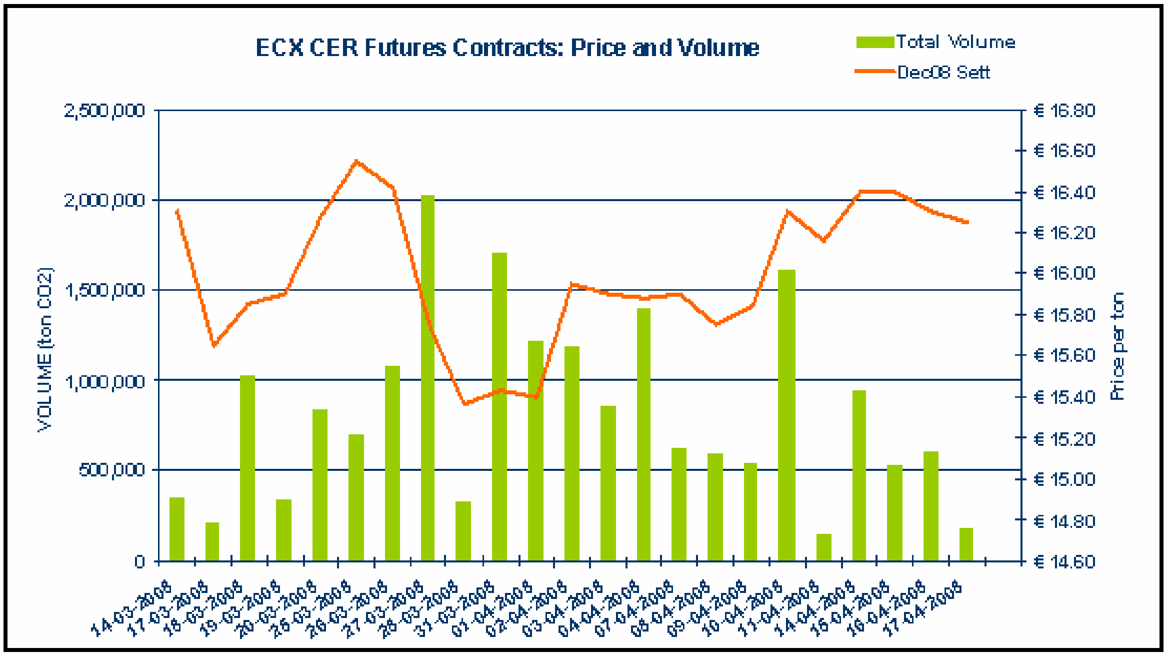


Figure 82: ECX CER prices from March to April 2008 [6]

6.6 Risk assessment

The various risk attributes that have been discussed earlier in this chapter is assessed in this section. To rate the consequence of each attribute, the consequence severity is multiplied by the likelihood or frequency, to give a consequence rating out of 25. The rating of each attribute is colour-coded as seen in Table 18, with red catastrophic and green insignificant.

Consequence severity
Level 5 - Catastrophic
Level 4 - Major
Level 3 - Moderate
Level 2 -Minor
Level 1 - Insignificant

Likelihood or Frequency
Level 5 - Very Likely
Level 4 - Likely
Level 3 - Occasional
Level 2 - Unlikely
Level 1 - Rare

	Consequences				
	Catastrophic	Major	Moderate	Minor	Insignificant
Very likely	25	20	15	10	5
Likely	20	16	12	8	4
Occasional	15	12	9	6	3
Unlikely	10	8	6	4	2
Rare	5	4	3	2	1

Table 18: Rating of consequences

This is a simple risk assessment tool that would help managers to avoid allocating company resources towards attributes that could be detrimental to the success of the energy-efficiency projects. Table 19 assesses the risk of the ESCo, a DSM project and a CDM project.

The ESCo project activity implementation risk, calculated as the severity times the likelihood, amounts to 15 for all 4 attributes. Dividing this number by the maximum possible risk of 100 gives a risk factor of 15% or a probability of P(ESCo successful project activity) = 0.85. The combined ESCo-DSM probability of a successful implementation is calculated in the same way and amounts to P(ESCo successful DSM) = 0.75. Given HVAC International's over-performing track record P(HVAC successful DSM)=1 is used for further analysis in Chapter 7. Finally, P(ESCo succesful CDM) = 0.70

6.7 Conclusion

As with all commodity markets, larger companies will undoubtedly have larger staff numbers and potentially better analytical capability, which may help them achieve better prices in commercial transactions. However, the carbon market has developed and several years of price history exists, which give all participants better information on which to base future forecasts.

In general, as markets develop there is a narrowing of the knowledge-gap between the smaller and larger players. In addition, the increase in the volumes of EUAs and CERs traded at exchanges, means that players of all sizes can see transacted prices at any time in the trading day, and have access to these quoted market prices in exactly the same way as larger players. There are also several data and analysis providers in the market, which give transparency to the market and improve price reporting.

IDENTIFICATION OF RISK				EVALUATION OF RISKS		
NO	ESCO AND PROJECT RISK	ATTRIBUTES	RISKS	SEVERITY=S	LIKELIHOOD/FREQ=P	RISK=SxP
1	ESCo	Customer's consent to the energy efficiency project.	The client must have full understanding of the DSM/CDM project and give his full support in the undertaking of the project activity. Without his consent there is no project activity to register.	5	1	**5**
		Installation of automation hardware and other supporting equipment.	The hardware which include valves, PLCs, network equipment etc. is outsourced but still project managed by HVAC International. Good project management is essential to on-time / on-budget completion of the project activity.	3	1	**3**
		Technology	Successful implementation of REMS-CARBON will be essential to the project success. Without REMS-CARBON the system cannot be controlled to realise energy efficiency.	5	1	**5**
		Sustainability	Successful implementation of OSIMS will be essential to the project success. Without OSIMS the project activity will not realise sustainable savings.	2	1	**2**
	Maximum risk of 25 x 4 = 100					**15**
2	DSM	Project approval time risk	The procurement of DSM projects can take anything from 100 days to as long as 800 days. The ESCo should thus be careful in planning his cash flow to make it through a possible long delay.	3	5	**15**
		Under-performance	Liquidated damages due to under - performance of the client or system could be enforced by Eskom through penalties	4	1	**4**
		Policy changes	Eskom DSM budget cuts could result in more stringent procurement processes	3	3	**9**
	Maximum risk of 25 x 3 = 75					**28**
3	CDM	Approval of new methodology	If the new proposed methodology is not approved by the CDM Executive Board, the CDM process comes to a halt and HVAC International should consider a DSM approach if feasible.	5	5	**25**
		Host country risk	Approval by the DNA based on various sustainability criteria is essential for CDM success.	5	2	**10**
		CDM sector risk	Energy efficiency for specific technologies contributes only 10% of projects within the Type 2 small scale category and only 5% of total CDM projects. There is thus an inherent risk associated with these types of projects and only a success rate of 63%.	5	2	**10**
		Project approval time risk	From the start of the CDM process untill the first CER is registered could take as long as 798 days. This is already a long process and risk of further delays will have huge financial impacts.	4	1	**4**
		CER price	Unlike the Eskom DSM funding with a fixed R/MW value, the CER price can be very volatile. Reductions in the CER price could tilt the feasibility more towards DSM.	3	1	**3**
		Policy and regulatory issues	The only certain crediting period at the moment is until 2012 when the Kyoto Protocol expires. If project based credits like CERs are not allowed to be carried over to a new protocol the rest of the 10 year crediting period will be valueless.	5	1	**5**
	Maximum risk of 25 x 6 = 150					**57**

Table 19: ESCo, DSM and CDM risk assessment

Table 20 summarises the price dynamics for various carbon credits under the different market mechanisms: EUAs, CER/ERUs and AAU up to 2012.

	Phase I 2005-2007	Phase II 2008-2012	Phase III? 2013-
EUAs	• Market is long • Low price • No quantitative restrictions on use of CERs • Incentives to bank CERs into Phase II	• Market is short • Forward price determined by CER/ERU supply and relative fuel prices for power generation • Quota limit allows for more credits that the aggregate short position, provided industrial sectors and the power sector swap EUAs and CERs. • Supply limitations are likely to be more relevant than restrictions due to the initial allocation of credits. • CERs might be banked forward again, once NAP 3 and post 2012 UNFCCC framework is in place.	• No supply/demand signals but ambitious political targets set. • Linking of trading schemes, with Kyoto project credits forming the price link, is a possible scenario. • Allocation process is likely to be further harmonized
CERs ERUs	• Forward CER prices reflect delivery risks and phase II allowance price in EU ETS	• Spot CERs will probably trade at a small discount to spot EUAs to reflect differences in usability • There is a two-way price causality between CERs and EUAs	• Price should be equal to marginal abatement cost. • US participation could boost demand
AAUs	• No AAU market	• Market is long • Limited private sector participation (except possibly in Japan) • Bilateral government-to-government trades expected • Supply from Russia and Ukraine will be important • Few price signals	• Price will be dependent on whether there is a market and how ambitious the commitments are made from the Annex-1 countries (including new ones) • Banking from Russia and Ukraine and US participation will have major impacts on supply and demand • Chinese and Indian participation unlikely but possible

Table 20: Summary of the carbon market dynamic [5]

Chapter 6 has narrowed down all the risk factors contributing to the ultimate decision of investing a specific energy-efficiency intervention into a DSM or CDM funding mechanism. With this data at the decision-makers' disposal there is no need for expensive risk management fees. The probabilities are summarised as follows:

- P(ESCo successful project activity) = 0.85;
- P (ESCo successful DSM) = 0.75;
- P (HVAC International successful DSM) = 1.00; and
- P (ESCo successful CDM) = 0.70.

6.8 References

[1]. Eskom, *Demand-side Management Agreement*, Sub clause 18, Revision: June 07, PO Box 1091, Johannesburg, 2000, +27 11 800 3388

[2]. J. Fenhann, *Guidance to the CDM and JI pipelines*, February 2008, UNEP RisØ Centre Denmark, Tel: +45 46775 105, j.fenhann@risoe.dk

[3]. C. van der Merwe, *SA lacks Incentive to go the CDM Route*, Engineering News, 18 February 2008

[4]. Carbon Market Analyst, *What Determines the price of Carbon?*, October 14, 2004, Point Carbon, Klingenberggaten 4, N-0161, Oslo, Norway, Tel. +47 92 42 9400, Fax. +47 92 57 0818

[5]. Point Carbon, *Issues in the International Carbon Market, 2008-2012 and beyond*, October 2007, Point Carbon, London, 102-108 Clerkenwell Road, EC1M 5SA, Tel: +44 20 7253 7870, Fax: +44 20 7253 7856

[6]. European Climate Exchange, *Market Data - Historic Data*, Hasilwood House 62 Bishopsgate EC2N 4AW London UK, Tel: +44 (0)207 382 7800,Fax: +44 (0)207 382 7810

[7]. European Climate Exchange, *New ECX Record Daily Volume*, London, 11 Aril 2008, www.europeanclimateexchange.com

[8]. Point Carbon, *Towards a truly Global Market*, This report was published at Point Carbon's 3rd annual conference, Carbon Market Insights 2006 in Copenhagen 28 February - 2 March 2006. www.pointcarbon.co.za