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REGULATORY UNCERTAINTY AND OPPORTUNITY SEEKING: THE CLIMATE CHANGE CLEAN DEVELOPMENT CASE

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ABSTRACT

Regulatory uncertainty has been inherent to climate change in the absence of a successor to the Kyoto Protocol and with ongoing policy discussions on how to proceed. To facilitate steps to help address the issue, many companies have called for more certainty and a stable policy framework. What has remained underexposed, however, is that, besides having clear disadvantages, regulatory uncertainty may also benefit some companies if they recognize the opportunities of flux and move early. This lack of attention may be due to the fact that disadvantages are easier to pin-point and study than opportunities, also because companies tend to be much more open and explicit in emphasizing problems as they publicly seek political support or financial redress, while keeping strategic opportunities for themselves. Despite these practical difficulties of data collection, the relevance of opportunities related to regulatory uncertainty is very high, for managers but also for policy-makers and academics. To shed some more light on the phenomenon, this article explores regulatory uncertainty and opportunity seeking for the climate change clean development case. It unravels opportunities that have emerged for different types of companies, including utilities, banks, project development & carbon offset companies, brokers, exchanges, consultants, auditors and legal services providers. The article also shows how opportunities have evolved over the years, and have varied for different types of companies, related to fluctuations in the degree of uncertainty and the evolution of clean development projects and the related carbon market.

KEY WORDS
Climate change; opportunities; regulatory uncertainty

REGULATORY UNCERTAINTY AND OPPORTUNITY SEEKING:

THE CLIMATE CHANGE CLEAN DEVELOPMENT CASE

Regulatory uncertainty has been inherent to climate change in the absence of a successor to the Kyoto Protocol and with ongoing policy discussions on how to proceed. Many companies have called for more certainty and a stable policy framework in order for carbon markets to develop properly and to scale up investments in clean technologies. In its absence, money will be invested elsewhere and companies may be discouraged from taking 'early action', i.e. refrain from investing in projects that may generate emission rights that can be used for compliance. The negative effects of regulatory uncertainty on corporate decision making and strategies have been explored for climate change, most often in the case of energy-intensive companies, particularly utilities.[1]

These are issues of current concern for managers as well, as recent statements illustrate. An executive director of Morgan Stanley noted[2] that "Private sector investors in abatement projects require regulatory certainty. Regulatory flux is not something that private sector investors are well equipped to deal with". And, referring to CDM project developers : "For investors to suddenly find out that these projects have been successfully registered and implemented over a number of years yet now face additional scrutiny and barriers creates regulatory uncertainty".

What has remained underexposed, however, is that, besides having clear disadvantages, regulatory uncertainty may also benefit some companies if they recognize the opportunities of flux and move early to shape emerging rules and frameworks to their favor.[3] This phenomenon has been explored in the context of the European Emissions Trading System, with preliminary evidence suggesting strategic behavior by companies affected by carbon restrictions.[4] However, companies that do not face constraints, such as banks and consultants, can operate strategically as well by seeking opportunities for financial gain. As a representative of brokers CarbonDesk recently said, "A lack of regulatory clarity means clients benefit from our more bespoke services",[5] thus pointing at the need for tailor-made solutions in case of uncertainty and the opportunities that this generates for some companies.

Interestingly, the debate on regulatory uncertainty has focused on the disadvantages rather than the (potential) opportunities. This may be because the former are easier to pin-point and study than the latter. Companies also tend to be much more open and explicit in emphasizing threats and problems as they publicly seek political support or financial redress. Opportunities, though, are more likely to be kept internal as they are part of core, strategic business activities that companies aim to reap first before sharing them, if at all.

Despite these practical difficulties of data collection, the relevance of opportunities related to regulatory uncertainty is very high, for managers but also for policy-makers and academics. Therefore, this paper aims to provide some insight on regulatory uncertainty and opportunity seeking for the climate change Clean Development case. We will first give some information on the specific topic, and then explore the situation for various types of companies based on inside observations.[6]

THE CLEAN DEVELOPMENT MECHANISM

Our primary empirical context is the Clean Development Mechanism (CDM), adopted at the

Kyoto meeting in 1997 as a market-based approach for greenhouse gas emission reduction investments in developing countries. CDM is the primary international offset program based on climate change projects for, for example, renewable energy, energy efficiency or land-fill gas capture, that are carried out in developing countries. The so-called certified emission reductions (CERs) realized by these projects can be traded, if approved by the relevant (United Nations) bodies in charge of CDM in accordance with the rules set. In this way, a "fairly credible, internationally-recognized, carbon offset market" has been created,[7] even though its volume is limited overall. Many companies have become involved in this: already in 2006, they accounted for 80% of the transactions, while in the beginning the World Bank and the government of the Netherlands were predominant parties in CDM.[8]

Initially most CERs were transacted directly from the projects ('primary' CERs, or pCERs). In the meantime, however, the market for CER futures, spot and option contracts ('secondary' CERs, or sCERs) has eclipsed the primary market: in 2010, the volume of the secondary market was more than 12 times higher than the primary one. The value of the pCERs was $1.5 billion in 2010 (down from $6.5 billion in 2008 and $2.7 billion in 2009) while those of sCERs amounted to $18.3 billion in 2010 ($26.3 billion in 2008 and $17.5 billion in 2009).[9] This collapse of the primary CDM market has been directly related to "the lack of post-2012 clarity".[10] The shift from a pCER market to a sCER market requires different types of skills, from often different types of companies: while the primary, 'origination' market is rather technical in nature, the secondary, trading market extends more to bankers, brokers and exchanges.

The CDM has seen an interesting evolution from a policy perspective as well. While was agreed upon in principle in Kyoto in 1997, the 2001 Marrakesh Accords were crucial for the operationalization of key aspects. These includes the registration procedure for CDM projects, the development of methodologies to calculate emission reductions, and the so-called 'additionality' requirement, i.e. that projects needed to be additional to what would have been done otherwise. Clear decisions about other measures and implementation rules followed later as the executive board of CDM adopted a learning-by-doing approach, particularly on methodologies and additionality. This meant that methodologies have been subject to change, and the CDM Executive Board rejected many proposed projects because they believed that they would have happened even in the absence of the CDM. For participants, this resulted in considerable uncertainty, although there were fluctuations in the degree of regulatory uncertainty over the years, as will be examined below.

CDM and regulatory uncertainty

In the context of this paper, regulatory uncertainty is defined as a company's "inability to predict the future state of the regulatory environment", which thus directly stems from the actions taken by policy makers to draw up, implement and enforce regulation.[11] We argue that CDM has not functioned according to assumptions of a so-called discontinuous resolution, i.e. that regulatory uncertainty is high in the beginning of a policy process and diminishes over time.[12] Rather, as our paper will examine in more detail, it has been much more volatile, with ups and downs related to decisions taken in the various categories of regulatory uncertainty distinguished in the literature: basic direction; measures and rules; implementation processes; and interdependence with other regulations.[13]

Overall, a decrease in regulatory uncertainty could be noted in the first decade, as illustrated by Figures 1 and 2 which show the development in terms of volumes, prices as well as number of CDM projects. A factor that clearly stimulated CDM was the decision of the European Union (EU), in October 2004, to allow CDM credits for fulfilling the obligations

under its emission trading system (EU ETS) (via the so-called 'linking directive'). Although it took some time before details and exact rules became clear and implementation could start, volumes increased (see the bars in Figure 1) and so did average prices (the line in Figure 1) and number of projects (Figure 2).

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Figures 1 and 2 around here
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In the period from 2008 onwards, regulatory uncertainty increased strongly – something that has had an impact on volumes, prices and number of projects (see Figures 1 and 2). A main driver in that respect was the EU's decision not to allow additional use of CDM credits for meeting EU ETS reduction requirements after 2012 (when the current Kyoto agreement expires). This included the fact that the EU wanted to stop accepting CDM projects from "advanced developing countries and highly competitive economic sectors"[14] – meant as an "incentive for countries to come within an international agreement".[15] However, the latter has failed to materialize, resulting in growing regulatory uncertainty following the 2009 Copenhagen climate summit. At the Cancun meeting in December 2010, agreement was reached on a green fund for developing countries, with expectations rising that CDM would continue even if no immediate successor to the Kyoto Protocol could be realized.[16] That signal led to higher prices for UN offsets in one month than they had been in the preceding year. Follow-up meetings have dashed hopes again, however.

Uncertainty reigns and this is likely to remain for some time to come. For example, the EU has also decided to ban, from mid-2013 onwards, credits obtained from projects involving two industrial gases (HFC-23 and N2O) from carbon trading. These industrial gas projects have been controversial because a small number of large projects accounted for the majority of all CERs in the early years, mostly undertaken in China (and India to a much lesser extent). They also involve gases with high-global warming potential for which end-of-pipe abatement is very cheap, thus bringing large windfall profits for developers; with HFC-23 being a by-product of an ozone-depleting substance specifically produced by local chemical companies in increasingly large quantities for reaping these rewards.[17]

In a recent report, published in June 2011, the World Bank clearly emphasized ongoing uncertainty given the lack of clarity after 2012, when the Kyoto Protocol expires. As there is no sight on a successor for the Kyoto Protocol, it raised the question "how long can a market be in transition?"[18]. Lack of clarity post-2012 and other unpredictable regulatory developments were much more influential for these carbon markets overall than the economic slowdown, as stagnation persisted even when the global economy started to recover.[19]

Hence, the emergence of a secondary market, implementation and policy issues, and a certain of controversy have formed the context for companies that have been active on CDM. There has been variation in the degree of regulatory uncertainty over the years, related to implementation delays, fragmentation of the CDM market and lack of clarity as to what will happen with CDM after 2012, as well as uncertainty in connection with future demand for CERs post-2012 and additional requirements imposed by the EU. Some actors could profit from this, for example by offering custodian services, or undertaking brokerage or verification activities. Below we will explore opportunities for different categories of companies in relation to CDM.

CDM and opportunities

In the general literature on climate change, a distinction has been made for different

categories of companies related to the degree to which they are affected by climate change and also, related to this, for which it can be a potential source of competitive advantage.[20] This section discusses them briefly to see whether there were (potential) opportunities for financial gain related to CDM. We will focus on those categories included in Table 1 for which climate change and CDM may offer opportunities, i.e. the first two rows.

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Most confronted with climate change issues are high-salience industries such as oil and gas, automobiles and utilities as their core activities are directly at stake, with their fossil-fuel based business models being threatened. At the same time, an early change to develop new key capabilities in a lower-carbon direction may transform climate change into a driver for future profitability and growth, particularly if companies are early movers. In theory, emission reduction requirements as imposed by the EU ETS could function as a driver, and thus also spark a direct strategic interest in CDM. CERs from CDM projects can be used for fulfilling EU ETS obligations via a swap. The EU ETS was set up in such a way that it offered certain arbitrage opportunities, allowing companies to use, up to a certain percentage,[21] CERs for compliance. They could swap their EUAs (EU Allowances that they received for free) against CERs (which are cheaper than EUAs), and receive a cash payment.

However, in reality, EU ETS, and thus also CDM, has not been a real issue for industrial companies, as they have almost all been allocated enough EUAs so far. EU ETS turned out not to form a real constraint, because targets were lax and the economic slowdown reduced emissions anyway. Therefore, industrial companies have adopted a compliance orientation; and corporate efforts have focused on influencing the rules in such a way that future restrictions would neither be really harmful. In the case of industrial companies there is, in the current context, not much sign of opportunities resulting from uncertainties surrounding the CDM, or the CDM itself for that matter. This has been rather different for *utilities*, which have played a major role in the CDM. They have been very active players on the carbon market, and have been seeking opportunities wherever possible. Utilities initially focused on developing CDM projects to obtain and sell credits, and they have gradually expanded to trading products for industrial clients (see the next section).

A second category of companies are those that specialize in goods or services that can help to mitigate climate change impacts, or to anticipate, influence or respond to climate policy developments.[22] It is this category of companies where opportunities in relation to CDM seems to have been most prominent (see Table 2). This has included *project development companies* that have developed CDM projects and dealt with the surrounding operational complexities, *banks* that engaged particularly in carbon trading and related investment and financial services, *brokers* and *exchanges* that grew in importance with the emergence of the secondary market, and *consulting, auditing and legal services providers* that have played a role throughout. Table 2 gives an overview of the various types of companies that have profited from CDM, and the development of the opportunities over time, related to the degree of uncertainty and the evolution of the CDM and the related carbon market.

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Opportunities resulting from CDM-related activities have differed over time and in location. In the early stages of the CDM, companies focused on developing primary CDM projects,

which required a combination of skills at corporate headquarters and at the local level. Some CDM project development companies, such as EcoSecurities and Econergy, originated from the United States; others, such as Tricorona and OneCarbon, from Europe (Sweden and the Netherlands, respectively). They companies opened offices and built up expertise in the countries where they were developing CDM projects. EcoSecurities, for example, had projects in 26 countries spread over five continents by 2006.[23]

Over time, companies became much more oriented to Europe. As the dominant market focus shifted from the development of primary CDM projects to trading of secondary CERs, companies specialized in financial and trading activities increased in importance. These companies have traditionally been located in London, with Geneva and Amsterdam following at a distance, also because many were listed on the London stock exchange to raise cash to finance their expansion strategies. With the changing focus of the market, many CDM project development companies were not able to remain independent (see below), and were purchased by London-based investment banks. Their networks in developing countries shrank likewise. EcoSecurities, for example, currently has offices in just eight countries.[24]

OPPORTUNITY SEEKING IN THE CONTEXT OF REGULATORY UNCERTAINTY

Below we will explore how opportunities have worked out in the context of regulatory uncertainty surrounding CDM, per type of company as distinguished in the previous section (see Table 2) as this allows for a consideration of sector-specific developments and dynamics. We will use illustrative examples that are briefly indicated in Table 3; this Table is built around the various regulatory uncertainties and opportunities that have come to the fore.

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Utilities

The majority of emissions covered by EU ETS originates from the production of heat and electricity, with thus a major role for utilities. In the early years, utilities accounted for 55% of all EU allowances, with as top five recipients EDF (France), Enel (Italy), E.ON (Germany), RWE (Germany) and Vattenfall (Sweden).[25] They clearly gained from over-allocation of free allowances and earned large windfall profits as they passed opportunity costs to customers.[26] Utilities, also those outside the EU, were involved in developing CDM projects to realize CERs that can be used for trading. An example from the US includes Duke Energy, which clearly indicated that it was interested in having its energy projects certified according to CDM if possible, to then sell these CERs; in the EU ETS context, the Italian Enel bought a large amount of credits from Chinese HFC-23 projects.[27]

Most utilities have expanded their trading desks to include carbon products and have dedicated employees for CDM as well, with activities becoming more sophisticated, also to structure solutions for their customers. A utility's interest in the carbon business is generally threefold: to manage its own position, to manage positions of its clients, and speculative trading. After 2012, most utilities will have to purchase allowances rather than receiving them gratis from the government. They face uncertainty about the type of CERs that they can surrender after 2012, either for their own compliance or on behalf of their clients. A company must be rather sophisticated to understand and anticipate the full intricacies of the use of CERs post 2012. Utilities have the size and knowledge to anticipate these changes and

capitalize on their opportunities.

We will give a practical example of one such utility, a state-owned entity from Northern Europe, which is an active player on the EU carbon market. Its carbon team consists of approximately a dozen people, including risk managers and legal support. The company is active in the whole value chain of the CDM, from origination of CDM projects, to structuring deals, to actively trading sCERs on exchanges and the bilateral Over-The-Counter market. The company has invested significant resources in developing new products that serve companies that are compliant under EU ETS with new trading opportunities. In doing so, the company takes a significant amount of risk onto its books, but it is confident to be able to manage this risk, despite the uncertainties. By going beyond the standard products that are offered by the majority of the market (particularly banks, see below), it has found a niche that is turning out to be very profitable as such higher risk trades command a premium. A key to success for this company is that the risk managers and legal experts are fully engaged with the front office staff, all sharing office in the company's trading room, with thus short communication lines. Risk and legal staff are also dedicated to one suite of products and are comfortable with the subject matter.

Interestingly, over the years, utilities have started to compete with banks in the carbon market, particularly when it comes to providing industrial companies under the EU ETS with trading products. The advantage that utilities have vis-à-vis banks is that they have an exposure themselves in the EU ETS, which means that if CERs cannot be traded, they may be able to use them for their own (future) compliance. Utilities with well-organized carbon teams can make regulatory uncertainty in the carbon market their strength, and can take on risk, even for products that stretch into the period after 2012, for which the rules are still unclear. Utilities are much less constrained in that sense than banks in the current context, also in view of the specific developments related to the financial sector.

Banks

Banks have been engaged in the carbon market since its inception, and many even made carbon trading part of their core business. Over the years, banks have played many roles in the carbon market, such as setting up trading desks (e.g. by ABN Amro and Fortis in the Netherlands, and Barclays in the UK), developing investor products (ABN Amro) and brokering (placing shares of companies on the stock exchange). Some banks developed quite a large portfolio of primary CDM projects early on (Barclays, Fortis, and Morgan Stanley) or invested in CDM climate funds (such as Deutsche Bank that pioneered by investing in the World Bank's Prototype Carbon Fund and in the Umbrella Carbon Fund). Goldman Sachs was an early investor in the Chicago Climate Exchange (which owns half of the European Climate Exchange). Banks, such as Fortis and BNY Mellon, also offered custodian services (i.e. safe-keeping of CERs) when CDM had large problems in the beginning with its registries software that impeded the transfer of CERs to buyers' accounts (see below).[28]

Some banks started trading allowances even prior to the start of the EU ETS; a similar development has recently been observed for California's emissions trading scheme that is scheduled to start in 2013. Fortis bank already traded EUAs for delivery in 2008 (Phase II) back in 2004 and Morgan Stanley traded EUAs for delivery in 2013 (Phase III) already in 2007. In November 2010, Barclays announced the first forward trade of carbon allowances created under California's Cap AB 32 emissions trading scheme. There was little volume behind these EU ETS related trades, and they seemed to have been conducted without a clear idea about allocation and other fundamentals. Banks were motivated by their desire to be seen as early movers to build up a name and attract customer flow. Potentially losing

some money in long-dated trades would be compensated by attracting additional revenue with standard carbon trading products. Banks appeared less sensitive to the different types of uncertainties: a good trader at a bank's trading desk makes money if prices are volatile because volatility signals higher trading activity. In fact, a case can be made that because of regulatory uncertainty, this market is more volatile than others and therefore trading desks can make more money in trading EU Allowances and CERs.

Overall, however, despite initially bullish signs of banks getting more involved in the carbon market, their activities in trading EU Allowances and in the development of primary CDM projects has dwindled. As stated in a recent World Bank report, "reasonably healthy EU financials saw greater opportunity in acquiring undervalued CER portfolios from distressed and liquidity-short actors than in seeking new projects".[29] In the current context, it also seems unlikely that banks are well placed to be innovators in the carbon markets. For any product that could be seen as speculating it has been very difficult to obtain approval from risk management in the 'post Lehman Brothers' world. Therefore, most banks now largely focus on standard carbon trading products that are settled no later than December 2012 and that can be hedged immediately and therefore carry little risk. As there are no real opportunities yet to hedge post-2012 CER risk (as it is unclear what type of CERs will be eligible in Phase III), banks will not be very active with these types of products.

At some banks, including, for example, Fortis, risk managers that previously overlooked the potential for losses in carbon trading became very risk adverse after the financial crisis. In another case, ABN Amro, the necessary blend of cooperation between front office, risk managers and legal team was never optimal. Risk managers and the legal team were new to carbon trading, and to the trading of commodities in general. They also covered many different financial products, so risk and legal staff were overstretched and not able to build up a critical mass of knowledge. After the financial crisis and the changes at ABN Amro, also in ownership, the bank's own carbon trading moved to the Royal Bank of Scotland, which has withdrawn from that market in the meantime. Fortis has continued its carbon trading but that now takes place under the ABN Amro brand given that Fortis has become part of the new ABN Amro bank.

A few banks that emerged strongly after the economic crisis, such as Barclays Bank and Morgan Stanley, expressed confidence that there will be continued growth and they are betting that a global market for carbon will emerge. In particular, these banks assumed that the regulatory uncertainty regarding a federal cap and trade system in the US will lift at some point. In addition to hiring staff to engage in the alleged emerging US market, they have bought large CDM project development companies that generate tradable carbon credits that can be used in the US scheme. This may have been premature; no firm decision is expected anytime soon on a federal cap and trade scheme. However, the risk to the balance sheet of the bank is limited; most banks have set up separate affiliates that handle the portfolio of CDM projects being developed. Some even profited from the misfortune of CDM project development companies (see below) by acquiring them relatively cheaply.

CDM project development companies

Companies that developed projects and the related carbon offset possibilities grew quickly in number after the CDM was created. In this first period, this was booming business: many projects were developed and submitted for CDM approval. However, approval had to be done on a case-by-case basis with methodologies that only slowly evolved via a learning-by-doing approach. Many CDM project development companies implored the United Nations to develop clearer rules and improve the process of registering projects and issuing CERs, as

they were the first to take the brunt in case of delays or when rules changed during the 'game'. The backlog peaked in 2007 and caused some project developing companies to reduce their expected supply of CERs. It was around this same period that there were problems with CDM's registries software and that the EU announced not to allow additional use of CERs for compliance with EU ETS after 2012, as noted in earlier sections. As a result, the number of registered projects slowed down significantly. It is very important for project developers that they can actually deliver the CERs to the end buyer. Payment is always on delivery as very few pre-payments are made. Thus, if CER delivery is delayed, so is the receipt of revenue, which can lead to large cash-flow problems. That is why the registries software was so important. So, while projects generated CERs, these were stuck in the CDM registry. As the legal ownership of these CERs was unclear, end-buyers only wanted to pay on delivery.

In this situation, companies specialized in developing CDM projects and concomitant carbon offsets suffered, with share prices collapsing. For example, EcoSecurities traded at a high of 421 pence in 2007, but it collapsed subsequently, with shares trading at only a fraction of that in 2008 and 2009; another listed company, Camco, traded as high as 92.50 pence, but went down to 8 pence in 2009.[30] Many of the companies have delisted since the height of the market and some were taken over by banks. For example, JP Morgan's Carbon Acquisition Company bought EcoSecurities in 2009 and ClimateCare in 2008; the carbon trading joint venture of the French bank Société Generale bought OneCarbon from Econcern in 2009; and Barclays Bank purchased the Swedish developer of offset projects Tricorona in 2010, running it as an independent company. There were quite some investors, including pension funds, that had put money in listed carbon companies and thus lost their shirt when these companies ultimately struggled to stay profitable and could not remain independent.

In the current setting, CDM project developers are keenly following the direction in which the EU is pointing them. Thus, renewable energy projects in least developed countries are receiving much more interest from CDM project development companies, in a move away from China and India and from a reliance on industrial gases. Tricorona, for example, the company bought by Barclays Bank, recently stated that "it makes sense to diversify into countries that have less risk of their CERs being ruled out of the EU ETS in the future".[31] This means that new opportunities are being explored and likely to be found in Africa and in Asian countries such as Cambodia and Indonesia, via projects that are much smaller and involve, for example, solar, biomass and wind. These will generate EU ETS compliant CERs; companies are willing to pay a premium for such CERs because the EU ETS is currently by far the largest market where they can be used for compliance and where only high quality CERs are admitted. Buyers can distinguish themselves by taking the risk that the CERs can be used in the EU ETS, and providing a price floor combined with a EUA-linked floating price. CDM project development companies are well placed to manage this risk, as the front-office people, risk managers and the legal team closely work together and generally have years of experience in this market.

Brokers and exchanges

Carbon markets have traditionally attracted brokers and, increasingly, exchanges as well. Brokers operate in the bilateral Over-The-Counter (OTC) market, offering products that can be tailor made. They do not take a principal position in trades, but merely put buyers and sellers together. In relation to CDM, buyers can, for example, call a broker and specify that they need CERs from a renewable energy project in a least developed country. The broker will then activate its network and look for an offer that meets these criteria. Thus, as

uncertainty on measures and rules leads to a more fragmented market, for example because CERs from large hydro projects must have an additional certification (see below), or industrial gases will not be accepted any longer, brokers stand to benefit.

As soon as products become standardized and more liquid, however, exchanges start to play a more prominent role. This does not mean that exchanges do not innovate and respond to trends in the market; they do. For example, exchanges started to list contracts to financially settle EUA/CER swaps when such transactions were being accommodated in the OTC-market. But exchanges can only list contracts once the infrastructure for settlement is completely operational. Thus, when the brokered market already offered CERs for which the final settlement could not take place because of the CDM's software problems, exchanges were only able to list contracts when actual deliveries could be made. The importance of exchanges versus brokers has changed over the years. While OTC accounted for all transactions by early 2005, its share had declined to around 50% five years later.[32] Besides this underlying generic trend that shows an increasing role for exchanges, there are clear fluctuations related to the degree of uncertainty and market fragmentation.

An illustrative example is the issue surrounding large hydro projects, which emerged when environmental groups expressed major concerns that CDM would lead to more large hydro projects. The EU subsequently decided that hydro projects larger than 20MW had to meet additional criteria to ensure their environmental and social integrity, in accordance with recommendations made by the World Commission on Dams. However, as the EU left it to member states how to handle this additional proof, there was the risk that one member state would set different standards than others. Indeed, Denmark, for example, proposed to be very strict, whereas the Netherlands had a more laissez-faire approach. This had large and unforeseen consequences for the market. The European Climate Exchange responded by disallowing all CERs from large hydro. CERs from large hydro, which can still be used for compliance in the EU ETS, could only be traded on the OTC market, where tailor-made transactions are put together by brokers. This fragmentation was very much welcomed by the brokers community. Even after the EU drew up uniform guidelines in 2009 (requiring a validated compliance report for large hydro projects) exchanges did not accept CERs from these projects, leaving room for brokers. Nevertheless, the largest volumes overall are being handled by exchanges via standardized contracts. Non-standard contracts, such as large hydro, account for a relatively small fraction of the total volume.

At the same time, further increasing fragmentation and uncertainty can be expected given the indeterminate future of CDM. The standard CER will cease to exist after 2012, as projects registered after that date will only be eligible if they are located in least developed countries, with industrial gases being excluded from EU ETS. Since exchanges only deal with standardized emission reductions, brokers in the OTC market can grow in importance again. There will be price differentiation between different types of CERs, leading to a less transparent market and more difficult price formation. Some private funds now offer to pay a fixed price for CERs generated between 2013 and 2020 regardless of whether the Kyoto Protocol is extended or not; the Post 2012 CER Fund managed by Gekko Carbon Asset Management is an example.[33] Exchanges are trying to develop contracts to accommodate these changes; however, it is very difficult to specify what exactly will be eligible and what not. Moreover, longer dated trades carry much more risk, especially after 2012. Hence, there will be ample room and opportunities for brokers in particular.

Consulting, auditing and legal services providers

As the rules become more complicated and the financial risks higher, service providers such

as lawyers and consultants can provide insight and knowledge to their customers. In an ideal world, there would be no uncertainty and all participants would have easy access to the same information. However, that is not the case, and, in addition, CDM and EU ETS are highly complex. Consultants can play a large role in collecting and analyzing information, and presenting that tailor-made in such a way that is most useful for their clients. Many consultants mention "regulatory uncertainty" on company websites, and in speeches, op-ed pieces and reports. All 'big four' accounting firms (Ernst & Young, Deloitte Touche Tohmatsu, KPMG and PwC) have developed climate change and sustainability consultancy practices that also include carbon and CDM activities.[34] A case in point is KPMG, which hired the former Executive Secretary of the United Framework Convention on Climate Change, Yvo de Boer. And many of the Indian CDM projects are represented by the local Ernst & Young climate change team. PwC recently issued a report on carbon markets, including CDM, which it presented as "our review of the green fraud risks you may face and the steps we can help you take to mitigate or eliminate them".[35]

CDM has also generated ample opportunities for auditors. Barriers to entry are relatively high because very detailed knowledge is required for the type of work. Some of the accounting firms' local practices were involved in CDM auditing, together with quality assurance firms (e.g. Veritas, SGS, Lloyd's) and a range of consulting firms, large and small. Accounting firms were active in the early stages of CDM, but dropped out later when they reached the limitations of their own risk management approaches post-Enron. Auditors can be held liable in case their performance does not meet the standards set by the United Nations. The number of auditors admitted by CDM is relatively limited (less than 40) and there has been a serious shortage of capacity, further increasing the system's backlog and overall delays. Auditors have been involved in the market from the very beginning as they are supposed to be the gatekeepers of the system. Finding qualified personnel is difficult, which explains why many auditing firms have been understaffed. Auditors were not able to hire enough qualified personnel and, as a result, the quality of the work of some firms dropped. The CDM Board even (temporarily) suspended the accreditation of four firms, including the three large ones, TÜV SÜD, SGS and DNV (DNV alone validated around 50% of all registered CDM projects);[36] all three were reinstated after they had implemented changes.

While part of the auditing work is related to verifying the rules that have been adopted, which does not relate to regulatory uncertainty strictly speaking, the regulatory uncertainty that has surrounded CDM has made matters more complicated rather than less, thus often leading to additional demand for auditing expertise, as unclear and emerging issues needed to be addressed by those with detailed knowledge. Extra work for auditors also resulted from the decision on large hydro projects: companies must provide a validated compliance report that the project meets the criteria as set out by the World Commission on Dams. Such assurances can be provided by auditors, and they fill a gap when companies are looking for external validity given changes and uncertainty.

CDM has also led to growing demand for legal advice. Lawyers are needed to interpret the large number of rules and procedures of the carbon market, promulgated by inter alia the EU and its member states, and the United Nations. All major law firms have developed specialized practices in carbon trading, including Norton Rose, Baker & McKenzie, and Allen & Overy. In-house lawyers, for example, at banks, often rely on them for legal opinions and contractual matters. Specialist legal advice is particularly indispensable in concluding purchasing contracts. While international trading associations have developed standardized contracts, amendments must often be made as the market evolves to

accommodate these changes. For example, many bilateral contracts for CER purchases did not exclude the possibility of large hydro CERs. Thus, those companies which bought such CERs bilaterally but planned to sell them on the exchange suddenly faced an unforeseen problem. Contracts were drawn up to fill this legal hole, but new changes are likely to emerge. Hence, lawyers are amongst the services providers that profited from regulatory uncertainty as well.

CONCLUSIONS AND IMPLICATIONS

Although companies publicly state that they need regulatory certainty, which is in line with studies on this topic, many privately admit that they can also profit from ongoing uncertainty. This article has used the climate change development case and its related regulatory uncertainties to unravel some of the opportunities that have emerged for different types of companies, and how this has developed over time. Our case did not show the so-called discontinuous resolution that has been suggested in the literature, which means that regulatory uncertainty is high in the beginning of a policy process and decreases as it evolves. Rather, we found much more volatility, with ups and down related to decisions taken (or not taken): regulatory uncertainty diminished in the early years, but then increased again. This has implications for various categories of companies, and may thus be relevant for managers and policymakers in countries where emissions trading schemes are being discussed or implemented, and where carbon markets may likewise increase in importance.

Our case mainly discussed experiences from Europe, as this is where an emissions trading scheme, with the possibility of using certified emission reductions from CDM projects for compliance, has been in place from some years already. Still, lessons from this context can be useful for companies from other countries, including the US, that will become active in the EU or fall under its requirements at some point. Moreover, various countries are considering to start with some sort of emissions trading, including Australia, China, Japan, New Zealand and South Korea. And while a federal cap and trade system in the US is not being considered at the moment, California's AB32 is scheduled to start in 2013, and aims to immediately establish an emissions trading program for large emitters. This adds to other regional emissions trading schemes that have emerged, such as the Regional Greenhouse Gas Initiative in the Northeastern states of the US.

The type of companies that can benefit from regulatory uncertainty in the climate change development case are ones that have made carbon trading part of their core business, either because they have a natural position or because they decided to (further) specialize in this area (see Tables 2 and 3). Involvement has been obvious for banks, brokers, exchanges, and CDM project development companies. Interestingly, utilities became large players with a broad spectrum of carbon products, taking on more risks than banks could after the financial crisis. Throughout the evolution of the CDM, banks focused on standard products, whereas utilities went beyond that.

This may hold a lesson for US-based utilities in case they become involved in a regional or perhaps even federal emissions trading scheme. While banks are clear competitors in this field because of their client relationships and experience with trading in complex derivatives, utilities are well positioned to become the primary providers of hedging tools for the carbon market. While initially heralded as the innovators of the carbon markets, banks have taken a step back due to constraints by risk management and increased capital requirements. When banks purchased several CDM project development companies such as EcoSecurities and Tricorona in 2009 and 2010 as the fortune of these companies dwindled, this was with a view to gain access to a future US emissions trading scheme. However, as the

prospects of a viable carbon market in the United States seem remote, these banks may have acted too early. Still banks are well suited to continue to supply standard hedging products to their extensive client base.

Carbon trading and the related products are complicated, so companies that want to engage in this must make sure to have access to sufficient relevant expertise. A successful identification and realization of opportunities requires close cooperation between front office staff, risk managers and legal experts. If not all the know-how is available in-house, consulting and law firms offer these services for a fee. Regulatory uncertainty has thus also created clear opportunities for consulting and legal services providers. Based on the experience with the CDM, it seems that consulting firms can benefit by emphasizing that their products help companies to understand and mitigate regulatory risk. All 'big four' accounting firms (Ernst & Young, Deloitte Touche Tohmatsu, KPMG and PwC) have developed climate change and sustainability consultancy practices that also include carbon and CDM activities. Their marketing material invariably emphasizes regulatory uncertainty in the carbon markets, thus prompting the need for advisory services by these companies.

The complexities of CDM and the many changes and uncertainties added further layers and procedures for which very specific auditing knowledge was required, and this became provided by traditional accounting as well as quality assurance and consulting companies. Accounting firms decreased their involvement after the beginning in view of their own risk management requirements. Consulting firms can even flourish in the absence of established markets such as the EU ETS. When several bills were under discussion to set up an emissions trading scheme in the US, consulting companies were keen to develop capabilities to understand the policy implications and offer advisory services to clients in the US.

Brokers and exchanges, while both active in matching supply and demand for CERs, are in a sense counterparts: the role of brokers increases in importance when markets become more fragmented and tailor-made services are needed, while exchanges expand when there is a large demand for more standardized, liquid products. Both routes are available for companies, depending on the level of regulatory uncertainty. US-based companies that may be covered by a federal or regional emissions trading scheme might thus consider accessing the carbon market not only through exchanges but also through brokers.

While regulatory uncertainty has been shown to offer clear opportunities in particular circumstances for some companies, it is crucial that the 'basic direction' of policy is 'positive'. In other words, there must be a signal that a carbon market or another type of mechanism with the same characteristics will continue to exist in whatever form or shape. In the end, there is no 'natural' demand for carbon and related products and services; it is government-driven. However, as long as these basic expectations continue to be reasonable, uncertainty about measures and rules, and their implementation and interdependence with other regulations will not only bear risks and be negative for companies, but can also provide considerable opportunities, as this article has demonstrated.

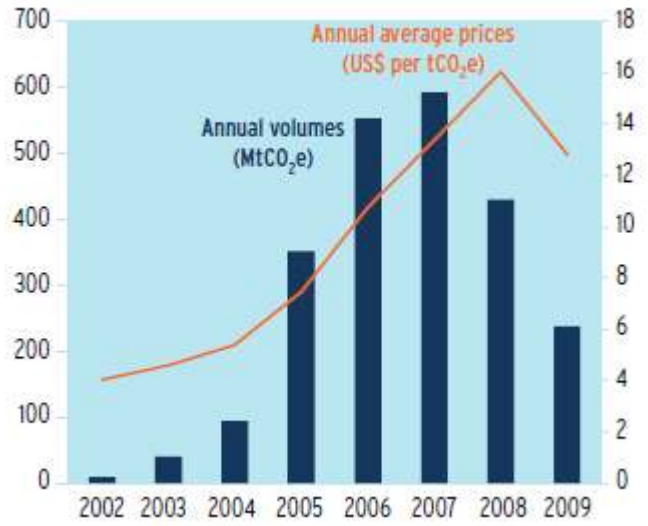
NOTES

[1] Recent studies include C. Engau and V.H. Hoffmann, "Effects of Regulatory Uncertainty on Corporate Strategy – An Analysis of Firms' Responses to Uncertainty about Post-Kyoto Policy," *Environmental Science & Policy*, 12 (2009): 766-777; V.H. Hoffmann, T. Trautmann and M. Schneider, "A Taxonomy for Regulatory Uncertainty – Application to the European Emissions Trading Scheme," *Environmental Science & Policy*, 11 (2008): 712-722; V.H. Hoffmann, T. Trautmann and J. Hamprecht, "Regulatory Uncertainty: A Reason to Postpone Investments? Not Necessarily," *Journal of Management Studies,* 46/7 (2009): 1227-1253; P.S Reinelt and D.W. Keith, "Carbon Capture Retrofits and the Cost of Regulatory Uncertainty," *The Energy Journal*, 28/4 (2007): 101-128. This is part of a much older debate which started already some decades ago, see e.g. A.A. Marcus, "Policy Uncertainty and Technological Innovation," *Academy of Management Review,* 6/3 (1981): 443-448; A.A. Marcus, "U.S. Firms' Responses to Regulation: Stonewalling and Opportunism," *Long Range Planning,* 20/3 (1987): 98-104.
[2] A. Kossoy and P. Ambrosi, *State and Trends of the Carbon Market 2010* (Washington, DC: World Bank, 2010), p. 49.
[3] S. Dorado, "Institutional Entrepreneurship, Partaking, and Convening," *Organization Studies*, 26/3 (2005): 385-414; N. Fligstein, "Social Skill and Institutional Theory," *American Behavioral Scientist*, 40/4 (1997): 397-405; R. Greenwood and R. Suddaby, "Institutional Entrepreneurship in Mature Fields: The Big Five Accounting Firms, " *Academy of Management Journal*, 49/1 (2006): 27-48; S. Maguire, C. Hardy and T.B. Lawrence, "Institutional Entrepreneurship in Emerging Fields: HIV/AIDS Treatment Advocacy in Canada," *Academy of Management Journal*, 47/5 (2004): 657-679; M.-G. Seo and W.E.D. Creed, "Institutional Contradictions, Praxis, and Institutional Change: A Dialectical Perspective," *Academy of Management Review*, 27/2 (2002): 222-247.
[4] J. Pinkse and A. Kolk, "Multinational Corporations and Emissions Trading: Strategic Responses to New Institutional Constraints," *European Management Journal,* 25/6 (2007): 441-452.
[5] M. Szabo, "Analysis: Are EU Carbon Offsett Limits a Boon for Brokers?," *Reuters*, 27 August 2010.
[6] Sources will be provided where possible, but quite some information is directly derived from the authors' personal experience in the past fifteen years in respectively research on the topic and the carbon industry itself, and involves some business informants that only provided information if their (company) names would not be disclosed.
[7] M. Gillenwater and S. Seres, *The Clean Development Mechanism. A Review of the First International Offset Program* (Arlington, VA: Pew Center on Global Climate Change, 2011), p. 35.
[8] F. Lecocq and P. Ambrosi, "The Clean Development Mechanism: History, Status, and Prospects," *Review of Environmental Economics and Policy*, 1/1 (2007): 134-151.
[9] N. Linacre, A. Kossoy and P. Ambrosi, *State and Trends of the Carbon Market 2011* (Washington, DC: World Bank, 2011), p. 9.
[10] N. Linacre, A. Kossoy and P. Ambrosi, op.cit., p. 9.
[11] Engau, C. and V.H. Hoffmann, "Corporate Response Strategies to Regulatory Uncertainty: Evidence from Uncertainty about Post-Kyoto Regulation," *Policy Sciences*, 44/1 (2010), p. 54.
[12] Engau and Hoffmann (2009), op. cit.
[13] Hoffmann, Trautmann and Schneider, op. cit.
[14] CEC, "Towards a Comprehensive Climate Change Agreement in Copenhagen," Brussels,

28.1.2009, COM(2009) 39 final.
[15] CEC, "Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC so as to Improve and Extend the Greenhouse Gas Emission Allowance Trading System of the Community," Brussels, 23.1.2008, COM(2008) 16 final.
[16] E. Krukowska, "EU Carbon Rises the Most in a Month Following Agreement in Cancun, Mexico," *Bloomberg*, 13 December 2010.
[17] CO_2 Handel.de, "HFC-23: Commission Welcomes Vote to Ban Certain Industrial Gas Credits", 21 January 2011; ENS, "China Threatens Deliberate Release of Potent Greenhouse Gas," *Environmental News Service*, 9 December 2010; Gillenwater and Seres, op.cit.; K. Røine and H. Hasselknippe, *Carbon 2007. A New Climate for Carbon Trading* (Oslo: Point Carbon, 2007).
[18] N. Linacre, A. Kossoy and P. Ambrosi, op.cit., p. 9.
[19] N. Linacre, A. Kossoy and P. Ambrosi, op.cit., p. 10.
[20] A. Kolk and J. Pinkse, "A Perspective on Multinational Enterprises and Climate Change. Learning From an 'Inconvenient Truth'?," *Journal of International Business Studies*, 39/8 (2008): 1359-1378.
[21] The percentage is different per member state, but averages 13.5%. (A. Delbosc, N. Stephan, V. Bellassen, A. Cormier and B. Leguet, "Assessment of supply-demand balance for Kyoto offsets (CERs and ERUs) up to 2020", CDC Climat Research, Working paper No. 2011-10.
[22] Kolk and Pinkse, op.cit.
[23] <http://www.ecosecurities.com/Assets/23504/PR_EcoSecurities%20launches%20Indonesian%20office.pdf>.
[24] <http://www.ecosecurities.com/Footers/Contact_Us/default.aspx>.
[25] Hasselknippe, H., & Røine, K. 2006. *Carbon 2006. Towards a Truly Global Market.* Oslo: Point Carbon.
[26] Pinkse and Kolk (2007), op.cit.; J. Sijm, K. Neuhoff and Y. Chen, "CO_2 Cost Pass-Through and Windfall Profits in the Power Sector," *Climate Policy*, 6/1(2006): 49-72.
[27] Pinkse and Kolk (2009), op.cit.; Røine and Hasselknippe, op.cit.
[28] <www.merchant-banking.nl/01/MyDocuments/695411_Carbonbroch_2009_def.pdf>; <www.bnymellon.com/environmentalsolutions/enduser.pdf>.
[29] Kossoy and Ambrosi, op.cit., p. 38.
[30] <http://uk.reuters.com/article/2007/11/06/uk-ecosecurities-trading-idUKL0621205020071106; http://www.londonstockexchange.com/exchange/prices-and-markets/stocks/summary/company-summary-chart.html?fourWayKey=GB00B11FB960GBGBXAIM>.
[31] "UN Needs Consistent CDM decisions: Tricorona", 11 November 2010; accessed via <http://www.tricorona.se/file/UN_needs_consistent_CDM_decisions.pdf>.
[32] Kossoy and Ambrosi, op.cit., p. 9.
[33] <http://www.post2012fund.com>.
[34] A. Kolk and A. Margineantu, "Globalisation/Regionalisation of Accounting Firms and Their Sustainability Services," *International Marketing Review*, 26/4-5 (2009): 396-410.
[35] PwC, *How to Assess your Green Fraud Risks* (PricewaterhouseCoopers LLP, UK, 2011).
[36] Gillenwater and Seres, op. cit.; <http://www.dnv.com/press_area/press_releases/2008/dnvtakesactiontoregaincdmaccreditation.asp>.

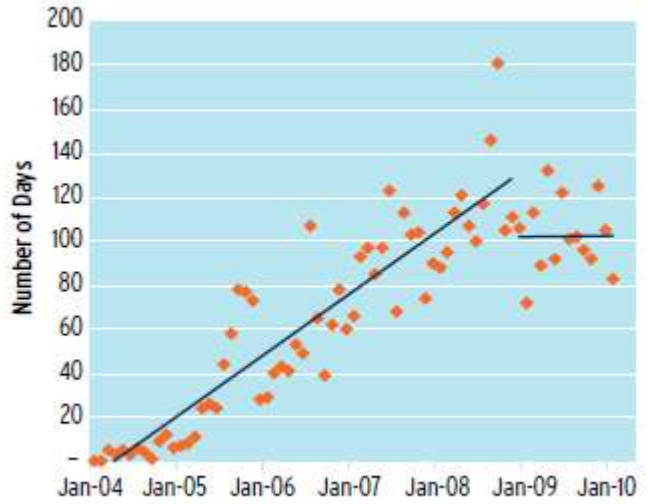
FIGURES AND TABLES

Figure 1. Volumes and prices for Kyoto offset transactions since 2002



Source: Kossoy and Ambrosi, op. cit., p. 37.
Volumes represented by bars; the price development by the line

Figure 2. Number of projects entering the CDM pipeline each month, January 2004 – February 2010



Source: Kossoy and Ambrosi, op. cit., p. 40.

Table 1. Relevance of climate change and CDM for different categories of companies

Category of companies	Impact of climate change issue	Link with the Clean Development Mechanism
High-salience sectors	● Strongly affected in view of energy intensity and dependence ● Early change in business models might be source of competitive advantage	● Potentially relevant to industrial companies, but no serious shortage of emission allowances so far, so no real need for CDM opportunities ● Utilities have been very active with CDM projects and related carbon trading activities
Companies specialized in climate-relevant goods and services	Can profit by helping companies mitigate climate change impacts or to anticipate, influence or respond to climate policy	Opportunities for project development & carbon offset firms, banks, brokers, exchanges, and consulting, auditing and legal services
Remaining firms with low-emission activities	● No main source of profitability/growth, but may gain legitimacy from acting visibly ● Can deal with issue via external markets	In case of e.g. carbon-neutral policy, CDM can be one way of buying offsets, but there are other, less costly and more flexible ways

Table 2. Opportunities in the clean development climate change case

Company type	Opportunities in relation to CDM	Evolution over the course of CDM so far
Utilities	Developed projects, structured deals, actively traded on exchanges and over-the-counter market, also for industrial clients	Initially focused on CDM projects to obtain and sell credits, and have expanded to trading products for industrial clients, even if risky
Banks	Played many roles, including project development, trading, brokering, offering custodian services, investment	Were most active in the beginning in various roles, but focus on standard products and much less able to take risk after financial crisis
Project development & carbon offset companies	Developed and submitted projects, worked on CDM methodologies, sold and delivered CERs, and assisted clients on carbon offsets	Booming business in early years of CDM, then declined due to delay and EU ETS limits; now reorientation to smaller countries/projects
Brokers	Put buyers and sellers together, operating in over-the-counter market, with bespoke products for non-standard situations	Played a major role in early phase when standardization was lacking, then declined, but re-emerged with growing uncertainty
Exchanges	Handled large volumes of standardized contracts, while accommodating changes once appropriate infrastructure was in place	Emerged after the early phase when products became standardized and more liquid, but face difficulties with increasing fragmentation
Consultants	Collect and analyze information about complex rules and procedures related to CDM, and advise clients in tailor-made way	Have played an important role throughout, though opportunities are largest when there is uncertainty, complexity and change
Auditors	Project validation prior to implementation to assess that criteria are met, verification to periodically audit emission reductions	Active from the beginning, but suffered when CDM had problems and bottlenecks; most opportunities when market continues to grow
Legal services providers	Interpret rules and procedures of carbon market for clients, offering specialized knowledge particularly needed for contracts	Opportunities are largest when there is uncertainty and contracts are needed to fill legal holes, and market parties need advice

Table 3. Examples of opportunities and of regulatory uncertainty related to CDM

	Examples of opportunities		
Examples of uncertainty	*Trading*	*Investment*	*Provision of services*
Implementation delays of CDM	n.a. (no clear opportunities)	Banks buying CDM development companies (Barclays/Tricorona; JP Morgan/EcoSecurities; SocGen/OneCarbon)	Custodian services for CERs offered by banks (Fortis Bank; BNY Mellon); advisory role for consultanting and accounting firms; adjustment contracts by lawyers (NortonRose; Baker & McKenzie; Allen & Overy)
Fragmentation of CDM market and uncertainty post-2012	Arbitrage by utilities (Northern European utility); Brokers (CarbonDesk)	Private Post-2012 CDM Funds (Gekko Post-2012 Carbon Fund)	Advisory role for consulting and accounting firms (e.g. PwC; KPMG); adjustment contracts by lawyers (NortonRose; Baker & McKenzie; Allen & Overy)
Additional requirements by EU	Arbitrage by traders (all entities; CERs from large hydro cannot be traded on exchanges, only bilaterally)	n.a. (no clear opportunities)	Auditing expertise offered by verification companies (DNV; SGS; TÜV SÜD); adjustment contracts by lawyers (NortonRose; Baker & McKenzie; Allen & Overy)
Expected lower demand for CERs from EU ETS post-2012	n.a. (no clear opportunities)	Banks buying CDM development companies (Barclays/Tricorona; JP Morgan/EcoSecurities; SocGen/OneCarbon)	Advisory role for consulting and accounting firms (e.g. PwC; KPMG)