Caisse des Dépôts

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Editorial

CO_2 markets: What are they all about?

Emissions trading systems are one of the tools available for easing the battle against climate change. This letter explores various uses to which these new instruments can be put, as well as their real economic impacts.

The earliest uses of emissions markets date back a little more than ten years, and specifically to a program to combat acid rain that was launched in 1995 in the United States. From the outset, this program provided a long-term institutional framework with very precisely defined rules. In the interview he kindly gave us, Professor Ellermann said that market mechanisms have reduced the costs of achieving the specified environmental objectives by more than half.

In Europe, the CO_2 market operates according to a similar principle, with the allocation of emissions allowances to industrial installations. As shown by the example of the electric power generation sector, the carbon factor has already become an integral part of operating decisions. On the other hand, the integration of the price signal in investment decisions, especially for long-term investments, is less well established, at least in the context of current institutional rules.

The European market: Prices of allowances

In response to initial information available on effective emissions in 2005 of installations including European Emission Trading Scheme, the CO_2 price per ton dropped from 29.4 euros on April 22 to 12.5 euros on May 5. If this correction lasts, it means that the market overestimated the cost of achieving the objective of reducing CO_2 emissions, presumably because of incomplete information. Moreover, a correction of this magnitude will be reflected in the price of the credits with which project mechanisms are rewarded, which will in turn limit the incentive to voluntarily take actions to reduce greenhouse gas emissions.

Summary

On the international level, major emerging countries such as India, China and Brazil have implemented active strategies to take maximum advantage of the project mechanisms set up in the framework of the Kyoto Protocol. Nevertheless, the integration into this market of less-advanced countries will not happen by itself.

Two other types of initiatives should increase the impact of market instruments on greenhouse gas emissions: the use of carbon assets in “carbon neutrality” programs that are undertaken voluntarily by some market participants who want to compensate for their own emissions, and very long-term emissions reductions buyback programs that governments or public agencies may put in place, beginning today, to stimulate innovation and investments in reducing the level of greenhouse gases generated by our economic activities. An initiative of this type would have the benefit of sending a strong signal to participants in the market who may be disoriented by excessive fluctuations in the short-term price of European allowances.

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The US SO_2 market: Lessons learned

An interview with Denny Ellerman

The objective of the US program to combat acid rain is to reduce sulfur dioxide emissions in 2010 to half of 1980 levels by trading emission permits among electric power plants.

What role has the emissions trading system played in the US program to combat acid rain?

Denny Ellerman : The initial objective was political - to leave the dead end that had been reached in conventional attempts to regulate acid rain. For the first President Bush, a Republican, the creation of a market for environmental assets was a strong gesture aimed at limiting government interference in the economy. NGOs, which had been frustrated by previous failures, decided to try this new "cap-and-trade" system.

After the creation of the SO_2 market, this method of regulation turned out to be less expensive and more efficient from the environmental point of view, and resulted in a decrease in SO_2 emissions of approximately 3.9 million tons in the first year. It was estimated that this system reduced the costs of compliance by 55% compared to the standard "command-and-control" approach (taxes, standards etc.), thanks to, among other things, the banking of allowances for future use.

Fluctuations in the price of energy have caused disruptions in the price of CO_2 on the European market. Has this type of phenomenon occurred on the SO_2 market in the US? Is there a need to limit these instabilities caused by disruptive outside events?

D.E : On the European market, the price of CO_2 has been two to three times higher than the expected price since July 2005. Although the surprise in that case was a higher price, the reverse is true for the SO_2 market. The initial price was one-half to even two-thirds lower than the expected price.

I don't think there is a need to limit the price fluctuations on these markets, especially when the allowances are distributed for free. These allowances form assets that offset the cost of the restrictions on CO_2 emissions and keep the net position of companies more or less constant. Financial tools such as futures markets can also protect them from temporary instabilities.

If we want stable and predictable prices, all we have to do is impose a tax. But we know what political problems it would cause, especially for a system that is ultimately designed to have a global reach.

The Europeans are negotiating the allocation of allowances for Phase Two (2008-2012). Can we learn any lessons from the SO_2 market that can be applied to the definition of the allocation plans for this phase?

D.E : One lesson we can learn from the various US experiences is that the distribution of allowances has little effect on the efficiency of the program or on the competitiveness of the companies. First of all, the effects of the initial allocation of allowances are mainly financial, and do not have any direct effect on the power generation choices (what to generate, how to generate it and in what quantities). Second, the cost of CO_2 is not a condition that determines a company's competitiveness. Of course, a company's competitiveness may be affected by this new cost, but the free allocation of the allowances offsets that.

Interview conducted by Anaïs Delbosc
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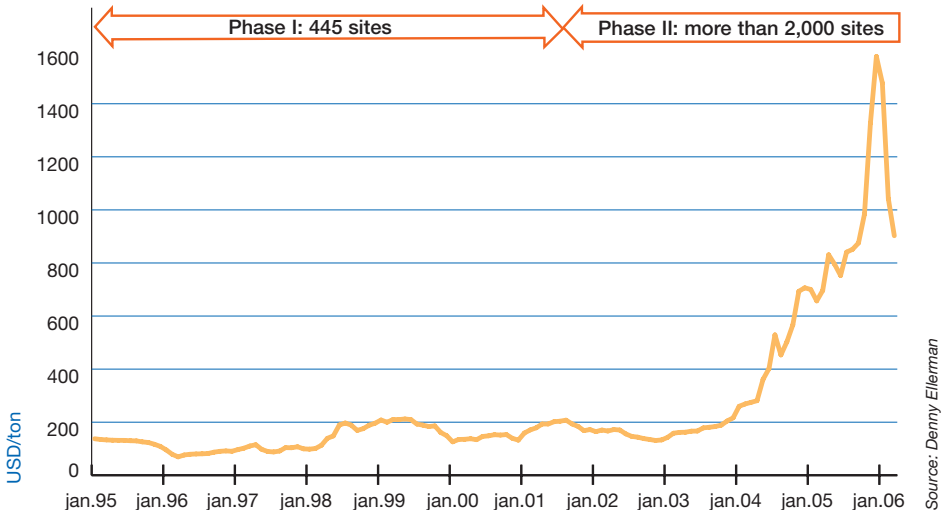
Denny Ellerman, a Professor at the Massachusetts Institute of Technology (MIT), is a specialist in the US acid-rain program and trading systems in policies to combat climate change.

Price of SO_2 allowances from 1995 to 2006



SO_2 price remained around USD 200/ton during the first period (1995-2000), although it has risen sharply since 2004. As in the European CO_2 market, the peak reached in late 2005 correlated with the flare-up in natural gas prices, which acted in favor of coal-burning power plants, which emit more sulfur dioxide.

Impact of the European trading system on the electric power generation sector

The electric power generation sector is the largest recipient of allowances in Europe. How has its activity been impacted?

With 65% of its CO_2 emissions produced by the combustion of fossil fuels, the European electric power generation sector is the largest emitter and is allocated about 30% of the allowances. Electric power generators are also among the industrial operators of whom the greatest emissions reduction effort is demanded.

CO_2 and fuel prices

With the system of CO_2 allowances, electric power generators must now integrate the price of the allowance into the management of their existing power generation stations. In the short term, their operating costs mainly consist of fuel prices. That is why power generation plants are managed on the basis of "spreads", which constitute their operating cash flow calculated as the difference between the selling price of electricity during peak hours and the price of the fuel used, weighted by the energy output of the power plant. If a power plant burns natural gas, the spread is called the "spark spread", and if it burns coal, the spread is called the "dark spread". The higher the "spread", the more profitable the use of the power plant.

From now on, these spreads are to be corrected by the carbon value. The electric power producers add to the production cost of the fuels the price of the allowance multiplied by the quantity of CO_2 emitted per MWh generated. The result is the "clean spreads", which have now become the signals that guide the management of the fleet of existing power generation plants. All other things being equal, the higher the price of carbon dioxide, the more the operators have an incentive to switch from the power plants with the highest emissions to those that produce fewer emissions. Of course, the margin of substitution is limited by multiple factors including the availability of capacity, transportation costs and the regularity and continuity of supplies.

Considering the billing procedures, the carbon constraint also has a significant effect on the selling price of electricity. According to a study conducted by the Dutch Energy Research Centre, electric power producers shift between 40% and 70% of the CO_2 costs into the selling price of electricity. That means that a major part of the price signal of the allowance system is passed through to electric power consumers.

Uncertain impacts on investment decisions

In the longer term, the reduction of CO_2 emissions by the electric power sector will depend on the choices made in terms of investment decisions. A massive retirement and replacement of European power generation plants is projected to occur between 2010 and 2030, which will generate an investment flow that will determine the structure of the available fleet of power generation plants for many decades. It is less certain, however, how the future cost of carbon will be integrated into these investment choices.

In the first place, it is difficult to anticipate a future value of CO_2 beyond 2012 on account of institutional uncertainty. The design of the markets has not been defined from 2013 on, neither at the international level nor at the European Union level.

Second, the rules of free allowances allocation to new entrants that have been applied implicitly for the first period are less than ideally suited to the consideration of the carbon constraint in investment decisions.

Although the economic signal given by the value of the European allowance is quite clear when it comes to the management of existing power generation facilities, in the current institutional framework its effect is still uncertain concerning the choice of investments.

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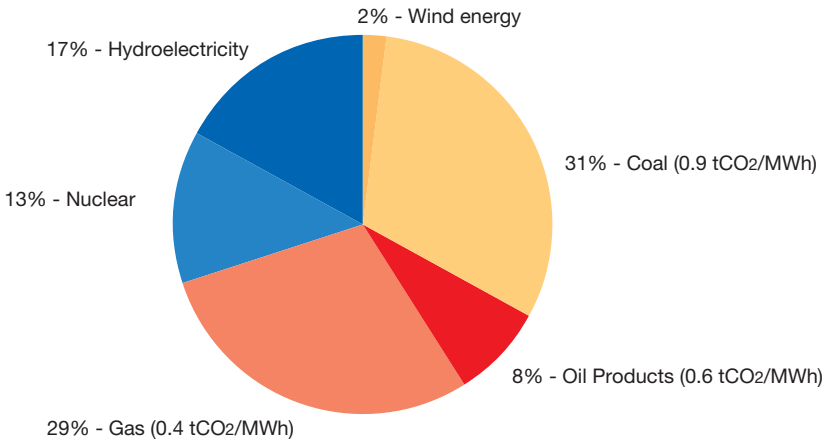
Electric power generation in Europe (EU25) by origin in 2003



Source: European Commission, Eurostat.

In 2003, more than two thirds of the electric power produced in Europe (EU25) was generated in thermal power plants from three sources of energy: coal (31%), natural gas (29%) and oil products (8%).

Kyoto Projects: a lever for development?

The Clean Development Mechanism (CDM) is enabling a certain number of participants in industrialized countries to reduce the cost of their CO_2 constraint. What benefits does the CDM offer to host countries?

The Clean Development Mechanism (CDM) allows an investor from an industrialized country to generate carbon credits on the basis of a project that reduces emissions in a developing country. This market currently consists for the most part of large emerging markets, which are implementing strategies to maximize the benefits.

India: encouraging the spread of technologies

India is a country that is particularly interesting in its appropriation of the mechanism to use it as a lever of development for its economy. When international negotiations began, India was opposed to the principle of the CDM. It is now the country that has the highest number of projects (more than 250) under way within its borders. The key to this success has been a strategy that combines procedures for a rapid processing of applications and choices in favor of projects that can be replicated easily. Approximately 200 of these projects relate to renewable energies and energy efficiency, sectors to which the Indian government has been devoting particular attention.

Other countries such as Brazil and Chile are promoting renewable energy projects within their borders via programs promoting or creating standardized reference scenarios. If sector programs are made eligible for the CDM after 2012, it will further promote this type of strategy.

China : the CDM as a financial resource

China is considered by many experts to be the greatest potential site for CDM projects. The Chinese government chose a strategy oriented around keeping the financial benefits of the CDM within its borders. For example, it taxes the carbon income of the CDM projects executed in China at variable rates, depending on the type of project, and imposes a minimum selling price on the credits that are generated, as a function of the prices observed on the international market. If we recall that the emissions reductions from HFC23 destruction projects, which are the most heavily taxed, generate several million credits a year and that 6 projects of this type are currently under construction in China, it is easy to see the financial benefits of a mechanism of this type for the Chinese government.

Moreover, current Chinese law requires that the CDM projects must be carried out by a Chinese company or by a joint venture in which the foreign-owned share of the company does not exceed 49%. This is another way to ensure that the money from the CDM is indeed injected into the Chinese economy. These measures are controversial, but have not discouraged a large number of investors. It remains to be seen whether the level of investment would be higher in the absence of such a strategy...

CDM and growth: the limits

Although the CDM enables developing countries to accelerate transfers of technology and investments, their room for manoeuvre depends on the economic attractiveness of their territory, which is the first requirement for the success of this mechanism. India, China and Brazil currently seem to be the “giants” of CDM (they represent 70% of the emissions reductions of projects currently in place), followed closely by a number of emerging countries in Asia and Latin America. In Africa, CDM investments are concentrated in the most developed countries (South Africa, certain countries in Northwest Africa) and in sectors linked to oil production. The rest of the continent, on the other hand, has seen little benefit from the Kyoto Protocol. The CDM seems to be less an instrument of development as such than an additional resource for countries where the economy is already attractive.

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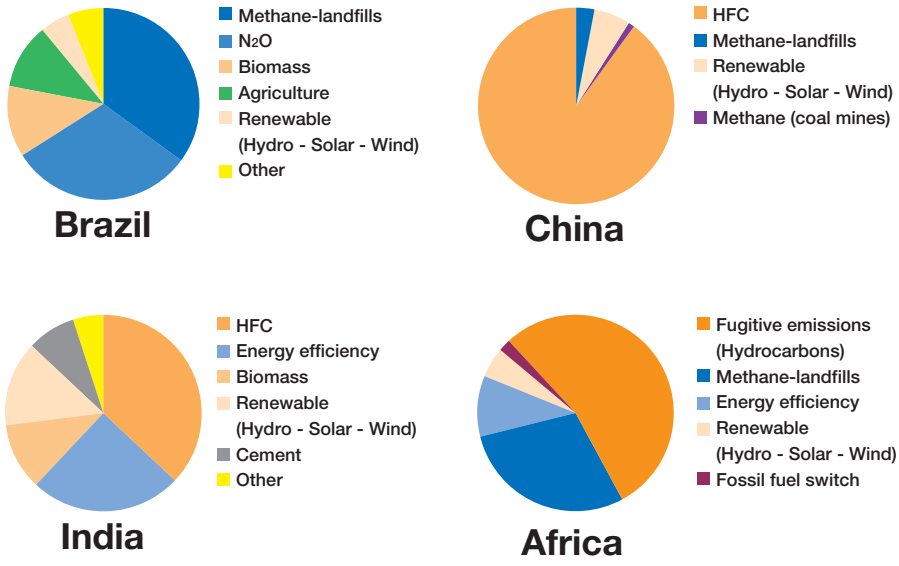
Distribution by sector of CDM projects under way in four regions, by amount of reduced emissions



Brazil: 131 projects - 19 $MtCO_2e$/year saved
China: 45 projects - 50 $MtCO_2e$/year saved
India: 266 projects - 21 $MtCO_2e$/year saved
Africa: 20 projects (8 in South Africa) - 7 $MtCO_2e$/year saved

Source: UNEP Risø Centre

CO_2 assets and carbon neutrality

A growing number of participants want to voluntarily compensate for their emissions to achieve carbon neutrality. A status report on the role of the CO_2 markets in this new demand.

The principle of carbon neutrality is based on a simple fact: one tonne of greenhouse gases emitted into the atmosphere has exactly the same impact on the climate, regardless of the location of the emitter or how the emissions were produced. Likewise, the reduction of the greenhouse gas emissions has the same impact, regardless of where it occurs. This fact gave birth to the idea of "compensating" for a company's emissions, so that the impact on the atmosphere would be equal to zero. In that case, we can speak of "carbon neutrality." To accomplish that, a company has two ways to compensate for its emissions: it can finance projects that reduce emissions elsewhere or purchase carbon assets on a market and "cancel them out."

Pioneers in neutrality

The 2002 Salt Lake City Olympic Games was one of the first major events to announce its carbon neutrality. The Games achieved neutrality via emissions reductions that were implemented off-site. Four US waste management companies achieved reductions in their methane emissions via landfill biogas recovery projects and then "donated" these reductions - 120,000 tons of CO_2 equivalent - to offset the emissions from the Games.

STMicroElectronics is one of several industrial companies that have resolved to be carbon neutral by 2010. The semiconductor manufacturer is financing a three-pronged strategic plan: energy management, with the dual objective of reducing energy intensity by 5% annually and using 15% renewable energy by 2012; cutting its PFC emissions by 90% between 1995 and 2008; and investments in reforestation projects to compensate for its remaining direct and indirect emissions (3 million tons of CO_2 equivalent between 2001 and 2010).

And one last example: in late 2004, the bank HSBC set itself the objective of carbon neutrality by 2006. Its strategy has three components: reducing its direct emissions by 5% by 2007; reducing the carbon intensity of the electricity it consumes; and compensating for its remaining emissions. As an experiment, HSBC has also decided to neutralize the 170,000 tons of CO_2 equivalent corresponding to its emissions in the fourth quarter of 2005. For that purpose, it acquired, on the basis of a tender offer, carbon assets generated by four projects in New Zealand, Australia, Germany and India.

Supply becomes institutionalized

Because a reduction in emissions is by its nature intangible, neutrality service providers must offer guarantees to make their clients' neutrality credible. Among other things, they must prove the reality of the implementation of the projects, and the reality of the emissions reductions generated, which is called additionality. The current supply is very broad in terms of services offered by the different service providers: it includes neutrality services based on projects of questionable additionality and without external verification, services that are subject to effective verification of emissions reductions by a third party, as well as purchase of carbon assets guaranteed by a market system. The price range, from USD 5 to USD 30 per ton, reflects these differences in approach.

Ultimately, clients who demand the maximum guarantees of the reality of their carbon neutrality must increasingly turn to external auditors and assets obtained from recognized market systems, the gold standard of which being Kyoto credits. It is therefore likely that the customary participants in the verification and financial markets will play a significant role in the emerging market for carbon neutrality. ●

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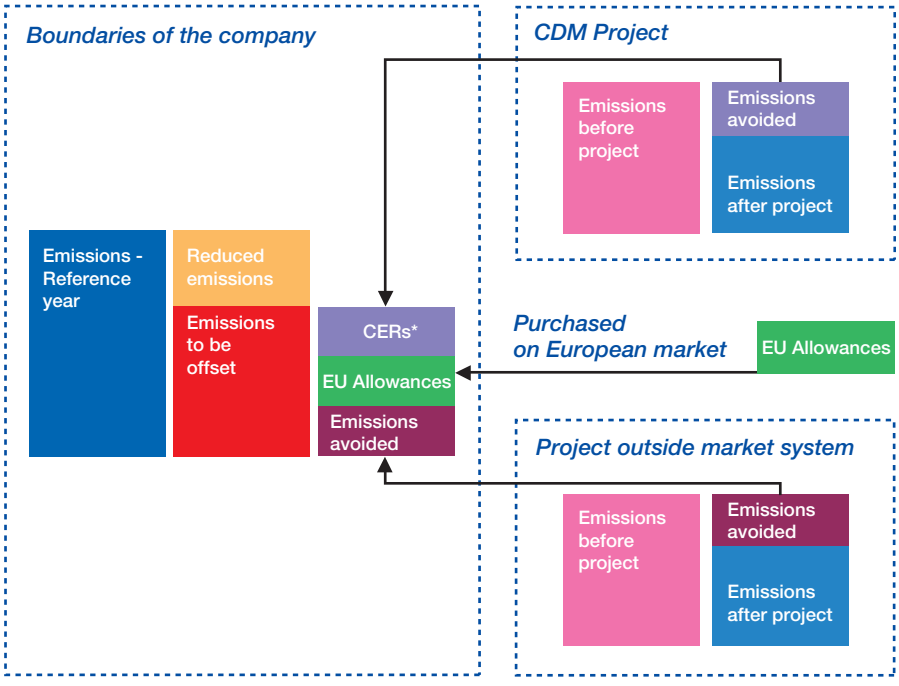
Example of the implementation of a carbon neutrality policy



A company has three ways to approach carbon neutrality: reducing its emissions, investing in projects, whether or not they are included in a market system, and directly purchasing CO_2 assets.
** Crédit generated by CDM Projects.*

Long-term

The post-2012 investment stakes

How can incentives be provided to long-term investments in low-emissions technologies?

2012 represents the far horizon of both the Kyoto Protocol and the European trading scheme. After that date, there are no guarantees in terms of institutional architecture. However, to respond effectively to the threat of climate change, it is necessary to promote the development of clean technologies that are low in greenhouse gas emissions, starting immediately and continuing in the long run.

One of the principal forces involved in the process is the European power generation sector, which will have to replace the majority of its power plants and expand its overall capacity by 2020. Given the lead time required for the construction of power generation plants, decisions will have to be made very soon. But the choice of the technology will depend not only on projections of the prices of fuels and electricity as far off as the period 2020-2050, but also on the price of the European allowance during the same period. Electric power producers must very quickly gain some visibility on this long-term carbon constraint and its potential price.

The importance of institutional conditions

The traditional mechanism used to hedge against uncertainty regarding the trend of prices in the future is recourse to financial markets, which offer a whole range of instruments (futures, options etc). In the case of the price of carbon, this mechanism is already being used, although it does not cover the period after 2012. Beyond that date, this possibility does not exist because the risk on the evolution of the price, and in particular that the price may become zero, depends on institutional conditions, on the international level for a Kyoto II Protocol, and on the European level for the European emission trading scheme. If the States decide to eliminate the carbon constraint, emissions will once again be free and industrial operators who have taken expensive action to reduce emissions will see their competitiveness weakened.

As long as international negotiations have not produced decisions concerning the maintenance of a long-term carbon constraint, only the States, individually or via groups such as the European Union, can currently make any commitment for the post-2012 period. If they do so, they will then be giving a strong signal to their industrial companies and will exercise a major strategic option by preparing their economies if the carbon constraint intensifies.

A long-term carbon contract?

Because climate policies are within the area of responsibility of governments, it is fair that the State, and not industrial operators, bears the risk of the carbon price linked to institutional conditions. This is the principle on which Dieter Helm, a British economist, among others, has developed the idea of "long-term carbon contracts."

This mechanism consists of an auction of emissions reductions over the long term (20 or 30 years). The State then buys back these allowances from willing industries at the lowest offered price per ton of CO_2. This system has a dual advantage. On the one hand, it provides an impetus for the immediate financing of industrial operators to pursue R&D projects and to invest in clean technologies over the long term, and on the other hand it enables the State to reduce its national emissions at the lowest cost. The counterparts for the State could take three different forms: providing a carbon neutrality service to requesting organizations, the sale of "credits" corresponding to emissions reductions in future carbon markets, or the use of these emissions reductions as a means to achieve compliance with the State's commitments under the future Kyoto II, III or IV Protocols.

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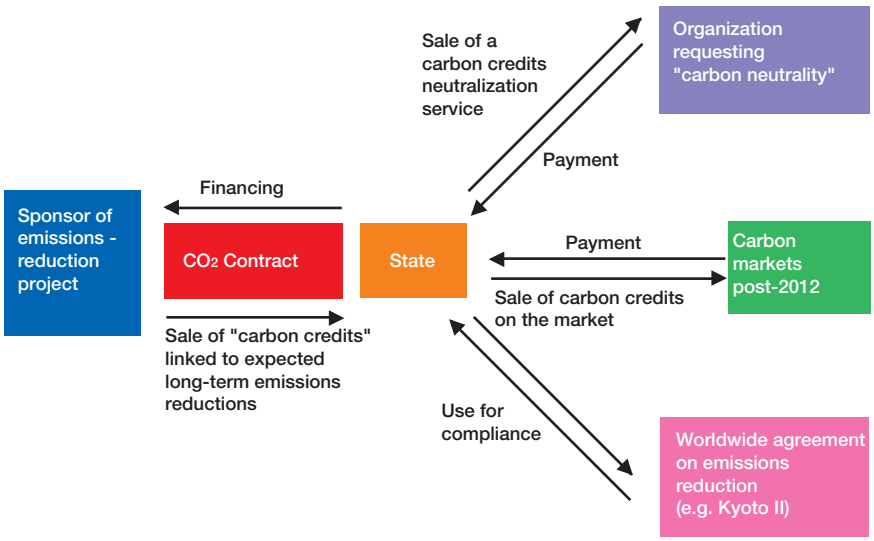
The operation of a long-term carbon contract



Source: Climate Task Force, from D. Helm

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The Climate Task Force of the Caisse des Dépôts directs and co-ordinates the research and development initiatives in the area of the fight against climate change.

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