

# Climate Report

Research on the economics of climate change



N°46 • July 2014

## SMART UNCONVENTIONAL MONETARY (SUMO) POLICIES: GIVING IMPETUS TO GREEN INVESTMENT

### APPENDIX III – CARBON CERTIFICATES

Camille Ferron<sup>1</sup> and Romain Morel<sup>2</sup>

---

This is an appendix of CDC Climat Research's 46<sup>th</sup> Climate Report.

You can find the main report here: <http://bit.ly/SUMOpolicies>

.

---

<sup>1</sup> CDC Climat Research. [camille.ferron@cdcclimat.com](mailto:camille.ferron@cdcclimat.com) - +33 1 58 50 68 85.

<sup>2</sup> CDC Climat Research. [romain.morel@cdcclimat.com](mailto:romain.morel@cdcclimat.com) - +33 1 58 50 60 18.

## **TABLE OF CONTENTS**

---

<b>I. BACKGROUND</b>	<b>3</b>
<b>II. GENERAL PRINCIPLE</b>	<b>3</b>
<b>III. THE STRENGTHS OF THE CARBON CERTIFICATE MECHANISM</b>	<b>6</b>
A. Carbon certificates can potentially become international green reserve assets	6
B. Setting the SCC via an agreement would limit the risk of a “carbon bubble”	6
<b>IV. THE LIMITS OF THIS MECHANISM</b>	<b>6</b>
A. Moral hazard issue	6
B. The need for European agreements on the SCC, the emission calculation methodology, and on the amount of carbon assets created	6
C. A risk of plurality of carbon prices	7
D. A risk of illiquidity	7
E. Need for further elaboration concerning the link of this mechanism with the Green Fund, and its adaptability for DCs	7
<b>REFERENCES</b>	<b>8</b>
<b>LATEST PUBLICATIONS IN CDC CLIMAT’S “CLIMATE REPORTS” SERIES</b>	<b>9</b>

## I. BACKGROUND

---

This financing mechanism was initially designed to operate at the European Union (EU) level.

In addition to the desire to combine a solution to the economic downturn with the transition to a low-carbon economy, the authors noticed a certain suspicion among developing countries where the promises of developed countries regarding combating climate change were concerned. The aim of their proposal was therefore to provide a background to the Cancun paradigm, according to which all countries ought to enjoy “fair access to development” (Hourcade 2014). In fact, according to J.C. Hourcade, developing countries (DCs) have already understood that their interest lay in developing in a sustainable manner; however the problem resides in the fact that the large amounts of available savings are not directed towards the financing of zero-carbon energy, but support speculative bubbles instead. Accordingly, the purpose of the carbon certificate mechanism is to redirect global savings towards the financing of low-carbon projects and sustainable infrastructure. According to Hourcade, reforming the European financial system via the creation of carbon assets would enable the unity of Europe to be reinforced, and Europe to be made more credible in the eyes of DCs.

Hourcade and his co-authors underline the European carbon market’s inability to enable the emergence of a carbon price. In fact, the EU-ETS only covers part of the production sector, and has resulted in highly volatile carbon prices. This is why they are suggesting a new mechanism, based on the negotiated determination of a social carbon cost (SCC), the aim of which is to “fill the anticipation gap” between the carbon price anticipated by operators and the actual carbon price (Hourcade, Perrissin Fabert, and Rozenberg 2012). In other words, the objective is to include private finance in the mechanism in order to redirect loan incentives toward green projects.

## II. GENERAL PRINCIPLE

---

The mechanism (see Figure 1) is generally set out on the basis of five points (Hourcade, Cassen, and Shukla Forthcoming):

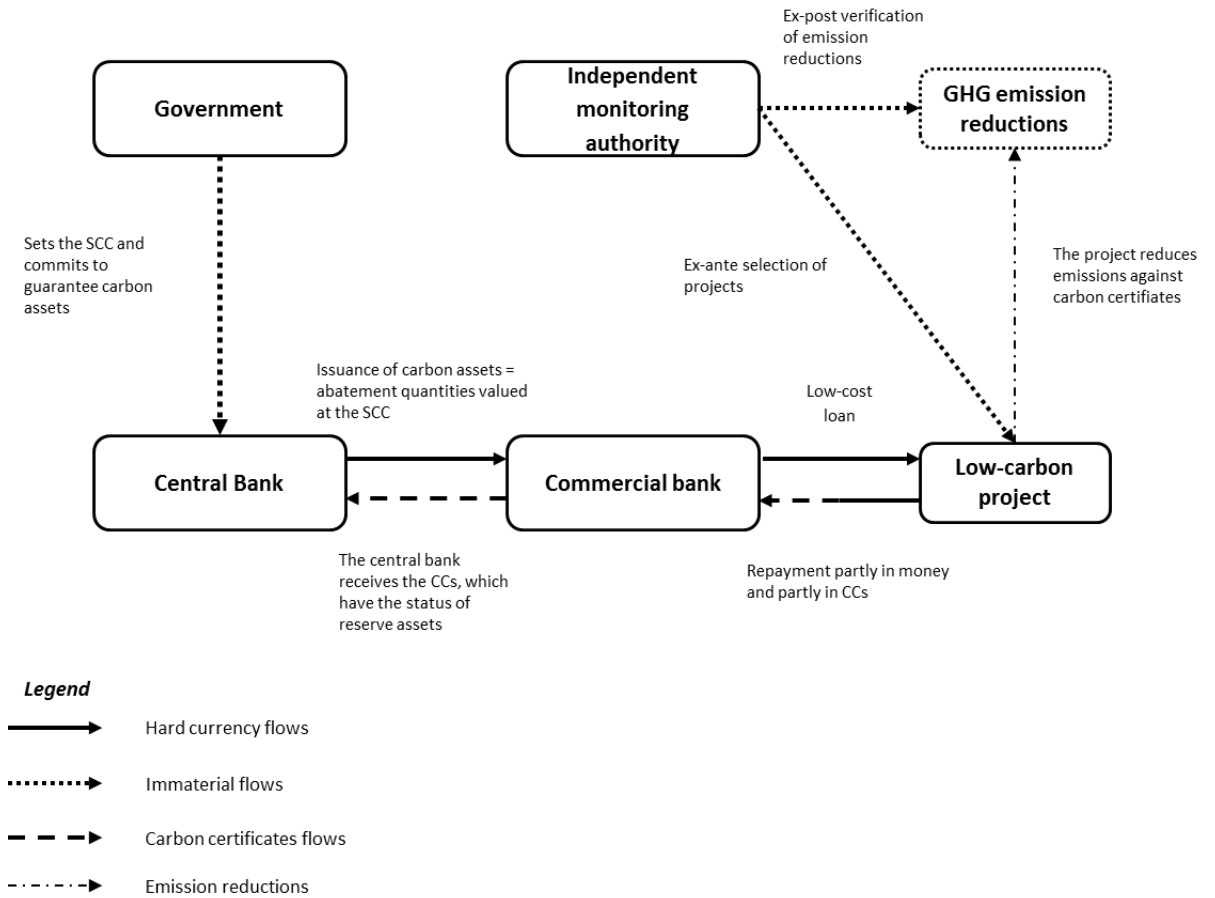
- 1) Countries mutually agree on the SCC, and make a voluntary commitment to guaranteeing the “carbon assets” issued by their central bank. Carbon assets, which are in fact drawing rights, are offset amounts valued according to the SCC: for example, if the SCC is €10 per tCO<sub>2</sub>, 100 carbon assets, i.e. €100 in drawing rights, will be equivalent to an emission reduction of 10 tCO<sub>2</sub>. The total volume of the assets created, and the volumes for each country will be limited by a local emission reduction target.
- 2) Based on the carbon assets guaranteed by the system’s Member States, the central bank grants credit lines to commercial development banks, and gives them the right to issue “Carbon Certificates” (CCs) dedicated to financing low-carbon projects (LCPs). The risk-adjusted profitability of these projects increases accordingly.
- 3) Countries that are members of the system, even those who do not issue any carbon assets<sup>3</sup>, have a certain number of national strategies that will help to determine the LCPs that are eligible for financing approved by the UNFCCC (Hourcade, forthcoming). The CCs issued will depend on the emission reductions expected from the LCPs that are financed.
- 4) Once the emission reductions have been checked by an independent organization, the carbon assets will actually be issued (Hourcade, Cassen, and Shukla Forthcoming). These assets may be turned into legal reserves for the central bank and investors.
- 5) At the same time, banks create “green” financial products, based on the projects financed via the CCs, which are rated AAA, in order to attract savings from households and institutional investors.

---

<sup>3</sup> Countries that are not included in the UNFCCC Annex 1 can participate in the system without issuing carbon assets.

Lastly, we may need to provide for an exit strategy for this system once the transition to a no-carbon economy is self-sufficient (Hourcade and Perrissin Fabert 2013).

Figure 1: The Carbon Certificates mechanism



Source: authors, inspired from Hourcade, Perrissin Fabert, and Rozenberg (2012)

In one of their articles, Perrissin Fabert and Hourcade (2013) provide an example to illustrate the consequences of the Carbon Certificates mechanism on the financing of a low-carbon project. In this example, a commercial bank grants a loan of 100 to an entrepreneur, who must repay 90 at the rate of  $r^l$ , and 10 with emission reduction certificates. The refinancing rate that the commercial bank obtains from the central bank is  $r^d$ . The return on the project is  $110R^{LC}$ . Its aim is to offset five units of  $CO_2$ , and the SCC is set at 2.

Stage 1: granting of the loan

CENTRAL BANK		COMMERCIAL BANK		ENTREPRENEUR	
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
CO <sub>2</sub> loan +10	+10	+90 <sup>l</sup> +10	+90 <sup>d</sup> +10	110R <sup>LC</sup>	+90 <sup>l</sup> +10
5 CO <sub>2</sub>	10		+0.08(90 <sup>l</sup> )		
Emission reductions	Drawing rights				

Source : Perrissin Fabert and Hourcade (2013)

The central bank records a receivable of 10 on its balance sheet, which it holds against the commercial bank that grants the loan, following the issue of carbon assets amounting to the value of five CO<sub>2</sub> units valued according to the SCC.

The commercial bank records the loan under its assets. On the liability side, it must refinance 90 at the  $r^d$  rate with the central bank. The 10 remaining units are financed via the carbon assets issued by the central bank, which benefit from a zero prudential coefficient. The increase in the bank's net assets is therefore  $0.08(90r^l)^4$ , compared with  $0.08(100r^l)$  for a project financed with no carbon assets, which represents a reduction in its balance sheet restrictions, and therefore an increase in its lending capacity.

The entrepreneur records the expected return on the loan under assets, and  $90r^l$ , which they will repay in euros under liabilities, along with 10 that they will be able to repay in emission reduction certificates.

**Stage 2: balance sheet halfway through the term of the loan**

CENTRAL BANK		COMMERCIAL BANK		ENTREPRENEUR	
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
CO <sub>2</sub> loan +10	+10	+45 <sup>r<sup>l</sup></sup> +10	+45 <sup>r<sup>d</sup></sup> +10	110R <sup>LC</sup> -45 <sup>r<sup>l</sup></sup> +2.5 CC	+45 <sup>r<sup>l</sup></sup> +10
5 CO <sub>2</sub>	10		+0.08 (45 <sup>r<sup>l</sup></sup> )		
Emission reductions	Drawing rights				

*Source: Perrissin Fabert and Hourcade (2013)*

The central bank still holds a receivable of 10 against the commercial bank. The entrepreneur has repaid 50% of their loan, including 45<sup>r<sup>l</sup></sup> in cash, and 2.5 emission reduction certificates.

**Stage 3: balance sheet at the end of the term, and transfer of the carbon assets**

CENTRAL BANK		COMMERCIAL BANK		ENTREPRENEUR	
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
5 CCs CO <sub>2</sub> loan +10	+10	+0 +10	+0 +10	110R <sup>LC</sup> -90 <sup>r<sup>l</sup></sup> +5 CCs	+0 +10
5 CO <sub>2</sub>	10		+0		
Emission reductions	Drawing rights				

*Source: Perrissin Fabert and Hourcade (2013)*

The entrepreneur has repaid 90<sup>r<sup>l</sup></sup> in cash, and has achieved a reduction amounting to 5 CO<sub>2</sub> units. He has therefore received 5 CCs. The commercial bank's balance sheet restriction expires. The central bank exchanges its receivable of 10 carbon assets against the entrepreneur's 5 CCs, which cancels all the remaining debt. Lastly, the amount of carbon liquidity that the central bank is allowed to issue, and their emission reduction target will decrease by an amount equivalent to the reductions achieved.

If the entrepreneur fails to achieve that emission reduction target, he must repay the value of the CCs received for the emission reductions that were not achieved in cash at interest rate  $r^l$ . If default on the environmental debt makes the project insolvent, there will also be a loss for the bank, which must therefore ensure that the project is solvent even if it does not generate any emission reductions.

<sup>4</sup> The 0.08 figure corresponds to the prudential ratio of 8% recommended by the Basel III Regulations.

Conversely, if the offset is larger than expected, the profits could be shared between the bank and the investor, according to a rule that is yet to be defined (Perrissin Fabert and Hourcade 2013).

To avoid moral hazard issues, the independent control authority will need to apply a project selection procedure. Initially, it will define the kinds of projects that are eligible, then draw up an emission reduction timetable for each kind of project, and finally calculate the discounted value of the offsets, which will be used as the basis for distributing the CCs. In addition, only a portion of the emissions avoided will be financed in the form of CCs. Lastly, Hourcade, Perrissin Fabert, and Rozenberg (2012) underline that this selection process may be adjusted over time and according to experience.

### **III. THE STRENGTHS OF THE CARBON CERTIFICATE MECHANISM**

---

#### **A. Carbon certificates can potentially become international green reserve assets**

As mentioned above, if they acquire the status of international reserve assets, CCs could contribute to increasing and diversifying developing countries' reserves, thereby enabling them to rebalance their very excessive balance of payments, and to be less dependent on the US dollar and US monetary policy. The authors even mention the possible inclusion of CCs in the currency basket used as the basis for SDRs (Aglietta and Hourcade 2012).

#### **B. Setting the SCC via an agreement would limit the risk of a “carbon bubble”**

The specific nature of this mechanism compared with others involves the setting of an SCC by agreement. The market price of the CCs would need to gravitate around the SCC, which ought to be enough to significantly reduce the risk of a bubble (Hourcade, Perrissin Fabert, and Rozenberg 2012).

### **IV. THE LIMITS OF THIS MECHANISM**

---

#### **A. Moral hazard issue**

As we have previously noted, both banks and entrepreneurs have an economic interest in over-estimating the emissions avoided by the project. This moral hazard issue may lead to payment default situations (Hourcade, Perrissin Fabert, and Rozenberg 2012). In this event, the question of repaying the loan, and more generally of the credibility of CCs and the attractiveness of this kind of asset for commercial banks, will arise. We must therefore ensure that the emission reduction control process implemented is effective, which may result in substantial procedure costs.

#### **B. The need for European agreements on the SCC, the emission calculation methodology, and on the amount of carbon assets created**

Hourcade and Perrissin Fabert (2013) argue that an agreement on the SCC would be easier to obtain than an agreement on the price of CO<sub>2</sub>. Indeed, according to them, it is easier to reach an agreement on the wealth created by an investment (SCC) than on a price to pay for each ton of CO<sub>2</sub> emitted. The main difference between these two elements is that the SCC gives an idea of the gain obtained from an effort whereas a carbon price is associated with the notion of constraint – even on existing infrastructure. However, the implementation of a carbon price, through a carbon tax for instance, is more efficient than a SCC because the SCC only sends a signal for new investments and spares the installed capital, contrary to a carbon tax. Thus, with a SCC, the long term objective will be reached less rapidly depending on the pace of depreciation of the carbon-intensive capital. Therefore, there is a trade-off between optimality and acceptability.

Although Hourcade and Perrissin Fabert (2013) assert that an agreement on the SCC would be easy to achieve because it is a simple signal, we are entitled to express reservations on this point. Undoubtedly,

some countries have already assigned a social value to carbon; however these SCCs are not equivalent, are not used for the same purposes, can be volatile, and are not calculated in the same way. Moreover, as we have seen previously, an agreement will also need to be reached on the calculation method for the avoided emissions. Lastly, countries in the same monetary zone will need to agree on an annual greenhouse gas emission reduction target.

### **C. A risk of plurality of carbon prices**

One can wonder in terms of carbon prices what will happen if this mechanism is jointly implemented with a carbon tax or a carbon market. The carbon price and the SCC might converge in the long run but it is not sure. Different carbon prices could lead to inequalities between economic actors, such as between old and new carbon-intensive industries. Moreover, this can be an obstacle to the implementation of local carbon trade scheme by defining an official carbon price, different from a local price. This issue needs to be further addressed.

### **D. A risk of illiquidity**

The CCs, contrary to bonds or gold, cannot be converted in cash money. The articulation between CCs and the prudential reserves of commercial banks has to be further developed. Indeed, if the CCs are only useful for the banks during their refinancing operations with the central bank, we can wonder what will happen if the banks cease to borrow from the central bank. Indeed, in this event, the CCs will be accumulated in the balance sheets of commercial banks, who could ask for the exercise of the government's guarantee. In case of a crisis of trust, we could think of a green central bank which could convert those CCs into money or to implement a carbon market making CCs easily convertible into money. All in all, if CCs are completely illiquid, they face the risk to never become popular with commercial banks or private investors.

### **E. Need for further elaboration concerning the link of this mechanism with the Green Fund, and its adaptability for DCs**

A portion of the carbon assets may be used to finance the Green Climate Fund, thereby covering a portion of the annual \$100 billion that developed countries promised to raise on behalf of developing countries at the Copenhagen Conference, but the modalities under which this would be done are not clearly defined yet. In addition, some of the investments made thanks to CCs loans can be directed towards DCs. However, we will need to consider how the Central Banks of major emerging countries could take part in the mechanism.

Quantitative easing (QE) is the modern version of the “money printing press”. This non-conventional monetary policy was broadly deployed by the United States Federal Reserve (Fed) and the Bank of England during the recent economic downturn, as well as by the Bank of Japan in the 1990s. Meanwhile, the European Central Bank (ECB) used a similar non-conventional policy via long-term refinancing operations (LTROs)<sup>5</sup>.

The principle of Green QE would be to use the creation of money by the central bank in order to finance low-carbon projects.

The basic premise is as follows: private banks can borrow from central banks at rates close to zero, so why not use this driver to finance projects aimed at helping the transition to a low-carbon economy?

---

<sup>5</sup> ECB Monthly Bulletin, September 2011, Box 5.

## REFERENCES

---

- Aglietta, Michel, and Jean-Charles Hourcade. 2012. “Can Indebted Europe Afford Climate Policy? Can It Bail Out Its Debt Without Climate Policy?” *Intereconomics 2012*. ZBW-Leibniz Information Center for Economics, 159–64.
- Hourcade, Jean-Charles. forthcoming. “Document de Travail-EPE.”
- ———. 2014. “Europe : Le Défi Climatique Pour Horizon.” *Revue-Projet.com*, February 26. <http://www.revue-projet.com/articles/2014-03-hourcade-europe-le-defi-climatique-pour-horizon/>.
- Hourcade, Jean-Charles, Christophe Cassen, and Priyadarshi Shukla. Forthcoming. “Climate Policy Architecture for the Cancun’s Paradigm Shift: Building upon the Lessons from History.” *Proposed for Publication in a Special Issue of International Environmental Agreements*
- Hourcade, Jean-Charles, and Baptiste Perrissin Fabert. 2013. “Triggering the Funding of the Low-Carbon Transition: A Monetary Plan.” *CIREA*, July.
- Hourcade, Jean-Charles, Baptiste Perrissin Fabert, and Julie Rozenberg. 2012. “Venturing into Uncharted Financial Waters: An Essay on Climate-Friendly Finance.” *International Environmental Agreements*, March, 165–86.
- Perrissin Fabert, Baptiste, and Jean-Charles Hourcade. 2013. “Des ‘Certificats Carbone’ Pour Soutenir L’investissement Bas Carbone : Étude Du Circuit Financier”, June.



## **LATEST PUBLICATIONS IN CDC CLIMAT'S "CLIMATE REPORTS" SERIES**

---

- No. 45 **Introducing short term flexibility in the EU-ETS to assure its long-term credibility: a multi criteria analysis of policy options**  
ZUHEIR DESAI, EMILIE ALBEROLA AND NICOLAS BERGHMANS - July 2014
- No. 44 **Ex-post evaluation of the Kyoto Protocol: Four key lessons for the 2015 Paris Agreement**  
ROMAIN MOREL & IGOR SHISHLOV – May 2014
- No. 43 **Use of Kyoto credits by European installations: from an efficient market to a burst bubble**  
NICOLAS STEPHAN, VALENTIN BELLASSEN & EMILIE ALBEROLA - January 2014
- No. 42 **Power sector in Phase 2 of the EU ETS: fewer CO<sub>2</sub> emissions, but just as much coal**  
NICOLAS BERGHMANS & EMILIE ALBEROLA - November 2013
- No. 41 **Combating Fuel Poverty: Policies in France and the United Kingdom**  
JOHAN TYSZLER, CÉCILE BORDIER & ALEXIA LESEUR - September 2013
- No. 40 **Forests and climate change mitigation in the European policies: priority to fuel wood**  
FREDERIC BARON, VALENTIN BELLASSEN & MARIANNA DEHEZA - April 2013
- No. 39 **More than 800 agricultural and agri-food sites are affected by the EU ETS**  
CLAUDINE FOUCHEROT & VALENTIN BELLASSEN - March 2013
- No. 38 **The economic tools of Chinese climate and energy policy at the time of the 12<sup>th</sup> five-year plan**  
DI ZHOU & ANAÏS DELBOSC –January 2013
- No. 37 **Ten lessons from 10 years of the CDM**  
IGOR SHISHLOV & VALENTIN BELLASSEN - October 2012
- No. 36 **Regional Climate, Air and Energy Plans: a tool for guiding the energy and climate transition in French regions**  
JEREMIE DE CHARENTENAY, ALEXIA LESEUR & CECILE BORDIER - September 2012
- No. 35 **Delivering REDD+ incentives to local stakeholders: lessons from forest carbon frameworks in developed countries**  
IGOR SHISHLOV & VALENTIN BELLASSEN - August 2012
- No. 34 **Including international aviation in the EU ETS: a first step towards a global scheme?**  
EMILIE ALBEROLA & BORIS SOLIER - May 2012
- No. 33 **Joint implementation: a frontier mechanism within the borders of an emissions cap**  
IGOR SHISHLOV, VALENTIN BELLASSEN & BENOÎT LEGUET - February 2012
- No. 32 **Financing climate actions in developing countries: what role is there for NAMAs?**  
ROMAIN MOREL & ANAÏS DELBOSC -February 2012
- No. 31 **Carbon offset projects in the agricultural sector**  
CLAUDINE FOUCHEROT & VALENTIN BELLASSEN -December 2011
- No. 30 **The role of regional authorities in public support for renewable energies: examples in Europe and France**  
MARION JEULIN & ANAÏS DELBOSC -November 2011

**All CDC Climat Research publications are available from:**

**<http://www.cdcclimat.com>**