## Triggering the funding of the low-carbon transition: a monetary plan

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*July 2013*

### Jumping on the opportunity of a “paradigm shift” in climate negotiations

Recent climate negotiations have called for a ``paradigm shift'' to devise a successor of the Kyoto regime (Skea et al. 2013). Acknowledging that the pursuit of a world unique carbon price approach, or the so-called ``burden sharing'' approach leads to a diplomatic impasse (Hourcade et al. 2008, Shukla 2011), a new role has been given to project-based climate finance.

Given the magnitude of the funding needs, the objective is to bring the banking system and institutional investors in the funding of the low-carbon transition in order to scale up existing climate finance.

On the one hand, this paradigm shift happens in an untimely context of private deleveraging in the aftermath of the “Great Recession”, and public distrust in the ability and the willingness of the financial system to make a sustainable recovery possible. On the other hand, this context opens a window of opportunity to link the funding challenge of the low-carbon transition with the reform of the financial and monetary order to make it more resilient.

We present here the main blocks of a proposal to both scale up climate finance and overcome the stumbling blocks of climate negotiations.

It involves the transfer of the “social value” of avoided carbon emissions – also called the “Social Cost of Carbon” (SCC) – into the economy by means of an original carbon-based monetary instrument. Such instrument is in line with the so-called “unconventional monetary policies” implemented by many central banks to avoid a financial collapse and prime again the broken funding pump.

The basic principle of the plan consists in governments injecting liquidities into the economy with the help of central banks, provided that the money is used to fund low-carbon investment. Governments provide a public guarantee on a new carbon asset which allows the central bank to issue carbon-based liquidities that can be considered as ``equity in the commonwealth''. Such equity pays dividends in the form of ``actual wealth'' created by productive low carbon investments and averted emissions in the short term, a stronger resilience of the economy to environmental shocks in the long term.

In practice, this plan results in a significant enhancement of low-carbon entrepreneurs' solvency and helps banks to comply with their prudential balance sheet constraints. The banks which change the composition of their loan book by funding LCPs would be perceived as less risky and will be therefore rewarded by a reduction in the cost of their prudential capital constraint.

Our proposal for a climate-friendly financial architecture rests on four essential features:

1. An agreement on the SCC among involved countries
2. The use of the central bank's power to create central bank money
3. The building of an institutional arrangement between entrepreneurs, commercial banks and the central bank in order to avoid agency problems and really target emission reductions
4. The possibility of an exit strategy, once the transition has occurred and is self-sustaining.



**Figure 1: The main blocks and policy steps of our proposal for a climate-friendly financial architecture**

### Designing an unconventional carbon-based monetary policy

This report does not aim at presenting a full-fledged plan for funding the low-carbon transition. We describe instead the main steps pointed out in figure 1 to build a possible climate-friendly financial architecture.

*Step 1: Political valuation of the carbon externality*

In the last Conferences of the Parties, decision-makers of the United Nations have confirmed the long term objective of preventing a temperature increase greater than 2 degrees above pre-industrial levels. This political willingness to address the climate threat comes to implicitly acknowledge a value to the carbon externality. This is why it makes sense to imagine that a group of countries from the same monetary zone, concerned by the climate issue and/or eager to trigger a low-carbon energy transition, decides to give a value to avoided carbon emissions based on the SCC. This SCC is the value of the damage caused by an incremental emission of CO2. It is likely to increase as CO2 concentration in the atmosphere gets closer to dangerous levels. The estimate of the SCC is highly controversial in the literature (Tol 2008; Perrissin Fabert et al. 2012). Hence, the choice of the SCC will be ultimately political in nature and translates the willingness of governments to act for mitigating climate change.

Uncertainty about this value is very large but it is worth noting that the UK (Watkinson et al. 2008), the US, and France (Quinet et al. 2009) have already integrated a SCC into regulatory analysis of public investment decisions with values of respectively US$ 42, US$ 60 (the value has just been upgraded by the Obama administration +60%), and US$ 130 in 2030.

Political agreement on a SCC should be easier than on a carbon tax or national emissions cap because it serves as a notional price paying for avoided CO2 emissions entailed in low-carbon investments. Contrary to a carbon tax that must be paid for each unit of carbon emissions, it does not impose a direct short term cost on neither the public budget, or firms and consumers.

*Step 2: Implementing a carbon-based monetary policy*

Building on the political agreement on the SCC, a new class of carbon assets is created by the Central Bank. Their value is the agreed value of the SCC and their quantity is determined by an overall volume of emission reduction.

The attribution by the central bank of a conventional value to this carbon asset in the same fashion as gold under the Bretton Woods regime for instance, does not infringe on its independence. It is justified by an upstream political agreement on the SCC and backed upon the existence of effective emission reductions.

We list in Table 1 the components of central bank's balance sheet. Gold, special drawing rights, securities are part of the asset side while currency in circulation and bank’s deposits appear on the liability side.

**Table 1: Central bank’s balance sheet**



In accordance with government’s willingness to value emission reduction, the central bank announces that it will provide commercial banks with new liquidities to fund low-carbon projects. It also announces that it will accept as repayment “carbon certificates” (CC) which would testify effective carbon emission reduction. The value of the CC will be given by the politically negotiated SCC.

The total volume of these new carbon-based drawing rights is bounded by a given amount of emission reduction targeted by the monetary mechanism. The liquidities will be gradually injected in the economy through the banking system to help low-carbon projects to get funded. While the central bank announces its policy, the potential new asset and its corresponding liabilities are not yet incorporated into the balance sheet (see table 1). It is only when a commercial bank asks the central bank for its drawing right to fund part of a low-carbon project that a new credit line appears in central bank’s balance sheet that is a claim on the commercial bank, the value of which being the monetary value of the expected reduction emissions entailed in the project funded by the commercial bank. The central bank would therefore allow commercial banks to draw on the new sources of liquidities provided that they commit to use them to fund LCPs and therefore produce ``real wealth'' taking the form of low-carbon equipment and infrastructure, and emission reductions.

*Step 3: Monitoring effective CO2 emission reduction*

This mechanism offers to the banks a “free” drawing right, proportional to the value of *expected* emission reduction entailed in the projects they fund. To make sure that this funding scheme benefit to actual low-carbon projects and reward effective CO2 emission reduction, an independent international Supervisory Body, similar to the CDM Executive Board, determines eligible mitigation projects (size, technology, sector, time horizon), approves methods for monitoring their performance, and confirms that emission reductions are achieved based on verification reports by accredited independent bodies.

*Step 4: Incentives for the bank and for low-carbon entrepreneurs*

Accepting as repayment certified emission reduction instead of cash comes to accept at the end of credit maturity an asset swap: CC against the initial financial claim. This swap cancels out part of entrepreneur’s debt by an amount equivalent to the value of the emission reduction the project has achieved. This may significantly strengthen low-carbon projects’ solvency and therefore their relative attractiveness for commercial banks.

In this framework, the incentive for commercial banks to fund low-carbon projects is not only to fund projects with strengthened solvency, but also to reduce the cost of their prudential capital constraint in terms of risk-weighted assets (RWA). Indeed the mechanism is complemented with a prudential rule that allow the bank to apply a zero risk coefficient – in the same fashion as for sovereign bonds – to the fraction of the loan that comes from central bank liquidities backed upon the value of emission reduction.

This operation is tantamount for the central bank to paying a service of carbon emission reduction at a price justified by the politically agreed SCC, and eventually society’s willingness to pay for a better climate.

### Focus on the banking canal of the proposal

Tables 2, 3, 4 and 5 offer a numerical example of the balance sheet consequences for the central bank and a commercial bank of a 1000 loan to a low-carbon entrepreneur expected to realize 10 units of CO2 emission reduction. The SCC is set at 10, which values the expected emission reduction at 100.

Table 2 indicates that the loan to the entrepreneur is divided into two credit lines. On the first line, the commercial bank borrows 900 deposits at rate rd and lends 900 at rate rl. The second line refers to the 100 liquidities equivalent to the value of expected emission reduction lent by the central bank to the commercial bank that can be paid back with certified emission reduction. Prudential rule about minimum capital requirement only applies to the first credit line (900 rl), as a zero coefficient risk is applied to the line coming from the carbon-based liquidities. Then net worth increase of the bank should only be +0.08\*900rl instead of 0.08\*1000rl as in the BAU case, that is the funding of a conventional project.

The central bank owns a new 100 claim on the commercial bank. Thanks to the 1000 loan the entrepreneur is able to launch her project with expected returns RLC which makes her total expected revenues amounting to 1000 RLC. In the liability side of her balance sheet appears two lines corresponding to her two types of debt: 900 which will be paid back with the monetary revenues of the projects and at the interest rate rl, and 100 which can be eventually paid back with effective emission reduction[[1]](#footnote-1).

**Table 2: Balance sheets at the opening date of the low-carbon loan**



During the paid back period of the loan, the entrepreneur gradually reimburses the loan with monetary revenues of her project as suggested by table 3. As the project also realizes emission reductions, the entrepreneur receives new assets under the form of CC.

**Table 3: Balance sheets at mid-maturity of the low-carbon loan**



At the end of loan maturity, table 4 indicates that the entrepreneur has paid back her entire 900 debt with the monetary revenues of the project and has gotten 10 CC for the emission reduction her project has achieved. Capital constraint for the commercial bank gets null and only the second credit line remains unchanged in the balance sheets.

**Table 4: Balance sheets at the end of the payback period of the low-carbon loan before the asset swap**



This is when the second step of the monetary policy takes place. The central bank performs an asset swap by accepting the 10 CC as repayment of its 100 financial claims. This results in cancelling out the second credit line corresponding to the “carbon debt” of the low-carbon project. Total amount of carbon-based liquidities that the central bank can issue is reduced by 100.

**Table 5: Balance sheets after the carbon asset swap**



### Why would a carbon-based unconventional monetary policy make a difference?

Since 2007, central banks (in particular the FED) have carried out so-called ``unconventional'' monetary interventions resulting in massive injection of liquidities in the banking system in the hope that these new liquidities will be used by the banks to expand credits to economic agents and then foster economic recovery. These policies involve unprecedented changes in central banks' balance sheet. Quantitative easing policy implies an increase in bank's reserve and therefore in central bank's liabilities, while credit easing impacts the asset side of central bank's balance sheet both in terms of size and composition of assets. With the QE2 policy for instance, FED bought between 2011 and 2012 US$ 600 billion of treasury securities. With QE3 FED has committed itself to purchase US$ 40 billion of Mortgage Backed Securities per month since September 2012. This massive intervention will eventually amount to an increase in the asset side of FED of more than US$ 1 trillion, and is expected to keep nominal interest rate at the zero bound till at least 2015.

Awash with vast amount of fresh liquidities, the banks may have three possible reactions:

* They use the liquidities to expand credits to BAU projects which entail (supposedly) higher returns than low-carbon projects, low short-term financial risks, but high long term environmental risks due to high CO2 emissions. This brings only temporary recovery effect since long term potential growth is bound by environmental constraints. This is the worse strategy.
* They do not use new liquidities to increase loans to businesses. They store the liquidities to restore their balance-sheet (deleveraging). This is the “wait and see” strategy that may have significant depressive impacts.
* They use the liquidities to invest in high returns speculative assets such as real estate, gold, financial assets, agricultural commodities. Expected gains are high for the banks while macroeconomic gains are very low. At best, it is neutral on long term growth path (following a boom and bust cycle). At worst, it leads to a systemic crisis because the burst of the bubble impacts the real economy.

If the carbon-based monetary policy we examine in this paper were implemented, we expect a fourth reaction. The banks use the carbon-based liquidities to expand credit to LCPs. The targeted liquidities offset LCPs' extra financial risk perceived by the banks relatively to BAU projects so that it becomes profitable to fund these projects. Such investments make a sustainable economic recovery possible. Indeed, once the output gap is bridged the growth rate keeps sustainably on its potential path as the environmental constraint is no more binding.

### Challenges ahead

Awarding carbon certificates for mitigation projects would shift funds away from other investments. This is a benefit; not a problem. The world has a vast pool of savings and a lack of productive investment opportunities (Krugman, 2008; Bernanke, 2005) leading to investment in speculative assets (including housing) and the creation of “bubbles”. Shifting some of the savings from such speculative investments to low risk mitigation projects such as industrial energy efficiency, energy efficient buildings, renewable energy sources, and waste management would yield both financial and environmental benefits (Zenghelis, 2011).

To mobilize funds, banks would create climate-friendly financial products to attract savings from households looking for safe and sustainable investments. The investments are safe because the value of the emission reductions is determined by the SCC, which is set in advance, and the emission reductions achieved are certified by an accredited independent body.

The proposed system could be launched unilaterally by a small group of willing countries. However, for reasons of credibility and efficiency implementation by a relatively large group of industrialized countries is preferable. This would mean a common value for the social cost of carbon and a single international Supervisory Body.

The proposed system would complement, rather than replace, the recently established Green Climate Fund. The Green Climate Fund is likely to receive most of its funds from budgetary contributions and small taxes on financial transactions, international shipping emissions and international aviation emissions. It could also receive part of the carbon assets. Since the proposed system increases private investment in mitigation measures, it would increase the leverage effect of highly rated “carbon based bonds” to attract institutional investors by offering a slightly higher return than regular safe bonds (De Gouvello and Zelenko 2010).

In summary, the proposed system would create a carbon price signal (through the SCC) while being politically acceptable because it does not impose direct costs on firms or consumers. It also stimulates mitigation efforts efficiently without imposing demands on industrialized country government budgets. It will also help to divert a share of private savings from speculative assets to productive low-carbon investments. Hopefully, the scale of this system could be large enough to make a significant contribution to the global mitigation effort and to stimulate economic growth.

Important knowledge gaps still have to be filled to make the proposal operational. New research is needed to link long run energy-economy models with short-medium term macroeconomic models which incorporate finance and capital flows. The goal of such missing macroeconomic model is to show how the risk of inflation entailed by a climate-oriented monetary policy differs from the traditional “Keynesian compact” also needs to be appraised given that the carbon certificates are backed by real assets, like gold in the past.

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1. In this example, we assume the project realizes the 5 units of expected emission reductions. [↑](#footnote-ref-1)