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Pricing carbon removal

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One thing is certain about the new situation created after the 2016 US election: the progress by consensus dependent multilateral diplomatic agreements, under the UNFCCC, the G 7 or the G 20, will be delayed if not stalled for several years. There is now serious concern that the second largest greenhouse gas (GHG) emitter may not fulfil its (modest) Nationally Determined Contributions (NDC) (Voluntary national). This negative development kicks in at a time the window of opportunity for a 2 degrees Celsius trajectory is closing fast. The Paris Agreement(PA) offered progress but even if all NDCs were to be rigorously implemented a 12 Gt 'gap' will still remain, in 2030, pointing towards a calamitous 3 trajectory (UN Environment). As for the rather unlikely 1.5 horizon mentioned in the PA, it becomes ever more distant dependent of new negative emissions technologies on a large scale. When carbon feedbacks, on a yet undetermined global impact, are put into the equation human future becomes very frightening. Scientists considering worsening scenarios are drawn to look more closely at dubious geo engineering options as a measure of last resort. This tremendously worrisome situation highlights the urgency for new paths. It demands initiatives by Climate Clubs, cooperative alliances by willing governments, international organizations and the private sector, that could agree to work together on a specific agenda. It also somewhat stimulates internationally coordinated sub-national actions and it highlights the need for an array of new financial instruments.

The biggest challenge is, obviously, how to pay for this transition towards low carbon/carbon neutral economies. The solution for this crucial part of the equation will not come from the UNFCCC process. Its Standing Committee on Finance has been pathetically paralyzed by the geopolitical dispute over the US$ 100 billion developed countries should provide, every year, from 2020 on, for developing countries, trough the Green Climate Fund (GCF) and other channels. The Trump administration has announced its retreat from this commitment never detailed in precise figures for each donor country. Even before Trump, few sincerely believed this sum would somehow materialize –at least by means perceived as a net North-South transfer– though governments continue to pay *lip service* to it. Nevertheless, there are some interesting discussions on alternative ways of providing these and other funds through public guarantees that could leverage private liquidity.

Even if those protracted promises and endless negotiations for the provisioning the US$ 100, by 2020, were somehow to succeed they would fall dramatically short of the US$ 3.5 trillion estimated to be needed to finance only the energy and infrastructure transition (IEA-IRENA, 2017) and that could raise up to US$ 5 trillion, or more, considering the extensive reforestation and afforestation, the low-carbon agriculture, the Carbon Capture and Sequestration (CCS), the bio CCS and other critical mitigation investments. Not to mention the yet undetermined but certainly gargantuan costs of adaptation. Though these frequently mentioned US$ 3.5 to 5 trillion/year estimates are quite imprecise and need to be fine-tuned, it is unequivocally established that we are not talking here about billions but trillions. The challenge therefore is "moving the trillions" towards a low carbon/carbon neutral transition.

Financing a 2 trajectory will not be achievable under the current global economic/financial paradigm. Most governments struggle with large debt and persistent deficit. Public resources are limited. There are no appropriated mechanisms to mobilize enough capital from the global financial markets – worth close to 220 trillion US dollars, notwithstanding the immense excess of liquidity invested in speculative circuits away from productive investment. De-carbonization faces additional barriers to attract resources from this huge

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basket. From a financier's perspective most mitigation actions demand too much upfront investment, offer slower returns and bigger risks. The so called "market forces", by themselves, will just not deal with the climate challenge on the massive scale we need without some kind of protection and/or stimulus. All this is part of the big problem affecting world wide macroeconomics: too little liquidity flowing towards productive investment. The way out of this Catch 22 dilemma is to use public leverage to mobilize private savings in innovative ways including mechanisms related to the social and economic value of the carbon-minus: carbon reduction/removal, through verifiable and certifiable mitigation actions. In fact, three kinds of low-carbon financial mechanisms are currently on the table: 1 – the "carbon markets", 2 – the pricing of carbon for taxation purposes or as private companies' "shadow prices" along with fossil fuel subsidy elimination, 3 – the "positive pricing" of the minus-carbon.

1. Cap and trade and carbon pricing

Carbon markets and carbon tax have been around for some time. They were discussed at the Kyoto Conference, in 1997 when it was decided to avoid the path of trying to tax carbon internationally –a non starter in the UN process– in favor of cap-and-trade inspired by the successful reduction of SO2 pollution and acid rain, in the US, the previous decade. So cap-and-trade was adopted giving birth to the Clean Development Mechanism (CDM) and also to the voluntary markets. Now this discussion is back and a new element, positive pricing –or the "social value of carbon"– is in the mix too as we will see further on.

So what about the carbon markets? The Clean Development Mechanism has been functioning since 2005. It has generated close to US$ 1.8 billion worth carbon credits. At this time, carbon markets seem more promising on the national and subnational level. The post-Paris new global cap-and-trade mechanism is yet to be negotiated at the UNFCCC under Article 6 of the PA. This new cap-and-trade will be established in a different context. There will be no more Annex I, with mandatory targets and non-Annex I (Annex I) countries with companies from the former, buying carbon credits from projects from the latter. Currently all countries have there own NDCs. The PA has, nevertheless, established the grounds for a new CDM. It appears in Art. 6 as "*voluntary cooperation,*" –the word "market" being taboo– and relates to "*the use of mitigation results internationally transferred to nationally determined contributions*." This new mechanism should inherit and update the CDM and correct its perceived flaws like the recurrence of "double counting" and the mismanagement of the carbon credit market, leading to its crash, particularly in Europe. How will this new mechanism function in this all new context? Nobody really knows and after COP 23, in Bonn, the UNFCCC seems quite far away from establishing the new mechanism under article 6. Considering the different kinds of carbon markets there have been mixed signals. They seem to be performing reasonably well on the national and provincial scales lowering the costs of mitigation actions. The recent decision by the international air transport industry –not part of the UNFCCC process– to offset its growing emissions, from 2020 on, is an important new element to be taken into account as well as international shipping whose negotiation is under way and will probably produce a similar outcome.

Nevertheless, carbon markets are unlikely to provide the massive exponential boost needed for the transition to low-carbon economies. They definitively can provide quicker and cheaper paths for implementing the NDCs, internally, as various countries and regions look for ways of reducing their emissions in the most cost effective way. There are examples of markets that seem to be performing quite well, like the seven regional, in China (Beijing) and the Californian one. They can gain by articulating themselves internationally like California already has with Quebec.

Carbon pricing along with the elimination of fossil fuel subsidies seem to offer a much more powerful economy wide instrument. Globally, according to the IMF, fossil fuel subsidies amount to U$ 650 billion twice as much as the ones for clean energy. If their negative externalities to public health and other are included this could have mounted up to as many as US$ 5,3 trillion, in 2015 (Coady et al., 2017). There has been some effort to suppress these subsidies eventually causing social unrest. These subsidies' suppressions, mostly engendered by austerity policies should contain compensatory measures for the poor affected by higher food prices caused by more expensive freight and other side effects. The elimination of subsidies for coal, oil and gas depends basically on national policies and, of course, on complicated national and local politics.

The same applies to carbon pricing and taxation. It basically means pricing in negative externalities affecting global climate and the local environment impacts, costs that currently are ignored. As with subsidies' elimination, carbon taxation faces fierce political resistance on the national level with hazardous electoral consequences as we have seen several years ago in Australia. At the UNFCCC, it is confronted by some of the oil and coal exporting countries. The Paris Conference tiptoed around the very mention of carbon pricing. Although the issue was very much debated at side events, the only mention of it in the PA appears discretely, at the end of paragraph 137 of the Decision, in Part V "Non-party Stakeholders", when it "*recognizes the important role of providing incentives for emissions reduction activities including instruments such as domestic policies and carbon pricing.*" A sibylline reference to carbon pricing was finally included in an UNFCCC accord. Actually, several national and subnational governments, as well as companies are now implementing or considering some modality of carbon pricing. Some governments are already tackling with carbon taxation and generally considering it in a fiscally neutral approach. These are uphill battles to be fought and won, nation by nation, since both taxation systems and fossil fuel subsidies are national.

The 2017 *Report of the High Level Commission for Carbon Prices*, the so called "the Stiglitz-Stern report", points out that "*most emissions are currently not priced, and the range of carbon prices across existing initiatives remains substantially smaller than those necessary for achieving the Paris temperature target. The carbon prices observed span from less than US$1/tCO* $_2$*e to US$126/tCO*$_2$*e, 85 percent of global emissions are not priced today, and about three quarters of the emissions that are covered by a carbon price are priced below US$10/tCO* $_2$*e*".

The report identifies 42 national or sub-national carbon pricing initiatives including several forms of taxation at a prices from US$ 1 to US$ 126 for a ton of carbon equivalent. It also inventories 517 companies that use internal "shadow" carbon pricing and 732 that are preparing themselves to do the same. The Stiglitz-Stern Report has proposed "corridors" of carbon price levels, related to a 2 ° trajectory, substantially higher than current carbon market's prices: between U$ 40 and U$ 80, by 2020 and US$ 50 and US$ 100, by 2030.

International cooperation on carbon pricing and taxation is limited to interesting but dispersed initiatives by the World Bank, think

tanks, universities, business organization and bilateral exchanges by national and especially sub-national governments sharing experiences as they go on. Some national and sub-national governments move towards carbon taxation and a growing number of companies adopts various forms of carbon pricing. It is now generally admitted that a ton of carbon has to have a price that can be different in developed and developing economies. But what prices? Under what conditions and criteria? The Stiglitz-Stern Commission has made an eloquent case proposing 2 ° trajectory compatible "corridors" of prices by 2020 and 2030. It also admits that carbon prices in developing countries will be lower *"since the(ir) Purchasing Power Parity (PPP) exchange rates are usually higher than the market exchange rates (for instance, by a factor of 1.8 in China and Brazil, 3.8 in India, and 2.3 in South Africa)"*. Therefore, a US dollar spend on mitigation actions, in India, can buy more of it than the same dollar spent in the US and, of course, there are differentiated costs for different kinds of mitigation actions capable of reducing/removing a ton of carbon equivalent.

2. The price of the "carbon-minus"

The Commission focused on emissions from energy oil and coal and much less so on land use and agriculture which somehow limits its scope especially when related to negative emissions which will be so crucial in a long term strategy seeking zero net emissions, sometime in the second part of the current century. It clearly admits that carbon markets and a carbon price for taxation or for private company shadow pricing will probably not be sufficient. There has to be more to it. So it very cautiously considers positive pricing in its Appendix named as the "*social cost of carbon*" and the "*co-benefits*" of mitigation actions thus using some of the wording of Paragraph 108 (UNFCCC, 2015) but without getting into the full blown recognition that in addition to its "social" and "environmental" value and to its "co-benefits for adaptation and health", mitigation actions producing carbon-minus actually have economic value.

If an emitted ton of carbon has a 'negative' value, expressing its negative externalities, its reduction or removal logically has a 'positive' one to be determined as well. One ton of carbon-minus (reduced or removed carbon) has a "positive price" for the very same reason one ton of emitted carbon has a "real" –or "negative", if you prefer so– price. That is why we should call it positive pricing instead of euphemistically use the "social value of carbon" which is quite imprecise since it is the reduction/removal of carbon and the correspondent mitigation actions, not carbon itself, that are being recognized as of social value. In the end of the day real and positive pricing are just two ways of relating decarbonizing actions to economic value. One prices in the social negative impact of the ton of emitted carbon in order to tax it or to consider it a future additional cost. The other prices in certified avoidance or removal of the same ton of GEE with the purpose of rewarding the mitigation action that originated this "carbon-minus". Positive pricing does not replace "real" pricing for carbon taxation purposes. Each mechanism has its own specific role and scope. They are complementary: one as the "stick", the other as the "carrot".

In *Revisiting The Carbon Pricing Challenge after COP 21 and COP 22* Priyadarshi Shukla (IIMA), Jean-Charles Hourcade (Cired) and others explain how the notion of what they (more precisely) denominate "*the Social Value of Mitigation Action(SVMA)* can *"better frame the carbon pricing issue in a new paradigm where the objective is no longer to minimize the welfare losses of climate policies deployed at the margin of a given development path but to redirected the world growth engine in order to open new possibility spaces*. (…)*"*.

After all, in Paragraph 108 of the Paris Decision (the preamble of PA), 196 governments have unequivocally recognized "(…) *the social, economic and environmental value of voluntary mitigation actions and their co-benefits for adaptation, health and sustainable development;*". This should be considered along with item "c" of the Article II of the PA: "*Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development*". Clearly an economic value was recognized for the carbon-minus in a context of financial flows that should be consistent with a 2 degree decarbonizing pathway. The command of these two PA wordings is crystal clear but we are far away from the practical financial mechanisms needed for their true implementation. The UNFCCC consensus dependent decision making process just isn't fit for this kind of construction with so many devils hiding in so many details. This is by nature a process to involve directly chiefs of state, central bankers, development bankers, financial private sector and other instances not that much related to the climate crisis in a Low Carbon Bretton Woods of sorts.

Now is the time to conceive robust financial instruments built upon positive pricing to mobilize investments for mitigation. The big question is how can this concept, still resisted by some, notwithstanding it being so obvious, can be expressed in workable financial tools. It will need the constitution of a specific "climate club" of governments, central banks, development banks and multilateral institutions capable of guaranteeing and operating with "carbon reduction certificates". Willing governments' and/or development bank's backed guaranties that could enable a subsequent mobilization of resources from the private financial system. One can include in this repertoire certain kinds of "green bonds" and similar assets.

In a 2015 study, previous to COP 21, *A proposal to finance low carbon investment in Europe* Michel Aglietta, Étienne Espagne, Baptiste Perrissin Fabert explained that *"instead of relying solely on a "penalty "* (…) *a mechanism rewarding low-carbon investment while gradually penalizing carbon intensive capital is more politically acceptable, since it curbs the cost of the low carbon transition. It combines pricing instruments such as tax/quotas, set at low levels during a transition period –but with a long term increasing trend– with funding instruments incorporating a public guarantee on a high value of the carbon externality* (*social cost of carbon–SCC*)*"*.

So let us just imagine: this group of willing governments, central and development banks along with multilateral institutions form a "Climate Club" providing guaranties for specific quantities of carbon reduction assets. Governments in doing so could eventually use carbon taxation to cover their exposure. Bonds by private financial institutions could relate to and anticipate these assets. Bank loans for duly certified carbon reduction projects/policies could then be partially reimbursed in "carbon reduction certificates". This new value, covering from 10% to 20% of those investments in mitigation actions, could become the tipping point for low carbon financing demanding high upfront investment.

The structuration of a Climate Club capable of operating on the base of the recognition of a new source of value for humanity –the

carbon-minus- will probably be a long and arduous process. There are immediate preliminary steps towards its long term purposes. Recent quantitative easing operations by the European Central Bank trying to cope with stagnation and risks of deflation by injecting liquidity into the EU economy could have reserved some part of its purchasing operations for carbon reduction certificates or guarantees for them. This could have stimulated low carbon productive economy and created more jobs in contrast to some of the current operations that drain these resources all the way back towards financial speculation. It has been abundantly demonstrated that energy saving building retrofits, distributed generation solar power, reforestation and other kinds of decarbonizing investments create jobs (Gessesse et al., 2017) and have other positive social effects. It will be truly a pity if the ECB ends its quantitative easing operations –as it will, shortly– without having profited of the opportunity to boost job creating and modernizing low carbon investments.

3. The “new gold”?

As one floats the positive pricing of mitigation actions with treasury and Central Bank officials –as I do in Brazil—several objections are cast: but aren't you creating deficit? Isn't this by any means inflationary? How come you prove minus-carbon is indeed value not some crazy scheme? How is this different from bitcoin? Aren't you creating value “out of the air”? (Out of the air? Well yes!) This line of questioning takes us back to some interesting discussions on the very nature of economic value and from where does it come from, both current and very ancient. Since the dawn of mankind economic value has to do with challenges, perils and opportunities, present in every era, related to acute human necessity. Millennia ago, when exchanges were performed by barter, some crazy guy imagined that instead of just exchanging his goat for a bow and ten arrows he could convince his commercial counterpart that once the respective value is agreed upon both these goods could be represented by a certain number of pieces of that useless yellow metal, too fragile for practical use as a tool or a weapon but useful in coined pieces to facilitate and notably increase all transactions. Several millennia later, the gold coins were impersonated by ever more unlikely stuff: bits of paper with fancy paintings on them. Nowadays, invisible electronic bytes do the job. One can imagine the initial reaction of our pre-historic folks when that crazy vendor first came along with this highly suspicious idea based on imagination, trust and consensus. The pricing of a ton of carbon-minus to boost mitigation actions is something quite more palpable and easy to grasp. It is based on a straightforward recognition of verifiable economic facts. As manufactured negative emissions become a focus for media attention (The Economist, 2017) presenting us a set of technologies capable of literally sucking carbon out of the atmosphere (Kolbert, 2017), one can much more easily figure out the minus-carbon as an industrial product to be priced accordingly to the human necessity it serves. I would go as far as to suggest the carbon-minus can one day become a global currency, but let's leave this insight for a future text.

Developing financing instrument for decarbonizing build upon the positive pricing of minus-carbon is going to be an arduous process. It is basically in a question of political will, imagination and technical capacity of developing the proper mechanisms in an institutional framework that will probably have to be invented/structured in a “Climate Club”, outside but in liaison with the UNFCCC that has already very much done its due in the Paragraph 108 recognition. As we have seen above, there is real no conflict between both ways of carbon pricing, in fact they are strategically complementary.

There can be some tension related to carbon markets because of different approaches on what generates the economic value of mitigation actions. For the markets it is the demand for “carbon credits” (in fact, emission permits). In positive pricing there is the question of an intrinsic value for mitigation actions. This is not really such a big problem because future implementation mechanisms can be designed so as to preserve the demand for carbon credits for mitigation “under the cap” and use positive pricing to stimulate the additional actions to take us from the current 12 Gt gap projected for 2030, under current NDCs, to the more ambitious goals needed for a 2 trajectory. There are some upfront initiatives to prepare the terrain. One is to start by rewarding certain kinds of well established and easily certifiable additional mitigation actions. Governments delivering duly verified, economy wide, “over the cap”, additional to their NDCs would receive, a premium. This could be spent exclusively on technology, services and products promoting a subsequent GEE reduction/removal, thus creating a virtuous cycle. The verification process established by the CDM, that has been recognized as trustworthy, can be used to certify these actions.

The most urgent short term action is, however, to structure public backed AAA guarantees funds that could be somehow related to the GCF, multilateral agencies and regional development banks– to enable the investment by the private financial sector in mitigation projects presenting high upfront investment demands. A pioneer Climate Club should be structured to leverage by means of public guarantees that could be a first step in the way of building more powerful positive pricing instruments destined to move in the needed trillions.

The best way to deal with the US federal government reactionary climate/environmental policy is to bypass it establishing a direct relationship with the U(d)SA, the United (decarbonizing) States of America: California, New York, Washington State and others, along with hundreds of American cities and major companies. Together they represent the fifth biggest economy and have declared their willingness to remain in the Paris Agreement. In the last two years we have seen some signals of a possible decupling between the curve of GDP growth and the one of CO2 emissions in the energy sector. This could have been inflected in 2017 but there are still some signals that the peak of global carbon emissions could arrive sooner than imagined in 2015. So despite the recent setbacks, the window of opportunity remains open and a 2° trajectory is still possible if no time is lost and the economy can be mobilized in some of the ways discussed here. Time is of essence. It is yet again: “the economy, stupid”! In fact, a stupid global economy that just has to get smart.

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