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A new paradigm: establishing a global carbon market as an element for the foundation of a 'Low Carbon Bretton Woods' system

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Abstract

The forthcoming deadline of December 2015 has increased the pressure on the negotiating parties to reach a reliable and solid agreement for a radical change of the Kyoto Protocol. Vested interests and ideological lock-ins still threaten the establishment of a widely shared accord, with no clear solution yet identified. The paper aims at eradicating the lock-ins through the introduction of a global carbon market, based on a set of limited reforms that would be focused on an equitable distribution of duties and rights between the parties. The market and its functioning system should facilitate the current negotiations, while at the same time leading to a radical change in a wider socio-economic perspective worldwide. The proposal includes in fact elements for the development of a debate for a 'climate economy' with the potential to inspire a renewed global economic system, able to equally improve social justice, environmental protection and economic development. Aiming to influence the future development of a variety of different domains and sectors including the international monetary system, the proposal can be defined as the 'Low Carbon Bretton Woods' project.

Introduction

The current stall in climate change negotiations clashes with the need for a general but consistent agreement to be reached by the end of 2015. Any actor involved in the negotiations is at present focused on researching possible solutions for the stall to be overcome, while different factors or persistent problems are increasingly affecting the negotiations, all of them thus requiring solution to reach a reliable agreement.

The paper starts with a discussion and analysis of the different persistent problems. It subsequently identifies the possible solution in the institution of a global carbon market. In doing so it declares the need to establish an elaborate system of rules for the parties and involved actors, through the foundation of a regulatory framework defining the scope and functioning of this market. The framework represents the minimum set of duties and rights for the different actors participating in the proposed system. It is also the starting point for its evolution towards a coherent mechanism able to both cope with the current persistent problems and offer a reliable long-term perspective for a sustainable process aimed at substantial reductions in anthropogenic greenhouse gases (GHGs) worldwide.

The functioning of the proposed market based on the above-mentioned framework and on norms similar to those that have regulated extant carbon markets, such as the Clean Development Mechanism (CDM) introduces the prospect of a new 'climate economy', where GHGs emissions reductions are stimulated through a direct incentives system, based on the issuance of 'credits' corresponding to the obtained reductions. Emitting activities are discouraged through a mechanism of distribution of duties associated with emissions reduction. The aims of the current proposal are not limited to the identification of a viable and reliable solution to overcome the stalling of climate change negotiations: a wider and long-term perspective of climate, social and economic stabilisation worldwide is also supported. Under this view the objective of the market overcomes the mere carbon pricing definition: the hypothesis introduced in this paper has the aim of designing a flexible instrument through which a variety of actors (governments at different levels, private and public companies, financial institutions, associations, NGOs, movements and individuals) can pursue their own interests, strategies, policies, ideals, while directly and indirectly acting to mitigate climate change.

The new 'climate economy' proposed by the paper is not limited to the adoption of mechanisms and instruments that facilitate investments, trade exchanges, green-oriented industrial policies and related financial systems. The proposal aims at a renewal of international monetary systems, forecasting the introduction of a new representative currency, recognised worldwide. The overall set of novelties proposed by the paper then aims to lead to the institution of a new economic paradigm that may become one of the pillars for the reform of the international economic system towards a radically new 'Low Carbon Bretton Woods' idea.

The paper analyses the elements described above through four steps: the introduction of the persistent problems affecting the climate change negotiations (section 1); the analysis of the framework of the proposal, with the introduction of presumptions representing the

fundamental pillars of the carbon market and its related system (section 2); the description of the possible outcomes arising from the proposed reform (section 4). A final section offers a set of conclusions and policy recommendations for the future developments of the proposal.

1. The current climate change negotiations context

With December 2015 approaching, when, based on the Copenhagen statements (article 12 of the Copenhagen accords, FCCC/CP/2009/11/Add.1, p. 7, March 2010, in UNFCCC, 2010), the agreement for a new protocol defining global actions for combating climate change shall be reached, the definition of possible solutions to encourage convergence of as many parties as possible on a robust and reliable plan is no longer deferrable. Despite this urgency the current reality of climate change negotiations demonstrates that only limited agreements have been reached, and the different proposals introduced to date represent just fragmented solutions (Kuik et al., 2008).

Promising ideas, like the introduction of a low carbon development facility (De Gouvello et al., 2010), just remain on paper, while commentators (Sadat, 2011; Sethi, 2011; Razzouk, 2013; Wu, 2013) express consistent doubts on the effective enforcement of recent reforms like the establishment of a Green Climate Fund (UNFCCC, 2011). More generally the question of how to finance climate change mitigation and adaptation actions (core elements in the negotiations), remains unanswered, with critiques being offered on both the use of existing market mechanisms (Newell, 2012; Ervine, 2013; Gomez-Echeverri, 2013; Pittel and Rubbelke, 2013; Warnecke et al., 2014) and the proposals for introducing carbon tariffs and taxation systems (Moore, 2011; Perry et al., 2013)

While the main persistent problem opposing the achievement of an agreement is often seen in the parties' unwillingness to take charge of the costs related to substantial emissions reductions (Christoff, 2010; Skovgaard, 2014) and denial of direct responsibilities (Compston and Bailey, 2008; Pidgeon, 2012), a more in-depth analysis is required to better frame the problem, its origins and foundations. Two main categories of original persistent problems can be identified: vested interests governed by the lobbies of different civil societies or groups (Boston and Lempp, 2011, pp. 1006-1007; Bohmelt, 2013, p. 704), and ideological lock-ins. Both the categories require detailed discussion before they can be understood and then overcome (Garibaldi, 2014).

1.1 Vested interests affecting the climate change negotiations

Identifying the whole set of vested interests affecting the climate change negotiations requires an understanding of the three objectives that most influence the actions and choices taken by the involved parties: avoiding or reinterpreting the definition of their own duties and responsibilities; reaping benefits possibly originating from any form of agreement; maintaining or increasing their (geo)political influence and 'privileges'. Each of the objectives comprises a variety of different and contrasting interests, requiring detailed

analysis.

Based on the widely held view that reducing GHGs emissions mainly implies socio-economic costs (Buchs et al., 2011), the different parties tend to act in a manner that leads them to reduce their responsibilities: governments aim to avoid duties whose effects are likely, in their view, to affect their citizens, companies and own interests (Christoff, 2010, pp. 645-651; Boston and Lempp, 2011, pp. 1005-1006; Stadelmann-Steffen, 2011). This avoidance of duty because of self-interest is also exhibited supported by a variety of pressure groups sharing the same perspective, including energy-related actors, industrial associations, parties, think-tanks, financial institutions, academic circles, movements, and different forms of other organisations, defined collectively as 'clubs'. The lack of support of these clubs towards a clear and robust agreement represents a persistent problem in climate change negotiations, that can be overcome only by convincing the clubs' members about the direct benefits to them reaching an agreement.

On the other hand, an increasing number of stakeholders, which again include governments and interrelated clubs (Kolk and Levi, 2001; Orr 2012, pp. 166-167) have started to recognise the socio-economic benefits relating to GHGs emissions reduction policies, mainly represented by investment and financial opportunities in the actions aiming to contain or reduce GHGs emissions (Meckling, 2011). As a consequence different pressure groups are acting to guarantee to their reference parties the obtainment of maximum benefits, to the detriment of others, leading to the radicalisation of the parties' positions and further contributing to the stalling of negotiations. Proposing perspectives of substantial growth in the aggregated benefits, in exchange for a more equitable distribution of this growth, can destabilise the pressure groups' equilibrium, leading to a solution of the identified problem.

The negotiations represent one of the most relevant international frameworks that currently exist, both in terms of participants and in terms of ambitions. As a framework the negotiations represent an opportunity for re-balancing powers between the involved parties (Christoff, 2010, pp. 643-645; Timmons Roberts, 2011). Inadvertently, however, they have led to a third persistent problem (Grubb, 2014, p. 325): based on these considerations, governments and clubs are further pushed to accelerate the radicalisation of their positions in an attempt to guarantee for themselves a well-represented position in the newly defined geopolitical framework (Hurrel and Sengupta, 2012; Papa and Gleason, 2012). An additional problem of a geopolitical nature, represented by the fear of losing 'privileges' in case of agreement, is widespread throughout the parties, leading in fact to further pressure for extending the timings and reducing the ambitions of the agreement. A proposal where possible losses can be compensated by the obtainment of new 'privileges' would overcome the obstacles posed by the problem.

1.2. Ideological lock-ins affecting the climate change negotiations

While the problems introduced in section 1.1 can be overcome with pragmatic solutions, a different approach must be adopted towards the ideology-related persistent problems inside the negotiations. This category of problems is mainly created by conflicts and mistrust between those parties influencing the negotiations framework despite their origins and

nature being alien to it.

Most of the ideological disputes affecting the negotiations are based on polarised approaches, founded on long-term established representations of the 'other' in and outside the negotiations framework. Such approaches derive from the persistence of different kinds of dichotomies that position the involved parties into opposing sides. The subdivision between developed and developing countries, and the trajectories of the historical development of the negotiations, represent the most relevant contribution to the radicalisation of the countries' positions in the negotiations, thus becoming the main persistent problem referred to as 'ideological lock-ins'. Overcoming this problems requires a radical reform of one of the founding concepts of the previous climate agreement framework: the 'common but differentiated responsibilities' principle (Ipsen et al., 2001, pp. 315-316).

Officially established during the United Nations Conference on Environment and Development, held in Rio in 1992 (Hurrel and Sengupta, 2012, pp 467-469), the concept of common but differentiated responsibilities can be identified as one of the most relevant of the conference's for developing countries: by accepting the definition of 'common but differentiated responsibilities towards the planet' the 178 countries participating in the conference stated that developed countries had the duty to take the lead in global environmental protection efforts, while affirming the right for developing countries to pursue their own socio-economic development as their own main priority.

Originating in a peculiar context where the Soviet block had just been 'defeated', when neoliberal capitalism seemed to be destined for a worldwide triumph, and the international public appeared seriously motivated to act to reduce the socio-economic differences between 'rich' and 'poor' nations, the concept found its most relevant achievement inside the Kyoto Protocol on Climate Change. Directly cited in article 10 of that Protocol (UNFCCC, 1997), common but differentiated responsibilities stated in that context the subdivision of countries into two categories: nations with the duty of taking the lead in climate change combat (defined as Annex I countries and provided with binding emissions reductions) on one side, and nations with the priority of acting for their own socio-economic development (defined as non-Annex I countries and provided with no binding emissions reductions) on the other.

More than 20 years after its first definition the concept appears to be no more able to define the multi-faceted current global reality, becoming instead a persistent problem **(**Hurrel and Sengupta, 2012, p. 472). A more equitable and just definition of the duties (and rights) of countries and individuals in connection with environmental protection and socio-economic development (Garibaldi, 2014, p. 83), able to satisfy the different parties needs, while simultaneously safeguarding the natural integrity of the world, has become a priority not only in the field of climate negotiations but in the whole sustainable development debate.

Aiming to overcome this lock-in this paper introduces a new concept, potentially able to lead to a more just and equitable definition of duties for parties and involved actors: 'common responsibilities and individual duties'. The new concept aims to respond to the

need for a clearer definition of the heterogeneity characterising the current global reality, and for a better recognition of different socio-economic features of each involved party. The same concept can be read in a 'reverse' perspective resulting from the idea of 'common rights and individual benefits'.

The most relevant theoretical effect of the new approach leads to the exclusion of any ideological and static discrimination between the parties, suggesting the opportunity to identify more dynamic and equitable systems for parties' distinctions. In empirical terms dynamic and equitable forms of parties' comparisons shall exclude ex ante and general distinctions between them, requiring instead mechanisms able to take into account the progressions of the parties as well as to clearly identify specific and technical tools to measure their differences.

Under a theoretical perspective the new concept aims to offer the opportunity for every party to clearly recognise its own peculiarities, needs, priorities, limits and advances in the field of sustainable development: while overcoming any form of the parties' setting under artificially defined groups, the proposal describes the individual characteristics of each party and, using this description, sets out its duties (and benefits). The practical functioning and related consequences of the application in terms of the object of this paper are defined and described in detail in section 2, where the features, norms and functioning of a new articulated model (the global carbon market) and its reference system are analysed.

2. Hypothesis on the system governing a global carbon market

To overcome the persistent problems introduced in section 1 the paper proposes the institution of a single global carbon market, based on the issuance, exchange and stock of achieved emissions reductions in the form of certificates.

Setting the global carbon market governing system requires the establishment of a number of fundamental presumptions that are the subject of this first part of the section. These presumptions defining the scope of the proposed system shall not be considered as classic theoretical assumptions, although they shall become policy proposals to be discussed inside the climate change negotiations: in the absence of any of them the system simply cannot exist in the way proposed by the paper, while each of the presumptions on its own can be negotiated and agreed in its details as part of a political reform with an international perspective. The scope of the proposed market and corresponding system is described throughout the application of the concepts of 'common responsibilities and individual duties' and 'common rights and individual benefits' introduced in section 1. The presumptions are then organised into blocks, corresponding to the same concepts.

Describing the scope of the proposed global carbon market and reference system requires the definition and organisation of the presumptions representing the pillars of the whole hypothesis. These presumptions are that the following will take place: the setting up of a global emissions reduction target (common responsibilities); distribution of emissions targets between the parties (individual duties); organisation of an international institution

to certify emissions reductions and to monitor the parties' accomplishment (common rights); definition of the opportunities for different actors to operate inside the created market (individual benefits).

2.1. Presumptions defining common responsibilities and individual duties

To set a robust and reliable target for an absolute reduction in global anthropogenic GHGs emissions represents an absolute priority for the climate change negotiations. The first presumption concerns this priority, stating for the parties to reach a double-target structured agreement. Once defined a cap-year, representing the limit to anthropogenic GHG emissions and the reference for calculating the reductions, a first long-term and virtually-zero emissions target needs to be agreed. This target is represented as percentages of reductions compared to the cap-year. The emissions target shall then be subdivided in portions of reductions, represented in percentage, and distributed in milestones or timeframes throughout the period stated for the main reductions target. The main target and its interrelated sub-targets correspond to a set of common (global) responsibilities defined and agreed between the parties, although these parties' duties are not yet defined.

The agreement on a distribution of the reductions obligations (or duties) between the parties represents another priority for the negotiations. The second presumption refers to the agreement on a system of duties distribution capable of involving each of the parties at varying degrees, thus leading to the definition of 'individual duties' differing from party to party. Aiming to represent the actual and real duties of the parties the definition cannot be applied to the long-term target, being used instead to define the distribution of duties with reference to the different sub-targets.

Once a reference year, likely to be the same cap-year, is accepted to calculate the different parties' obligations concerning a first sub-target and related timeframe, a first definition of duties results from the application of a per-capita emissions principle: average per-capita global emissions of the reference year are compared with the same year per-capita emissions of each party. The global average per-capita emissions of GHGs are then taken as the reference against which the different (individual) duties of the parties are defined. The definition process requires a distinction between parties whose per-capita emissions are higher, and parties whose per-capita emissions are lower than the global average.

Those countries registering a negative result shall be excluded from any reduction duty for the reference timeframe, while those registering a positive result are required to reduce emissions. Once the parties that are bound to emissions reductions during the first timeframe have been identified, a more elaborate process to define the distribution of the absolute reduction duties between the remaining parties for the reference timeframe is required. The definition process is encapsulated in the following formula:

$$D_{j,t} = \frac{(C + V_{t-1}) * (PC_{j,t} - PCW_t) * P_j}{\sum_{i=1}^{N} (PC_{i,t} - PCW_t) * P_{i,t}}$$

where D represents the duties of a party, C is the constant of reduction per frame (fixed percentage of reductions referring to the target year), V represents the variations in parties emissions excluding the C effects,[1] j represents the reference party, t its timeframe and PC its per-capita emissions rate, PCW represents the worldwide per-capita, P the population of the party, and N and i represent the number and index of parties whose per-capita is higher than the global average, respectively.

Two main variables can be identified in the formula: P(opulation) and V(ariations). Changes in the parties population may lead to double-sided effects, both for the parties and globally: an increase of population contributes to changing the per-capita value of the corresponding party, favouring its reduction. At the same time parties with reductions duties will be charged for larger duties when registering an increase in population. Different rhythms of variations between the populations of the parties influence the global distribution of the duties and must be taken into account too.

The variations in the emissions of the parties, excluding the effects derived from the fulfilment of the already agreed binding reductions duties,[2] represent the second and fundamental variable of the formula. Any positive or negative change in the parties and global emissions may influence the distribution of the duties as well as the speed of the whole emissions reductions process. As shown in the formula the same variations shall be added to the constant, thus modifying the quantity of duties to be distributed in the following sub-target timeframe, in order to maintain global environmental integrity and to stimulate an acceleration in the process of reducing GHGs emissions.

The process of identifying the parties' reductions duties and the process of duties distribution between the identified parties shall be repeated at the beginning of every new sub-target phase. Adopting a similar system for the distribution of emissions duties between all the participating parties requires the same parties to accept 'voluntary' binding emissions targets. The 'voluntary' approach to binding emissions targets aims to emphasise a new perspective by parties, where the participation to the proposed system is mainly based on a volunteer basis, but still implies the obligation to achieve the agreed targets. In contrast to the past the binding targets gain a dynamic perspective, due to changes in emissions levels registered in the different sub-targets reference years. This dynamic process shall guarantee a fair and equitable distribution of duties between the parties over time.

The enforcement of the defined responsibilities and duties requires the institution of a compensation system to be applied in case of non-accomplishment of the defined

[1] When referring to the variations for the first timeframe, these will be equal to zero.

[2] Represented by C.

obligations. Despite its importance, the detailed definition of the compensation system is not necessary for the introduction of the present proposal, and it therefore falls outside the scope of the paper. It is nevertheless possible to address some important aspects to be taken into account for the compensation system definition: compensation must be clearly quantifiable, proportional to the failure in achieving the targets, reliable and substantial, being preferably represented by an equivalent to the value of the reductions certifications. An alternative to a compensation system may otherwise lie in the idea for parties which will not comply with their duties to be simply excluded from the proposed system in the following timeframes.

Similarly a proposal for the distribution of the duties within the parties is not defined in the paper, as each party shall be directly responsible for the distribution: it is likely that different parties will adopt different distribution policies, coupling these with their interrelated strategies and objectives. Entirely subject to the latter the duties distribution inside the parties may then become a governance instrument.[3]

Instead the introduction of a technical proposal concerning the overall responsibilities (or global reductions targets) and the distribution of the duties between the parties is foreseeable. Based on clear quantitative goals, the proposal aims at a just distribution of the duties between the parties and over the years, while at the same time guaranteeing the feasibility and sustainability of a robust reduction in global GHGs emissions. The proposed overall target forecasts a reduction of 80% of global anthropogenic GHGs emissions by 2080, possibly taking 2015 as the emissions reference target year, and potentially starting by 2016. The ambitious target is then subdivided into 16 four-year timeframes,[4] each aiming at a constant reduction of 5% of emissions referring to the target year. With the exclusion of the first timeframe (2016-2020) which would be one year longer than the others, binding emissions duties are distributed through the already introduced per-capita based formula, and are subject to a new calculation at the end of every timeframe, both globally and at the level of the parties.

The exclusion of the first timeframe from the binding emissions duties is based on the variety of open elements unlikely to be solved by December 2015 as well as on the need for a 'soft approach' during the very first phase of this reform application. A five-year piloting period shall contribute to the empirical verification of the correct functioning of the proposal and to its adjustment. For this reason it is suggested that the first timeframe be developed by parties on a completely voluntary base, with the corresponding duties to become binding by the end of the second phase (2024).

To introduce a similar piloting phase it is nevertheless necessary to put in place incentives for the reductions to happen even in the absence of a proper binding system. It is relevant to stress how complementary ideas related to the voluntary/early opportunities have been already developed in different academic and policy-making contexts, becoming reliable

[3] The role of policies is repeatedly emphasised in the paper, with reference to duties, rights and, above all, possible outcomes. Hence the importance of already approved reforms, such as NAMAs (Nationally Appropriate Mitigation Actions), must be stressed and taken into account.

[4] With the exclusion of the first reference time frame (2016-2020), which has a duration of five years.

options to support this first phase.

While the proposal does not belong to the presumptions listed in the paper, it potentially offers an efficient and equitable system of duties distribution, and is subject to the two variables already discussed, represented by the variations in parties emissions and in their populations. Positive and negative variations in parties' emissions compared those agreed are likely to happen, influencing both the timings of the occurrence of the reductions and the distributions of the duties. Variations in population are likely to differ from country to country, thus influencing the per-capita variations over time. Taking into account the two variables the proposal still appears to be a valuable solution.

2.2. Presumptions defining common rights and individual benefits

Based on the presumptions already analysed, the institution of a system to certify the parties' accomplishment of their corresponding duties becomes a new priority in terms of climate change negotiations. The third presumption distinguishes between duties and real reductions, stating that a single certification system of emissions reductions is adopted and accepted by all the parties, and that they can only use these certifications to accomplish their duties. The presumption firstly implies that any reduction of GHGs emissions can potentially be certified, and secondly suggests that for the certifications to have proper value, they should be the only instrument available for parties to demonstrate the accomplishment of their duties. Based on the presumption, parties can obtain the certifications either through direct reductions or through the acquisition of certificates from other actors; this process then lays the foundations for the development of an international certifications exchange system or carbon market.

While the analysis of the hypothetical certification system is further developed in the section on the functioning of the proposed carbon market (section 3), its implications need to be introduced here. The institution of a single system to (potentially) recognise all the emissions reductions happening worldwide, interrelated to and hierarchically more relevant than the distribution of duties (there can be no accomplishment of duties in the absence of certified emissions reductions), defines the framework to identify the common rights and individual benefits: the globally accepted recognition (certification) of emissions reductions represents a shared (common) asset (right), available to anyone able to 'produce' the reductions. At the same time the value gained by the certified reductions thanks to the parties duties transforms these certifications into different forms of potential revenues (benefits) for the (individual) actors reducing the emissions.

Similar to duties individual benefits can be subject to the influence of parties' policies and strategies that can impact their magnitude and trajectories to different degrees: the possible adoption of ad hoc norms addressed to push reductions towards specific sectors and domains, such as differential taxation or support through incentives, impedes an ex ante analysis of the individual benefits, limiting the identification of possible outcomes to on aggregate evaluations (see section 4).

2.3. Relevance of the presumptions for the proposed global carbon market

The presumptions introduced in sub-sections 2.1 and 2.2 represent the pillars of, and at the same time the scope for, the global carbon market as proposed by the paper, defining: (1) a new and quantified global objective, represented by the agreed long-term target (and the interrelated shorter-term targets) of GHGs emissions reduction; (2) the distribution of the tasks to reach the objective between all the participating parties, represented by the institution of the individual duties; (3) an instrument to demonstrate the achievement of the tasks, represented by the emissions reductions certifications; (4) the ways to obtain the instrument, by both direct production and indirect acquisitions through a trading system of the certified emissions reductions.

Establishing a trading system for the reductions certifications, hereafter defined as Global Emissions Reductions (GERs), requires answers to two main questions: who is in charge of the functioning of the trading system, and what rules define its functioning? The answer to these questions is provided in the following section, which focuses on the description of the proposed carbon market.

3. The functioning of the carbon market

To answer the requirements of the scope introduced in section 2, the proposed carbon market needs to become the only environment for emissions reductions certification, exchange and stock. A single institution for the issuance of the certifications must be established in order to safeguard the equivalence of the reductions with their certification wherever they happen. A single international market for the certifications exchange must be guaranteed and connected with existing markets. A single organisation must be in charge of collecting the due certifications at the end of the timeframes, thus representing the monitoring institution for the accomplishment of the duties and the place for the parties' reductions to be deposited by the end of each timeframe. The three points require detailed analysis.

3.1. The International Carbon Fund

Because of their intrinsic global value, emissions reductions must be equally certified worldwide: wherever they happen the reductions must be certified in a single way, through the issuance of a unique certification instrument (the GER introduced above). The following formula must be guaranteed to support the accountability of the certification system:

$$GERs / R\text{-}GHGs = C$$

where GERs represents reductions certifications, R-GHGs represents emissions reductions and C represents a constant.

To guarantee the equality of the system a single international institution shall be in charge

of recognising the emissions reductions by issuing the corresponding GERs. The main duty of the institution, hereby defined as the International Carbon Fund (ICF), concerns the certification of reductions: as a consequence the ICF has to manage the whole process of verification, acceptance and monitoring of the proposed reductions. Other entities can contribute to steps of the certification process, in a similar manner to the Designated Operational Entities (DOEs) of the Clean Development Mechanism (CDM). The CDM can be considered as a reference system for the establishment of the ICF and the management of the GERs distribution. The CDM is often used as a reference system for the proposal, and is being partially reviewed and redefined in the present paper.

By assigning to the ICF the role of managing the proposed reductions process it is assumed that a proposal to obtain the reductions certification must be made. It is suggested that these proposals follow a recognition process similar to the CDM process. Based on the presumptions already discussed, any actor[5] is potentially entitled to obtain GERs in exchange for a recognised GHGs reduction anywhere in the world. Following the CDM allows the use of already tested, analysed and applied instruments at different levels, starting from the forms to propose a reduction recognition, guaranteeing at the same time the adoption of a fundamentally technical approach to emissions reductions (Methmann, 2013). Its system – based on projects and, more recently, programmes of activities proposals – shall be maintained and extended worldwide, facilitating its diffusion.

The rules defined by the presumptions further increase accessibility to the recognition system by overcoming the most relevant technical issue concerning the CDM functioning: additionality.[6] The additionality rule requires for a CDM project to demonstrate it would not have happened in absence of the contribution provided by the system. Thus by its very nature additionality can hardly be demonstrated (Schneider, 2009), excluding a variety of reductions from the system (e.g. all the reductions coming from already economically sustainable activities), and discouraging policies supporting GHGs emissions reductions (Chadwick, 2006).

The introduction of additionality was meant to safeguard the environmental integrity related to CDM-supported projects (Bode and Michaelowa, 2003, pp. 505-509): a non-additional project would in fact have led to a 'double-counting' of the reductions. The introduced presumptions, which define emissions duties for all the involved parties, guarantee environmental integrity through the redistribution of the emissions variations over the different timeframes (see formula in section 2.1). Thanks to the presumption there is no more need for additionality relating to guaranteeing the environmental integrity of the proposed reduction activities, and by this virtually every action reducing GHGs emissions may be awarded with the issuance of corresponding GERs. Making additionality obsolete radically improves accessibility to the GERs, and is already stimulated by the global extension of the system.

The expansion of the number of actors involved in reductions activities and by this their increase, is further supported by the acceptance of both the project- and the programme-

5 'Any actor' refers to any individual, association, organisation, group, company, institution, movement, both private and public.

6 For a comprehensive analysis of additionality, see Michaelowa, 2009.

based methods to obtain the certifications. Both methods are virtually open to any actor, the project-based more often favouring medium- to large-size emissions reductions activities, while the programme-based referring more to organised accumulations of small activities.

The proper issuance of the GERs is then made by the ICF to the promoters of the reductions activities, previously defined as 'project owners' in the CDM, after an evaluation and monitoring process to guarantee the accountability of the announced reductions. As any emissions reductions activity possible is subject to certification, any actor able to reduce emissions is virtually entitled to receive GERs.

The scope of the current proposal does not include the technical definition of the monitoring and evaluation mechanisms, or the systems of acceptance of the proposed reductions; the definition and systems of acceptance are thus left for further and more specific studies and/or to direct policy-making choices. It is nevertheless suggested that the already existing rules referring to the CDM may offer a reliable base for the definition of the mechanism.

Once the single and global system of issuance of emissions reductions certifications and the set of its possible beneficiaries are defined, it will be necessary to define the system for the issued certifications to be exchanged in order to allow the parties to fulfil their emissions duties. Doing so requires the definition of the rules governing the trade of the GERs between different actors, starting with the institution of a proper exchange system (or market).

3.2. The GERs exchange system

To develop the rules for an efficient functioning of a hypothetical GERs exchange system it is necessary to clearly identify the demand and offer of the exchanged instrument. The demand is ultimately represented by the parties' emissions duties and is firstly regulated by the dynamic distribution of the parties duties within the different timeframes. Secondly the distribution of the different duties inside the parties is self-regulated and may vary substantially. Through this discretional system parties are entitled to incorporate their emissions duties in their policies, using their discretional potential to enforce the policies. As a result of the combination of all the parties' policies on their duties distribution an extremely varied set of actors will be involved in directly or indirectly supporting the demand for GERs, the only instrument set up to represent compliance with the duties.

As described above, GERs offer instead is potentially represented by any action reducing emissions, no matter where it takes place and by whom it is enacted. Any actor from any party able to make a real and quantified reduction in GHGs emissions is entitled to request the certification, and thus obtain the corresponding GERs issuance. Once they have obtained their certification, actors can freely decide on selling the GERs or keeping them. It is likely that reductions put in place by actors with or without duties will contribute to a real reduction in the reference timeframe. Actors from any party are equally entitled to sell, buy and trade GERs with no direct tie to their duties until the end of the reference timeframe.

The initial structure of the proper exchange system clearly follows the elements of a free international market, where potentially any exchange of GERs between any actor from any party may happen. In such a context it is possible for the number of involved actors to include, besides the first sellers and the final buyers, different intermediaries working as GERs brokers. A similar experience has been registered in all the previously existing carbon markets. In the CDM, which represents the reference market for the current proposals, more than 180 different first credits buyers were registered in China up to the end of 2012, 85% of them being financial brokers.[7]

The international free-market structure is likely to be modified at inter-party, party, and sub-party levels: policies, governance choices and strategies can substantially interact with the operational process of a market-based system. Similar interactions may lead to changes in the use of GERs system, enabling it to move up to a strictly programmed approach. Again the CDM offers a clear example of the potential flexibility of the proposed system: China's adoption of the CDM system is emblematic in demonstrating how a system conceived as project-based and market-oriented can be used instead as a programme-based and state-oriented tool, without breaking its functioning rules (Stua, 2013, pp. 1310-1312).

The value of the GERs is at a first level intrinsic as directly referring to a specific commodity. The reference commodity is represented by the GHGs, that are quantifiable and have become virtually finite with the adoption of a cap in global emissions, represented by the reference year chosen to calculate the long-term reductions goal. Based on the formula introduced in sub-section 3.1, any recognised reduction in GHGs emissions, and subsequently any reduction in the stock of the commodity, corresponds to a unique and determined certification, represented by the GERs. The latter represent the only instrument that the parties can use to demonstrate the accomplishment of their duties, thereby effectively becoming the only currency available to 'buy' any demonstration of emissions reduction. The new international currency then maintains a fixed exchange rate against its reference commodity (the GHGs emissions) and a flexible exchange rate against all the other currencies, used to buy GERs in the market.

A further set of considerations about the significance of the development of a new representative currency equally recognised worldwide is made in section 4.2, focuses on the possible outcomes of the proposed system with reference to international monetary systems. Before analysing such outcomes it is necessary to describe the functioning of the GERs stock (or deposit) system.

3.3 The GERs deposit system

Based on the presumptions of the proposals, parties are required to fulfil their emissions duties at the end of every timeframe. For parties with reductions duties this implies a need

[7] Data collected through the direct analysis of the Chinese CDM projects design documents (PDDs), available on the UNFCCC website: http://cdm.unfccc.int/. The remaining 15% is mainly represented by corporations, government bodies of Annex I countries, and international organisations. Last access 20th April 2013.y.s.k.

to demonstrate the accomplishment of the duties through the collection of an equally corresponding number of GERs, accumulated over the timeframe.

The accumulation of GERs may happen unevenly over the years of the reference timeframes, although parties are entitled to accumulate GERs that exceed the required targets, thus influencing the distributions of duties in the following timeframe. Parties with no reductions duties in the reference timeframe are also entitled to accumulate stocks of GERs. In general any positive or negative variation in the GERs stock of the different parties leads to changes in duties distribution for the following timeframe.

The institution of a single organisation functioning as depository of parties' accumulations of GERs, and subsequently as verifier of the different parties' accomplishments of their duties, is required to guarantee an equitable functioning of the system. Due to its role concerning the stock of a representative currency (the GERs) the organisation is hereby defined as the Carbon Bank (CB).

The CB functions as depository of GERs from the different parties and accumulates the deposits in dedicated carbon accounts. The collection process allows the CB to verify fulfilment of the parties duties within and over the different timeframes, and thus to identify failures in accomplishing their targets. For this reason the CB shall be appointed as a unique institution for the certification of the fulfilment of duties by the different parties.

Overstocks of GERs shall be registered as variations (see the formula introduced in sub-section 2.1), thus leading to changes in duties distribution and in the overall level of GHGs emissions. Due to their value in the market non-deposited GERs shall be excluded from the calculation of the global and parties' variations. Variations shall also include non-registered changes in parties' emissions, including possible reductions not accounted for by the issuance system but verified throughout the official registries of parties emissions. While further considerations about the potentials of an institution like the CB are provided in section 4.2, it is again important to underline how strategies, policies and governance choices can interact with the GERs stock system. Over-accumulation of deposited GERs in particular may only depend upon parties decisions.

As a general consideration, based on the potential influence of policy and governance actions recurring in all the analysed aspects of the proposed carbon market, it should be stressed that industrial, social, agricultural, energy, environmental, economic, financial, fiscal and monetary policies may interact with the system at any level, from the reductions taking place to the deposit of the certifications and beyond. Similarly it is possible to affirm that actions, choices, behaviours and strategies of the different involved actors (both individuals and organisations) are likely to interact with, influence and be influenced by the proposed system. While the consequences of such interactions cannot be forecast nor anticipated, requiring the system to be active in order to be analysed, it is possible to affirm that such a variety of possible interactions and reciprocating influences is mainly due to the intrinsic characteristics of the proposed system: flexibility, reliability, accountability, equitability.

4. General considerations on the outcomes of the proposal

This section's focus on the outcomes possibly resulting from the application of the proposal shall be considered as largely hypothetical: the excess of variables, due to the mentioned open elements and to the flexibility of the proposed system, limits the opportunities for proper modelling for the study of economic and non-economic effects (or co-benefits) of the proposal at present. Nevertheless the existence of substantial evidence-based material, mainly represented by the results of the CDM projects, together with the implications related to the adoption of the presumptions introduced by the paper, help to define the sectors and domains most likely to be touched by the proposed reform; they also allow assumptions to be made regarding the trajectories of their effects and, more importantly, the definition of the potential for their reform. Moreover it is likely that the same evidence that originated from the CDM projects will become a solid base for further analyses and studies on the possible outcomes of the proposal. The potential offered by thousands of projects similar to those likely to be generated by the proposal shall guarantee those quantitative and qualitative criteria required for future models to be applied in order to overcome the uncertainties generated by the current excess of variables.

A general evaluation of the possible effects of the current proposal requires as a first step the definition of the categories of outcomes, based on the elements determining the chances of these outcomes and their possible evolutions. Three categories of effects have been identified: direct, potential and mixed. 'Direct' refers to any effect that will implicitly happen because of the system adopted and as consequence of its rules and functioning. 'Potential' includes any effect which may happen, depending on the choices of the involved actors. 'Mixed' covers effects that originate from a mix of direct and potential elements. Representing the majority of the outcomes, mixed effects often are originated on a direct basis, with the potential elements determining their magnitude and development pathways.

Potential (and as a consequence mixed) effects require a better definition in order to be understood in their use: as they refer to the choices of involved actors they express the governance potential of the system. As has already happened with the CDM[8] and possibly more, thanks to the extension of involved actors and the generally improved flexibility of the proposed system, different elements of this system can be adapted and transformed and choices on the use and functioning of the system shall be then taken at any level, from the international organisation to the single individual. States and related governments for example can be involved in a variety of aspects: they can directly produce and/or trade GERs; they can affect the development of GERs through the adoption of interrelated regulatory frameworks; finally they can maintain a role in the process of the issuance of GERs, if and when the role of the Designated National Authorities (DNAs) is confirmed.

Similarly, other actors such as local authorities, international and regional organisations,

[8] An extensive report of the CDM is beyond the scope of this paper. A vast literature is available on the variations in the functioning of CDM in different geographical, political, industrial and social contexts is available: some interesting examples are by Newell, 2014 (on Argentina), Amran et al., 2013 (on Malaysia), Phillips and Newell, 2013 (on India), Jia et al., 2013 (on China).

private groups (companies, associations, movements and NGOs) will benefit from a variety of instruments and opportunities allowing them to intervene and interfere with the GERs life-cycle. It is therefore the very flexibility of the proposed system that, while opening a variety of windows of opportunity for the actors to adapt the GERs to their needs, strongly reduces the chances of offering a clear outcomes-analysis during an ex ante application phase.

4.1 Typologies of outcomes

Direct outcomes of the proposal are likely to be found mainly in those domains typically defined as GHGs producers. These include: energy (production, distribution and demand side), transport, manufacturing and chemical industries, agriculture, waste handling and disposal, construction and buildings, metal production. Outcomes are also likely to be identified in those domains, like reforestation, that imply GHGs containment and capture. Additionally, based on the CDM experience (Schneider et al., 2010, p. 284), it is possible to affirm that domains related to the GERs management (services and financial sectors) are going to be affected by the proposal, and relevant outcomes can be expected in relation to them too. Finally, indirect outcomes are likely to be registered in a variety of domains that, despite not being linked with the GHGs, will enjoy indirect effects from the impact of the proposal on the previously cited sectors: the new wealth generated by the activities reducing GHGs emissions is likely to affect a variety of domains through a cascading effect. A domain evaluation of the possible outcomes of the proposal nevertheless runs the risk of being imprecise and even misleading as several cross-domain or multi-domain effects are likely to be registered. For this reason the option chosen here for a more detailed discussion on the outcomes is simply based on a consideration of a combination of non-economic and economic effects.

As GHGs reductions are the main non-economic direct effect of the proposal, the wide portfolio of further non-economic impacts ranges from environmental benefits to health gains, to social improvements. Specifically a radical shift in energy systems shall be encouraged as a consequence of the reform. Despite being allocated during a long-term timescale (65 years) the ambitious reductions targets shall lead to a progressive shift in energy systems towards an increasingly cleaner trajectory. Such a shift is likely to affect any aspect of energy, from production to transmission and demand, boosting the development of cleaner energy resources and stimulating improvements in terms of energy efficiency alike. Due to the predominance of energy among the GHGs emissions sources the effects in this domain will mainly be of a direct nature. Nevertheless the energy-related effects are likely to present mixed elements too: the importance of energy as a component of the GHGs reductions activities covered by the proposal will in fact be influenced also by specific political choices, made at any level, that will contribute to defining the magnitude and trajectories of energy shifts in the different areas where reductions activities will be developed.

Partially connected to the outcomes relating to energy, a further direct effect of the current proposal shall be the containment of the rebound effect. Strictly related to the increase in energy efficiency, the rebound effect is typically defined as the negative behavioural

consequence of actors who, enjoying a reduction in the per-unit cost of energy inputs derived by a more rational and conservative use of energy, tend to increase their aggregate consumption of the energy resources leading to decreasing benefits in terms of general efficiency impacts. Based on these considerations, the rebound effect implies a smaller aggregate reduction of GHGs compared to the per-unit impact of energy efficiency activities. In light of the current proposal the rebound effect shall be not only contrasted but also eradicated by the automatism of the dynamic distribution of duties: based on the formula proposed in section 2.1 any variation in GHGs, including variations related to the rebound effect, shall be counterbalanced by an additional duty corresponding to the same variations to be applied to the following timeframe, leading therefore to the abatement of the rebound effect.

Following the CDM evidence (Jia et al., 2013), substantial GHGs reductions will imply reductions in other air pollutants as well, such as sulphur dioxide and particulates, mainly through the energy production shift, as these pollutants are also typical side products of fossil fuels combustion. Water pollution related to the use of fossil fuels mainly but not exclusively in the transport sector shall also be contained by the actions related to the proposal. If the reductions in pollutants appear to be a direct effect of the proposal, their real impact must be classified as a mixed effect, seeing as the magnitude of the reductions dependant on both the policy choices put in place by the different parties and other authorities and the behaviours of actors involved in the GHGs reduction process. Similarly other pollutants will be contained as a consequence of the proposal: based on the evidence provided by the CDM experience, gases like methane, nitrous dioxide and sulphur hexafluoride (all being included in the category of GHGs) are likely to be abated through reductions activities in domains that include agriculture, and chemical, manufacturing, metal and mining industries.

It is possible to affirm that the reform will lead to a general improvement of environmental protection: to the already mentioned reductions of pollutants currently contributing to the degradation of the environment, further elements supporting the idea of an increased environmental protection are added through the implications related to other actions aiming to reduce GHGs and not yet analysed. Waste handling and disposal represents a domain where the CDM has registered relevant impacts, and may lead to substantial side effects in terms of environmental protection and restoration, if coupled with ad hoc policies and strategies. The need for a positive link between such activities and corresponding policies and strategies characterises these outcomes as mixed effects. By previewing relevant reductions of harmful emissions, most of the outcomes introduced above are likely to result in beneficial health effects for human beings. As health impacts are a consequence of the already discussed outputs they will be of mixed nature accordingly.

Technological innovation and its related diffusion are likely to become some of the most relevant outcomes of the proposal. The ambitious reduction targets proposed by the reform will imply substantial efforts aimed at accelerating technological innovation in almost every domain directly related to GHGs emissions. More than any other outcome, technological innovation will be characterised by a mixed nature: if its boost is in fact an implicit consequence of the goals of the proposal, the different forms and efforts related to it will strictly depend upon both ad hoc political choices and strategies and the behaviours of

individual actors (mainly private investors) towards the risks and benefits related to it. Technological diffusion will be even more characterised by potential elements, strongly depending on political choices or individual actions aiming to stimulate or contrast this diffusion process. The current debate on achievements and failures in the diffusion of technologies through the CDM appears to confirm the degree of 'potentiality' of this aspect (Bodas Freitas et al., 2012; Bayer and Urpelainen, 2013; Kim et al., 2013).

Moving to the social benefits related to the reform means approaching the line between non-economic and economic effects: most of the possible social outcomes in fact are likely to lead to complementary economic changes. The first social element related to the proposal can be associated with the concept of equity, with special reference to the distribution of duties between the parties: despite all parties being formally assigned emissions duties, based on the formula introduced in section 2.1, those countries registering a per-capita emission lower than the global average will not have to achieve absolute emissions reductions. Such a situation, revised at the end of every timeframe through the redefinition of the different parties' per-capita emissions, shall in principle foster development in the least developed countries, which are more likely to register a low per-capita emissions level. As a consequence, the poorest and most disadvantaged countries will firstly enjoy the absence of direct costs for reducing global emissions. Secondly, these countries will potentially be entitled to increase their own emissions up to the global per-capita level, thus enjoying the opportunity for medium-term growth without GHGs-related limitations; at the same time the costs resulting from the increase in global emissions will be shared between the other countries as additional duties for the timeframe following the period of emissions increase.

Boosting the global economy through the development of a proper 'climate economy' will be the primary economic effect related to the proposal: relevant investments will be in fact required to achieve the ambitious targets of the reform and the economic benefits related to such investments will be spread between all the actors involved in the GHGs emissions reductions. The investments accumulation and/or shift towards the sectors directly invested by the proposal are likely to register a substantial increase in terms of their own economic productivity compared to other possible uses: GERs are likely to attract financial investments towards highly productive activities, such as new and cleaner power plants, and systems to support energy efficiency. A proper estimation of the economic value related to this new economic process is extremely difficult before the process has commenced. It is nevertheless possible to provide a simple consideration related to the evidence of the CDM application. Data referring to the total CDM activities in China, the country that benefitted most from the system by accumulating more than 3,500 projects between 2005 and 2012, registered a total of direct investments of about 250 billion dollars, with a reduction of GHGs emissions that can be evaluated at about 1% of the global level. While a direct relationship between Chinese CDM data and the future activities related to the proposal is meaningless and probably misleading, due to the specific characteristics of a single context analysis and due to the differences between the CDM and the system proposed here, it is nevertheless clear that the direct economic impact of the reform in terms of investments in a variety of different domains will be relevant, influencing the overall trends of global economy.

The forecasted economic boost – that on aggregate can be considered a direct effect and as a mixed set of outcomes strongly influenced by policy choices and individual behaviours – is likely to lead to further socio-economic impacts. The direct investments will first of all create new jobs, subsequently pushing for indirect economic effects that will likely touch domains not related to the GHGs reductions. Possible negative effects, related to the shift of investments from sectors registering high levels of emissions (such as activities related to fossil fuels) and job losses in the same sectors are likely to be registered too, while their overall impact shall be substantially lower than the already described positive effects.

Further impacts in terms of job creation will relate to the services required to run the proposed system: a varied bureaucratic structure is likely to be put in place, that includes international public organisations (the International Climate Fund and the Climate Bank), a set of private agencies (devoted to monitoring the reductions activities) and a variety of national public offices (in charge of the evaluation of the reductions proposals at national and local level), leading to a new services system whose numbers, in terms of staff and budgets, could be relevant up to impact the economy at global level.

A potential economic effect of the proposed reform is linked to the adoption of specific taxation policies related to the GHGs reductions activities: as already discussed in the above sections parties and sub-national authorities will be entitled to act within the proposed system with a wide degree of freedom and flexibility. Such a flexibility, that can be expressed through the adoption of ad hoc policies, regulations and incentives, includes the opportunity for the development of taxation strategies, aimed at addressing the individual objectives of the involved parties. Whatever taxation systems are adopted by parties and whatever their final goals will be, they will possibly provide relevant revenues to the parties, whose economic impact may be of high significance. Nevertheless the whole part relating to taxation needs to be considered a potential outcome, entirely depending upon the individual choices and strategies of the involved parties.

The proposal will lead to relevant effects for the financial system as GERs will also represent a new financial instrument. Under a mixed effect perspective the magnitude of GERs' impact on the financial system cannot be evaluated ex ante as governments, in an attempt to address them, will be able to partially influence the financial system's dynamics through ad-hoc legislation.

As a general perspective it is possible to affirm that the proposal will lead to the development of new financial intermediaries and traders, in charge of matching the GERs production with their demand, in a process similar to that which governed the CDM related certified emissions reductions exchange. Additionally, the size of the GERs stock-market and the regulations related to the reductions duties and corresponding timeframes are likely to stimulate the development of a variety of new financial instruments, targeting the needs and requirements of the different involved actors.

4.2 Possible impacts on the international monetary system

It is probably in its potential monetary effects that the proposal best defines its ambition in supporting a radical shift in the current socio-economic system(s), with the establishment of a global representative currency as its main objective. As a result of the presumptions defining the proposal, six basic elements required to create a representative currency are given: (1) there will be a measurable and finite commodity (the GHGs become finite as a consequence of the global cap) acting as reference for the currency; (2) the same potential currency will have a fixed exchange rate with the commodity (x GERs = 1 mt of CO_2 eq., this being a traditional expression used in GHGs reductions) that will guarantee the intrinsic value of the currency; (3) a flexible exchange rate between GERs and any other currencies in the world will be applied as a direct consequence of the tradability of the GERs, guaranteeing to the latter a nominal exchange rate; (4) a single institution (the ICF) will be entitled issue the potential currency, always corresponding to an effective reduction in anthropogenic GHGs emissions; (5) the exchange of the potential currency will be open worldwide, provided provided this is permitted by the different national, regional, international and local regulations; (6) a single institution (the CB) will be in charge of the collection and deposit of the GERs, based on the duties of the different parties.

Based on these six elements, GERs will be first of all the unique form of currency representing the commodity of GHGs, as no other currency could be used for directly 'buying' the same commodity. Next, GERs will obtain the status of monetary representation towards a specific commodity, thus becoming the unit of account of this commodity. Any purchase of emissions reductions required to fulfil the mandatory emissions duties and reductions as previewed by the proposal shall consequently be done through the exchange of GERs. This exchange process gives to the GERs the second status of a currency, making them a proper medium of exchange.

The dual nature of GERs as currency (unit of account and medium of exchange), leads then to the opportunity of creating, for the first time in more than 40 years, a representative currency whose value can be commonly recognised worldwide. Its intrinsic and nominal values will allow the use of the same GERs as an instrument to evaluate and compare the wealth of the different involved parties, leading to a new way of measuring and evaluating world economies. Distortion linked to the simple use of fiat currencies can finally be overcome through the adoption of the new system and instrument.

To make the instrument fully operational it is possible to extend the powers and role of the Climate Bank in a way that partially follows the working characteristics of the institutions created by the Bretton Woods agreements: the CB may act as collector of GERs currency stocks (the GERs having been deposited by the parties as part of their duties) and possibly as lender of these stocks through a system of 'special drawing rights' (SDR) similar to the one put in place by the International Monetary Fund (IMF). In contrast to the traditional SDR GERs shall be considered, in light of the above-described context, as a proper currency that may become non-gold reserves of the different parties, automatically allocated through the duties distribution, to be used as a unit of account and, possibly, as an instrument for supporting parties in special financial needs. For example, in the hypothesis of a GERs-based compensation system the CB may act as a last-instance borrower for the parties to balance

their reductions deficits.

During the first phases of the reform it is likely that the GERs will be an 'institutional currency', whose use and application will be mainly restricted to exchanges between the parties and the CB. Nevertheless the role of GERs as a medium of exchange may progressively lead to a 'democratisation' of its use as currency: political choices and, most of all, individual behaviours towards GERs may push for an adoption of the same instrument that overcomes the limits of the reductions duties, transforming GERs into a proper currency for trading activities beyond the climate change perspective.

5. Conclusions and policy recommendations

Representing a radical change of perspective towards climate change mitigation policy and beyond, the proposal originated by this paper requires substantial technical revisions and corrections, in order to avoid distortions, misuse and imbalances in its application. This paper therefore represents a first sketch of a new socio-economic model, requiring relevant efforts to become a proper sustainable system. Various technical and political elements remain open, thus needing further actions at any level to be clarified and defined.

Nevertheless the main structure, aims and ambitions of this possible system have been defined. The first and most urgent ambition of the proposal lies in the attempt to demonstrate that time does not always matter: in order for the proposed reform to work the majority of the world's countries shall know, discuss and agree upon the fundamentals of the proposal by the end of 2015. Bearing in mind that the paper proposes a radical reform of the current climate change mitigation system, based on innovative and yet embryonic features, time becomes by far the most relevant challenge for its application and development.

Hence, not only shall the arguments included here be debated and discussed, but also an agreement on them shall be reached in a very limited amount of time. For this to become possible there is an urgency for the main topics and issues introduced by the proposal to be widely spread: different discussions and contexts, involving a variety of different actors, need to focus on the same proposal, leading to its introduction in the climate change negotiations framework as soon as possible.

The most challenging elements, such as the reform of the 'common but differentiated responsibilities' concept, the establishment of a set of global common rules accepted by all the involved parties, and the adoption of a long-term vision able to set the basic pillars for the development of a new economy, and finally the hypothesis for the introduction of a new representative currency 40 years after the failure of the dollar-based gold standard instrument, are likely to raise harsh debates both at academic and policy levels, but equally, any further delay in opening these debates may harm the whole proposal's feasibility. At the same time a variety of new discussion panels shall be set up to discuss the open aspects of the proposal, including but not limited to those introduced in the paper.

As a result of such considerations, conclusions and policy recommendations may only focus on stressing the urgency for opening and spreading the debate on the proposal. Provided there is reliability of and consistency to the drafted reforms, efforts by involved actors, from parties to academics, to interest groups, need to focus on a systematic process of extending the debate around the proposal, with the declared aim of making it an integral part of the renewed climate change framework to be developed at the end of COP21 negotiations. December 2015 may appear too ambitious for such a reform to be widely agreed and approved, but still parties and other involved actors may demonstrate there is no limit to human will. They may demonstrate that time not always matters.

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Glossary

J = reference party
T = reference time-frame
C = constant per time-frame reduction (5% of reductions with reference to a target year)
V = total of parties' emissions variations (excluding duties accomplishments)
P = population of party
PC = per-capita emissions of party
PCW = worldwide per-capita emissions
N = number of participating parties
I = index of all involved parties
D = duties of party

Formula

$$D_{j,t} = \frac{(C + V_{t-1}) * (PC_{j,t} - PCW_t) * P_j}{\sum_{i=1}^{N} (PC_{i,t} - PCW_t) * P_{i,t}}$$

V and P represent the two variables of the formula and several considerations concerning their possible relevance and impact can be done (and are part of my more extensive analysis inside the paper). The same considerations are nevertheless not covered here and left for further discussions.

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