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Accompanying document to the Commission decision on applying use restrictions on international credits (from HFC-23 and N2O projects) pursuant to Article 11a(9) of Directive 2009/29/EC

IMPACT ASSESSMENT

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This report commits only the Commission's services involved in its preparation and does not prejudge the final form of any decision to be taken by the Commission.

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1. PROCEDURAL ISSUES AND CONSULTATION OF INTERESTED PARTIES

1.1. Introduction and policy context

To contribute to global emission reduction efforts and reduce their compliance costs in the period 2008-12, **operators of installations in the EU emissions trading scheme (EU ETS) may use certain credits from JI/CDM up to a percentage of their allocation**. In the third trading period (2013-2020), EU ETS operators are allowed to continue using JI/CDM credits. Moreover, rights to use CDM/JI credits are bankable (transferable from 2008-12 to 2013-2020 trading period), subject to conditions specified in Article 11a of the revised ETS directive. The use of credits must remain supplementary to domestic action i.e. less than 50% of the overall reduction below 2005 levels over the period 2008-2020.

Largely thanks to demand from the EU ETS and from EU Member State Governments[1], the CDM has developed into a considerable scale, much bigger than expected at the time it was conceived. Over 2,400 projects have now been registered and several thousands more are in the pipeline waiting for registration. This impact assessment concerns less than 100 of them. The CDM has helped reduce compliance costs for the EU with its targets under the Kyoto protocol, facilitated some technology transfer to developing countries and has extended the carbon price signal far beyond the EU. For several reasons JI projects have not known the same success. Those credits that were generated mainly have gone to EU Governments and EU ETS operators.

The CDM Executive Board (CDM EB) and the Joint Implementation Supervisory Committee (JISC) are tasked to implement the rules adopted by the Kyoto signatories and ensure that issued Emission Reduction Units (ERUs)/ Certified Emission Reductions (CERs) represent real and additional reductions. However, the UNFCCC registration and issuance process and underlining modalities and procedures for **JI and CDM have been criticised for a number of important shortcomings that undermine their economic and environmental merits** (see Annex 1). These shortcomings have impacted public confidence in market based mechanisms in general. In the United States, proposed legislation provides for the development of self-standing international crediting mechanisms and national approval processes beyond those in the Kyoto Protocol. Most importantly, JI and CDM are pure offsetting mechanisms, where a tonne of greenhouse gas emissions reduced creates a right to emit a tonne of greenhouse gas. Such system would not be possible to scale up at the level necessary to pursue emission pathways in line with the 2 degrees Celsius target.

The EU position in the UNFCCC negotiations is that developing countries should contribute more than only selling emission reduction credits through the CDM. Beyond 2012, industrialised country commitments should be complemented by appropriate own actions by developing countries, in particular the most advanced ones. In parallel, a broad international carbon market should develop that can deliver the necessary global reductions in an efficient manner, where international credits are generated against baselines that require appropriate own actions by developing countries. **The EU has therefore been advocating an overhaul of the CDM and the creation of new sectoral market mechanisms where only part of the reductions achieved is credited.** The CDM should focus on Least Developed Countries (LDCs) and for emerging countries over time be replaced by sectoral market mechanisms and ultimately cap-and-trade. Similarly, the Commission believes that JI should be phased-out and participating sectors should be covered by cap-and-trade. A continuation of the recognition of

[1] The EU ETS provides around 75% of the demand for CDM credits at present, with demand from EU Member States making up much of the remainder.

credits from JI would slow down such a move because beneficiaries resist the loss of revenues from the sale of credits.

However, progress in reforming the CDM and establishing sectoral market mechanisms at UN level has been totally insufficient. This is mainly due to objections by developing countries to change the system that serves them well. But part of the reason is also that the EU's own credit purchasing behaviour has not been fully consistent with its negotiation position. **The EU should make better use of its demand-side power such that the use of international credits is much more coherent with and in support of its international negotiation position.** This requires a more selective and targeted approach to the use of international credits.

Concerns about their environmental merits and economic efficiency, combined with a lack of consistency with EU objectives internationally, make HFC-23 and N_2O projects prime candidates for the first application of use restrictions under Article 11a (9) of the EU ETS Directive. This impact assessment analyses in more depth the various concerns related to these projects, and assesses several policy options and relevant implications.

1.2. Services involved and external expertise

DG CLIMA took the lead on the impact assessment, with other DGs involved through an inter-service consultation meeting held on 3 September with representatives from the LS, MOVE A3, RELEX C.3, ENTR B.1, ENER A.2 and AGRI H.4. The group was invited to send suggestions on the design of these restrictions to CLIMA. Services have also been closely involved in the initial drafting of the revised EU ETS and the legal provision under article 11.a (9) therein that foresee use restrictions to be agreed through comitology.

External expertise was received from Bloomberg New Energy Finance, a carbon market analyst company, in particular on the determination of investment and operational costs of industrial gas projects. Furthermore, IPTS (Seville) provided the data from the POLES modelling runs that were used to assess the market implications of use restrictions. Finally, the issue was also discussed with Member State representatives in Working group III of the Climate Change Committee (responsible for the implementation of the EU ETS) to prepare the forthcoming discussions in the Climate Change Committee.

1.3. Stakeholder consultation

The debate surrounding HFC-23 and N_2O projects in the CDM has been ongoing for several years, both within the EU and outside. Recently, a coalition of NGOs submitted a request to the CDM Executive Board to revise existing rules for HFC-23 projects[2]. The NGOs consider that a large number of credits generated from these projects may come from non-additional abatement due to poorly defined production and emission factor limits in the baseline and monitoring methodology[3]. This summer in the European Parliament, several MEPs organised a stakeholder event to debate these concerns and the need for EU action to apply use restrictions, particularly for HFC-23 credits. The CDM Executive Board is now looking into these claims and in the process will consult with stakeholders. The debate has generated a number of submissions from stakeholders and reports from analysts.

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2 http://www.cdm-watch.org/wordpress/wp-content/uploads/2010/07/HFC-23_Policy-Briefing1.pdf

3 Revision to AM0001 to address methodological issues https://cdm.unfccc.int/methodologies/PAmethodologies/revisions/58215

The issue of quality restrictions on HFC-23 and N_2O projects was also addressed in the Commission's May 2010 Communication and was subject to public consultation and an extensive debate in the Council's Working Party for the Environment. Owing to market sensitivity of implementing this provision of the Directive, the request to the services to prepare a measure was made public and an invitation was extended to stakeholders for comments to be submitted, with a functional mailbox was established for this purpose.

The submissions received reveal a fairly common understanding of the consequences the high revenues these projects may have on market efficiency and the environmental merits of these credits. Depending on the interests involved, opinions differ as to how important it is for the EU to take action.

– Most comments refer to the need for a stable regulatory framework with no retroactive rule changes, which is interpreted in very different ways i.e. no use restrictions at all, no restrictions prior to 2013, no restrictions prior to end April 2013, no restrictions to the banking of credits from before 2013 or full restrictions with immediate effect.

– Some stakeholders wished to see N_2O credits treated differently than HFC-23 credits, arguing that the environmental value of these credits is not questioned to the same level. Nitric acid producers have also called for a different treatment because of the higher costs for abatement. Others call for agreement on a positive list of projects and ideally the conclusion of use restriction iterations during this comitology process. Some put an emphasis on the need to ensure that there is a liquid secondary market.

– One submission pointed to a threat posed by ERUs (especially from track 1) to the CER market post 2012 because inaction could mean that there is indirect access of AAUs into the EU ETS.

2. PROBLEM DEFINITION

2.1. Grounds for differentiation

2.1.1. Legal basis for differentiation between project types

Participation in JI and CDM is voluntary, and it is for countries and regions to decide voluntarily on allowing use of particular credits in emission trading systems that they set up. Article 12 of the Kyoto Protocol specifies that Annex I Parties "may" use CERs to contribute to compliance with their Kyoto Protocol commitments. The EU ETS Directive (2003/87/EC) up to the end of 2012 specifies that Member States, *'may'* allow companies to use JI/CDM credits for part of their compliance. The ability to use CERs or ERUs for compliance is therefore not automatically conferred on operators covered by the EU ETS.

In the ETS directive (2003/87/EC), credits generated from nuclear or LULUCF projects are explicitly excluded from use for compliance[4]. Large hydro projects are subject to specific

[4] The linking directive 2005/101/EC states in article 11.a(3) that in accordance with Decision 2002/358/EC concerning the approval, on behalf of the European Community, of the Kyoto Protocol to the United Nations Framework Convention on Climate Change and the joint fulfilment of commitments thereunder, operators are to refrain from using CERs and ERUs generated from nuclear projects. CERs and ERUs from land use, land use change and forestry are also prohibited.

guidelines and subsequently Member States agreed to a harmonised approach in order to facilitate market clarity. The directive also foresaw a review by 2006, and provisions for EU restrictions on the use of credits from certain project types incorporated in the revised directive are the result of this review.

The decentralised approach to the recognition of project types has caused uncertainty and fragmentation in the market, as project developers are not always certain that their credits will be accepted by all Member States. In the revised Directive 2009/29/EC, a harmonised approach to the recognition of units was therefore supported by Member States and by the European Parliament. This will prevent fragmentation of credit recognition standards between Member States and facilitate development of an international carbon market.

Article 11.a (9) foresees that "*from 1 January 2013, measures may be applied to restrict the use of specific credits from project types."* The provision also allows for a date to be established from which the measures would apply, *at the earliest, six months from the adoption of the measures or, at the latest, three years from their adoption*." The Directive also states that such quality standards are to ensure that projects represent *"real, verifiable, additional and permanent emission reductions and have clear sustainable development benefits and no significant negative environmental or social impacts"*[5]. Quality restrictions as per article 11.a (9) are not a one-off measure, but more can be added over the course of the third phase of the EU ETS, provided sufficient lead time is given to project developers. Applying quality standards is an implementing measure that does not re-open the climate and energy package to co-decision.

In addition, standards agreed under Article 11.a (9) do not automatically apply to Government purchases of credits. However, the Effort Sharing Decision (ESD) does require Member States to report on the use, geographical distribution, types and quality of JI/CDM credits, and to provide a written justification for using credits which are not allowed under the EU ETS, so as to allow for public scrutiny. Member States are also required to ensure that their policies for buying credits contribute to the achievement of an international agreement on climate change.

Other requirements included in the revised Directive and ESD relate to the date of project registration. In the absence of an international agreement, the revised ETS and the ESD foresee that, *subject to quality standards*, only CDM credits[6] from projects registered before 2013 can be used by ETS operators after 2012, unless the project is in a Least Developed Country (LDC)[7]. Developing countries, other than LDCs, can only supply credits from new activities pursuant to bilateral or multilateral agreements concluded in accordance with Article 11.a(5) of the ETS[8]. If an international agreement is reached, only credits from Parties to that international agreement will be accepted. Any other new types of credits to be used than those provided for by Article 11.a (5) agreements would require a full ordinary legislative procedure.

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5 Recital 29 of the EU ETS Directive

6 In accordance with the Directive (as amended by 2004/101/EC), CERs and ERUs from nuclear facilities or from LULUCF activities may not be used in the ETS.

7 This provision avoids free-riding of (advanced) developing countries by profiting from the sale of CDM credits while not signing up to a new international agreement.

8 Such bi/multilateral agreements are not limited to developing countries. i.e. an agreement could be concluded with Japan, Australia and/or United States, in terms of providing common demand for credits.

2.1.2. Use restrictions on HFC-23 and N_2O projects under the JI and CDM

The primary abatement method for HFC-23, a by-product in the manufacturing of HCFC-22[9], is thermal oxidation, a relatively inexpensive end of pipe solution. N_2O is emitted as a by-product in the production of adipic acid and nitric acid[10]. The primary abatement method is through catalytic destruction or through thermal destruction, also an end of pipe solution.

HFC-23 and N_2O projects are dominant in the CDM pipeline (less so in JI). Their success is largely due to the extremely low cost of these projects relative to the number of CERs generated. HFC-23 and N_2O projects have been controversial because they have resulted in undesirable consequences that undermine their effectiveness, efficiency and integrity.

The current rules have led to very large profits for project developers[11.] This in turn has resulted in **concerns about the environmental integrity of these credits because of the strong incentives to inflate the baseline and the generation of non-additional credits**, and the equally strong incentive for project host countries not to take action to phase-out of HCFC-22, a potent ozone depleting and greenhouse gas, under the Montreal Protocol. The current set-up also prevents these cheap reductions to be undertaken by developing countries themselves as part of their appropriate own action, or their inclusion in mandatory cap-and-trade systems. They also discourage the uptake of sectoral mechanisms with own contributions by developing countries. Both HFC-23 and N_2O projects have also caused concerns about competitive distortions for those EU producers than cannot benefit from the high returns from crediting emission reductions, and instead are subject to emission caps under the EU ETS. These distortions in turn cause further environmental concerns in the form of carbon leakage. These different points are further assessed in section 2.1.

The high rents could incentivise the construction of new plants for the sole purpose of destroying the waste gases to generate credits. To prevent this from happening, the registration of HFC-23 destruction projects is prohibited under the CDM for HCFC-22 production plants that do not have an operational history of at least three years between 2000 and 2004. Similarly, the current methodology excludes adipic acid plants that were not already operating before 2005. At the same time, the potential of benefiting from the CDM if the eligibility rules are changed, keeps developing countries from taking action to abate emissions from the non-CDM registered plants themselves, or accepting alternative international transfers to finance these reductions.

A vast majority of HFC-23 projects are in China (10, accounting for 80% of HFC-23 credits[12]) and India (7), with the remainder in three other advanced developing countries (one each in Korea, Mexico, both of which are members of the OECD, and one in Argentina). CDM projects from N_2O abatement in adipic acid plants are present in 3 countries, Brazil (1), China (2) and South Korea (1), and represent 15% of global production capacity. Nitric acid plants are also predominantly present in advanced developing countries (including 2 projects in Israel), with the exception of Indonesia (1), the Philippines (1) and Uzbekistan (7). This

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9 HCFC-22 is a gas used as a refrigerant in a wide range of refrigeration equipment from room air conditioners to large centrifugal chillers

10 Adipic acid is mainly used as a precursor for the production of nylon. Nitric acid is used to synthesize ammonium nitrate for fertilizers, and is also used in the manufacture of explosives, dyes, and pharmaceuticals

11 Wara M.W., and Victor D.G. (2008): "*A Realistic Policy on International Carbon Offsets"*, PESD, Working Paper 74. Stanford, CA: Stanford University Program on Energy and Sustainable Development

12 www.newenergyfinance.com/Download/pressreleases/10/pdffile/

exacerbates the issue of equitable regional distribution within the CDM. In Europe three adipic acid plants participate in the JI, one in France (Rhodia) and two in Germany (BASF, Lanxess), and receive ERUs for abatement efficiencies beyond 90%. Nitric acid projects in JI are present or being prepared in France (8), Germany (4), Poland (3), Finland (3) and Lithuania (1) and Hungary (1).

2.1.3. Basic data

HFC-23 reduction projects were among the first to be submitted for registration under the CDM. The technology used to destroy HFC-23 at relatively low cost was identified before the CDM came into operation[13]. To date, there are 20 registered HFC-23 projects, which constitute 0.4% of registered projects. However, they are the largest CDM projects in terms of volumes of CERs generated, responsible for 52% of generated CERs (218.6 million out of a total of 430.3 million CERs). This HFC-23 dominance is expected to decline over time as more projects, such as those related to renewable energy and energy efficiency, are registered. As eligible HFC-23 projects are currently limited to existing HCFC-22 plants[14], no projects involving new plants are expected to be registered in the near future. By 2012, HFC-23 registered projects are expected to have generated 470.5 million CERs. By 2020 and assuming the registration of an additional project, the renewal of crediting periods based on current baseline methodologies and wider UN CDM rules, this would be a bit more than one billion CERs (1046.2 million). The one HFC-23 projects registered under JI is expected to generate 1.7 million ERUs by 2012.

The 85 N_2O projects represent the second largest category of JI and CDM projects in terms of ERU/CER volumes. The 62 CDM registered N_2O reduction projects so far represent 2.6% of registered projects, while accounting for 95.8 million CERs or 23% of issued credits. Of these 85% are from adipic acid projects and 15% from nitric acid projects. By 2012 they are expected to generate 209.5 million CERs and by 2020 this would potentially increase to 520.6 million CERs. The 23 registered JI N_2O projects represent 14% of projects registered, while accounting for 26% of issued credits. Issuance so far was 2.6 million ERUs. By 2012 a total of 48 million ERUs is expected. After 2012, and in the absence of a second commitment period, issuance will end.

Overall, registered HFC-23 and N_2O projects are projected to issue up to 1,566.8 million ERU/CERs out of a total of 5,183.5 million CERs projected to be issued from registered projects. Of course this relative share is expected to decrease over time if more projects other than HFC-23 and N_2O get validated and registered.

Table 1: basic data on registered HFC-23 and N_2O projects

	CDM projects registered	**CERs issued (millions)**	**CERs expected by 2012 (millions)** [15]	**CERs expected by 2020 (million)** [16]	**JI projects registered**	**ERUs issued (millions)**	**ERUs expected by 2012 (millions)**
HFC-23	21	218.6	470.5	1,046.2	1	0.075	1.7

[13] http://www.epa.gov/highgwp/pdfs/chap2_hfc.pdf

[14] Plants with an operating history of at least three years between beginning of the year 2000 and the end of the year 2004 and has been in operation from 2005 until the start of the project activity.

[15] Adapted for operational and issuance risks

[16] ibid

N_2O	62	95.8	209.5	520.6	23	2.6	48
Total	83	314.4	680.0	1,566.8	24	2.675	49.7
Total all project types[17]	2,307	423.5	1,745.6	5,183.5	162	9.792	130.1
Proportion	3.6**%**	74.2**%**	38.9**%**	30.2**%**	14.8%	27.3%	38.2%

Sources: for CDM figures http://www.iges.or.jp/en/cdm/report_cdm.html; for JI figures www.uneprisoe.org

2.1.4. Low value for money of HFC-23 and N_2O destruction projects

The dominance of HFC-23 and N_2O projects is due to the low cost of abatement and their high Global Warming Potentials (respectively 11,700 CO_2e and 310 CO2e). In turn, these projects generate large numbers of ERUs/CERs for relatively low initial investments. These credits can be sold into the secondary EU ETS market for prices far above their production costs. Projects developers have therefore benefited from exceptionally high rents[18]. This is best illustrated by extreme short payback times and very high Net Present Values (NPV), even if high weighted average costs of capital are assumed.

[17] under validation, requesting registration and registered by 2012 and 2020

[18] Wara, M.W., and Victor, D.G., 2008 "*A Realistic Policy on International Carbon Offsets"*, PESD Working Paper 74. Stanford, CA: Stanford University Program on Energy and Sustainable Development

Table 2: Payback time and NPV from destruction of HFC-23 and N_2O in a typical JI/CDM registered plant

	Pay-back time (years)			NPV of every € invested (= excess profits in € on top of pay back per € invested, compensation of the average cost of capital and operating costs)[19]					
Weighted average cost of capital (WACC)	**10%**	**20%**	**30%**	**10%**		**20%**		**30%**	
				Project lifetime		**Project lifetime**		**Project lifetime**	
				7 yr	**21 yr**	**7 yr**	**21 yr**	**7 yr**	**21 yr**
HFC-23 destruction	<1	<1	<1	33	78.7	24	38.4	18	23.7
Nitric acid plant N_2O destruction	5[20]	7	14	0.46	2.4	0.06	0.7	-0.18	0.05
Adipic acid plant N_2O destruction	<1	<1	<1	30	70.7	22	34.6	17	21.4

Background data and assumptions:

- *The Project is assumed to have started generating credits in 2008, at a price of 10 € per credit.*
- *From 2010 onwards prices increase gradually to 16.5 € by 2020 (see for price estimate 2020 the reference scenario that assumes full implementation of the climate and energy package as presented in the Commission Staff Working Document accompanying the Communication 'Analysis of options to move beyond 20% greenhouse gas emission reductions and assessing the risk of carbon leakage', SEC(2010) 650). After 2020 prices are assumed to continue to increase gradually to 30 € by2030.*
- *Net Present Value (NPV):*

$$NPV = capitalinvestment + \sum_{t=1}^{7or21} \frac{operating\ costs - revenues}{(1+WACC)^t}$$

- *Payback time (x) is calculated by the number of years (x) needed to have a NPV that becomes zero or positive:*

$$0 < capitalinvestment + \sum_{t=1}^{x} \frac{operating\ costs - revenues}{(1+WACC)^t}$$

- *The primary abatement method for HFC-23, a by-product in the manufacturing of HCFC-22, is thermal oxidation. Capital cost for a thermal oxidation system of US$7m, with an annual operating cost of US$200,000/yr and a yearly generation of yields equal to 500.000 credits. Operating costs are assumed to be US$0.73/tCO2e reduced and a transaction cost of US$0.3/t$CO_2$e assumed[21].*
- *N_2O is emitted as a by-product in the production of adipic acid and nitric acid. The primary abatement*

19 Positive NPV mean that the IRR is higher than the WACC. Enterprises normally are willing to invest once the IRR is at the level of the WACC, given that it generates sufficient profit for them to undertake the investment. For sectors with higher risks, the WACC is normally higher.

20 This would be 6 years if sufficient profits need to be generated in these 5 years to pay for the operating costs for the remainder of the lifetime of the project (21 years).

21 Sources: IPCC: www.ipcc-nggip.iges.or.jp/public/bgp/3_8_HFC-23_HCFC-22_Production.pdf
US EPA: http://www.epa.gov/highgwp/projections.html, Honeywell, Gail E. Lehman. 2000. Letter, Re: Estimates of U.S. Emissions of High Global Warming Potential Gases and the Costs of Reductions, Review Draft, March 2000

22 US EPA: http://www.epa.gov/climatechange/economics/international.html
IPCC: www.ipcc-nggip.iges.or.jp/public/gp/bgp/3_2_Adipic_Acid_Nitric_Acid_Production.pdf

method in nitric acid plants is through catalytic destruction or through thermal destruction. According to the US EPA the catalytic process has a cost of US$2.5-5.0/tCO2e, assuming an efficiency factor of 85% in the destruction of N_2O. Costs for the low-temperature process are slightly higher. Operating costs are assumed to be US$0.64/tCO2e reduced and a transaction cost of US$0.3/t$CO_2$e. Similarly, catalytic destruction or thermal destruction can be utilized for N_2O destruction in adipic acid plants. The cost estimate for catalytic destruction is around US$7.3-12m for the capital cost. This works out at an operational cost of US$0.26 per tCO2e[22].

- *Annual abatement of the HFC23 plant is set at 5,000,000 tonnes CO2e. That of the nitric acid plant at 300,000 tonnes CO2e. The annual abatement in the adipic acid plant is set at 6,200,000 tonnes CO_2e*

Source: data provided by Bloomberg New Energy Finance

The table illustrates the importance of the rents that are generated by these abatement projects. The pay-back time of the capital and operational costs of HFC-23 and adipic acid plant N_2O destruction is less than a year, even with a yearly weighted average cost of capital of 30%, while projects can earn revenues up to 21 years in the future. Within the first year they even generate sufficient profits to also compensate all operating costs for the remainder of the lifetime of the project. This results in extremely high returns on investment, as illustrated by the NPV values. Depending on the cost of capital and the lifetime of the project that is assumed, these returns can be as high as 78.7 times the initial investment on top of the normal returns expressed in the WACC. Nitric acid plant N_2O destruction activities show lower excessive returns. In nearly all scenarios the return on investment nevertheless stays well above the WACC. The only exception to this is in the case of a 30% WACC and a project life time of 7 years.

If one would apply a social discount rate on any of the three types of projects, excess profits would multiply even further. For example, a social discount rate of 5% would see for every € invested, more than 100€ profits for the HFC-23 and N_2O in adipic acid plant projects and more than 5€ for the N_2O in nitric acid plant projects. It is clear that from a social perspective, it matters that these excessive rents are not invested in additional efficient greenhouse gas emission reductions.

The profitability of these projects is often subject to taxes depending on the taxation regime in the host country. The Chinese Government for instance taxes the generation of CERs from HFC-23 and N_2O projects by 65% and 30%, respectively, and has earmarked the resulting revenue for a sustainable development facilities fund. If the fund would be used to further reduce greenhouse gas emissions (e.g. in non-CDM eligible HFC-23 plants), excess profits would decrease but tax rates are not near to what would be needed to compensate for total excess profits.

Paying these rents is more difficult to justify in the post 2012 situation where developing countries are urged, and some have committed to under the Copenhagen Accord, to contribute to global emission reduction efforts by reducing emissions 15-30% below business as usual. Continuing to pay these high rents for abatements under the CDM would not be coherent with the EU's position in the negotiations that significant contributions to the global abatement efforts are required from advanced developing countries, starting with the cheapest ones[23].

Some developing countries have also been hiding from committing to own contributions on the basis that the cheap reductions have been bought up by Annex I. In this respect, it is worth keeping in mind that these projects may be credited under UN rules for a total period of 21 years, thereby excluding for a long time these types of cheap reductions (“low hanging fruit”)

[23] Commission Communication COM(2009) 475/3 "Stepping up international climate finance: A European blueprint for the Copenhagen"

from actions by developing countries which should lead to reductions of 15 to 30% below baseline by 2020[24].

In addition, over-paying for N_2O and HFC-23 abatement also diverts financial flows away from promising projects which have the potential to provide more sustainable development and additional environmental and technological benefits, such as energy efficiency and renewable energy projects: analysis e.g. conducted by UNEP researchers[25] has confirmed that HFC and N_2O projects are the project types which tend to be associated with fewest sustainable development benefits.

2.1.5. Undesirable consequences of HFC-23 and N_2O projects

The 2007 'Montreal Adjustment on Production and Consumption of HCFCs' under the Montreal Protocol, establishes the accelerated phase-out of HCFC-22 (an important ozone depleting substance) for non-feedstock uses. The phase-out for developing countries defines the base year as the average of 2009 and 2010, a freeze in production for the year 2013 and starting to reduce production from 2015. By 2030 the production of HCFC-22 for emissive uses should be completely phased-out. This phase-out is financed in part by the Multilateral Fund under the Montreal protocol, to which the EU also contributes[26].

However, the lucrative nature of HFC-23 projects discourages producers of HCFC-22 to reduce their production. A report by TEAP[27] estimated that one tonne of HCFC-22 has a market price of US$1,000-2,000, whereas the production of a tonne of HCFC-22 can generate around 430 CERs through the production and destruction as by-product of HFC-23. Assuming an average price of CERs in 2007-2008 of US$13 per tonne, the destroyed HFC-23 has a value of US$5,577 per tonne, 2.3 to 5.5 times above the production costs for HCFC-22.

To limit that installations further increase their production of HCFC-22, under the approved methodology for baseline setting and monitoring of HFC-23 destruction (AM0001), the production of HCFC-22 and the ratio between HFC-23 and HCFC-22 are capped at historic levels. However, because these caps are fixed there is no incentive for plant owners to reduce their production of HCFC-22 or invest in technologies that can bring down the HFC23/HCFC22 ratio. Some stakeholders regard these caps as not sufficiently stringent to avoid production levels of HCFC-22 above baselines[28]. And because of the CDM revenue, plant owners are incited to keep less efficient HCFC-22 plants in operation longer. Some producers outside the EU may even use the revenues from CDM to invest in increased

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[24] For more information about the range of own appropriate action by the group of developing countries, inline with a 2ºC objective, see chapter 2.2 of Commission Staff Working Document, Part 1, accompanying the Communication 'Towards a comprehensive climate change agreement in Copenhagen' (SEC(2009) 101).

[25] An analysis by UNEP Risoe centre confirms that few SD benefits are generated from HFC and N2O projects, see: Olsen K.H., Fenhann J. (2008) *"Sustainable development benefits of clean development mechanism projects: a new methodology for sustainability assessment based on text analysis of "the project design documents submitted for validation"*, UNEP Risoe Centre on Energy, Climate and Sustainable Development (URC), Roskilde, Denmark.

[26] For the period 2009-11 annual pledges from EU countries for HCFC phase-out amount to $61 million.

[27] See TEAP, Response to Decision Xviii/12, Report of the Task Force on HCFC Issues (with particular focus on the impact of the CDM) and emission reductions benefits arising from earlier HCFC Phase-out and other practical measures (2007).

[28] http://www.cdm-watch.org/wordpress/wp-content/uploads/2010/07/HFC-23_Policy-Briefing1.pdf

capacity of HCFC-22 production[29] outside the EU, even if the HFC23 reductions in these new plants can't be claimed under the CDM.

The CDM Executive Board is assessing these allegations and may adapt the methodology, if required to reduce the risks of inflated baselines. However, these remedies will only apply to projects that request a renewal of the crediting period after the new methodology has been adopted. If these allegations are confirmed, existing projects would continue using the deficient methodology for years to come. Furthermore, without use restrictions the non-additional credits issued in the past would still be in the market for surrender and use by EU ETS compliance buyers. And finally, a correction, if decided by the board, will not significantly improve the low value for money of these projects or encourage developing countries to have these projects as appropriate own action.

Finally, there would be a clear inconsistency in the EU's policy towards HCFC-22 if use restrictions were not implemented. While the EU is financing the phase-out of HCFC-22 through the multilateral fund, at the same time by using the CERs from the abatement of HFC23 it is encouraging HCFC-22 producers to maintain production levels at the maximum historical level allowed under the CDM methodology for as long as possible.

Despite the abatements achieved by the CDM, global HFC-23 emissions have recently been on the rise, due to a rapid increase in the production of HCFC-22 in developing countries resulting from the switch from CFCs to HFCs[30]. In 2010 the US, Mexico, Canada and Micronesia proposed that the Montreal Protocol controls and phases down HFCs. Their proposal, inter alia, strictly limits emissions of HFC-23 which would be eligible for financial assistance under the Montreal Protocol's Multilateral Fund, provided that the emitting production line or facility is not also funded by the CDM. As the funding under the Montreal Protocol would pay the incremental costs for the destruction directly, rather than through the generation of CERs, it is cost effective and excessive rents are avoided. The EU and other developed and developing countries supported the principle of this proposal. However, moves to use the Montreal Protocol for controlling HFCs have been blocked by some major developing countries, inter alia, for fear that this would undermine their objective to host new HCFC-22 plants to be registered as HFC-23 projects under the CDM.

2.1.6. EU competitiveness considerations

There are concerns that the attractiveness of the HFC23 and N_2O related JI/CDM revenues has caused producers to move their production outside the EU towards factories with registered projects, or that producers without registered projects have lost market shares to the advantage of producers outside the EU with projects. Given the high rents that are generated through adipic acid plant N_2O destruction, up to more than 78 times the initial investment (see table 1), CDM credits are thought to have a material impact on where new investment takes place in the adipic acid market. Sales margins per tonne of adipic acid are small relative to the value of the corresponding generated CERs[31]. Similarly, HFC23 crediting is thought to have caused distortions in the fluoro-polymer market to the detriment of production in the EU[32].

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29 Oral intervention by a representative from Sherry Consulting Chemical Business Management, during EPP Technical Hearing in the European Parliament, 6 October 2010

30 Montzka, S. A., L. Kuijpers, M. O. Battle, M. Aydin, K. R. Verhulst, E. S. Saltzman, and D. W. Fahey (2010), Recent increases in global HFC-23 emissions, Geophys. Res. Lett., 37, L02808, doi:10.1029/2009GL041195.

31 MacDonald R. (2009): "The global adipic acid market and the impact of CDM", report to the UNFCCC.

32 DuPont, presentation at EPP Technical Hearing, European Parliament, 6 October 2010.

A recent study by the Stockholm Environment Institute[33] looked at data on adipic acid production, plant utilization and international trade patterns in all major production units world-wide. It has found that during the economic downturn in 2008 and 2009 there were signs that adipic acid production has shifted from non-CDM plants to CDM plants outside the EU. The study concludes that it is likely that the shift occurred from plants that abate N_2O without the CDM or that are operating in countries with a cap under Kyoto, and that the revenues from CDM were the main reason for the shift. The resulting carbon leakage is estimated at between 17 and 22% of all CERs produced by this project type.

In contrast, another SEI study[34] focussing on nitric acid projects under the CDM revealed that at current carbon prices carbon leakage is unlikely to have happened for this project type. However, this is not to preclude that in the future the risk of competitive distortions could increase due to the different treatment of nitric acid plants under the EU ETS and under the CDM as of January 2013, and higher carbon prices due to an increasing stringency of the ETS cap.

EU chemical companies have also criticized the too generous baselines for CDM projects for HFC23 destruction in HCFC-22 plants and N_2O-abatement at adipic acid installations. While developing country projects get credits for all N_2O reduction, the outcome of which is 98% reduction, EU installations opted into the EU ETS by their governments are subject to a benchmark below 'business as usual' (do-nothing). This is illustrated by the differences in baseline values used for crediting a CDM project and the benchmark values used in the EU ETS post 2012 for the allocation of free EU allowances to adipic and nitric acid producers.

Adipic acid projects under the CDM receive a baseline for crediting of 270 kg N_2O/tonne[35]. This compares to a benchmark of 9 kg N_2O/tonne proposed in the EU ETS, a factor 30 lower. For nitric acid plants the benchmarks are respectively 4.5 kg[36] and 0.848 kg N_2O/tonne nitric acid or a factor 5 difference.

As adipic acid projects under JI are credited for reductions beyond 90% efficiency, no signs of competitive distortions and carbon leakage were found[37]. However, within the EU, there are concerns that nitric acid plants registered under the JI are thereby given commercial advantages over similar plants subject to more stringent benchmarks under the EU ETS. For the period 2008-12 some Member States[38] have been proposing JI projects crediting against a 'business as usual' baselines. In contrast, producers that are opted in by their respective Member State in (2008-2012) or mandatorily entering (2013-2020) the EU ETS are subject to a benchmark, which from 2013 will be based on the 10% most efficient installations as required by the Directive. In addition, EU ETS operators have mandatory obligations and face sanctions if they do not comply. JI project developers in the worst case scenario forfeit profits following successful implementation of their project activities (i.e. a 'no lose' scenario).

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33 Schneider L., Lazarus M., Kollmuss A. (2010): "Industrial N2O projects under the CDM: adipic acid – a case of carbon leakage?", Stockholm Environment Institute Working Paper WP-US-1006, October 2010

34 Kollmuss A., Lazarus M. (2010): "Industrial N2O projects under the CDM: the case of Nitric Acid Production", Stockholm Environment Institute Working paper WP-US-1007

35 N2O Emission Reduction in Onsan, Republic of Korea.

36 Kaifeng Jinkai N_2O Abatement Project, Peoples Republic of China

37 Schneider L., Lazarus M., Kollmuss A. (2010): "Industrial N2O projects under the CDM: adipic acid – a case of carbon leakage?", Stockholm Environment Institute Working Paper WP-US-1006, October 2010

38 Bulgaria, Czech Republic, Germany, Hungary, Lithuania, Poland, Romania, possibly others

2.1.7. EU position on transition from project based to sectoral market mechanisms and emissions trading.

The EU has been advocating for a substantial time now in the multilateral process a reform of the CDM, a move away from crediting mechanisms based on the "do nothing" baseline and the creation of new sectoral carbon market mechanisms with a "do something" baseline as an interim step towards the development of (multi-sectoral) cap and trade systems, in particular in the more advanced developing countries. Use restrictions on HFC-23 and N_2O can improve the prospects in the UN negotiations to agree CDM reform and the creation of new mechanisms. A concern that impedes progress on the development of sectoral mechanisms is the uncertainty that there would be sufficient demand for credits to justify the investments in these mechanisms. By introducing use restrictions on HFC-23 and N_2O credits in the EU ETS, demand can shift from CDM towards sectoral credits, which can also be vented under the EU's own legislation[39]. Third countries' interest in sectoral crediting in these areas is lowered by the EU allowing continued use by the EU ETS of CDM credits from these projects after 2012.

The EU has also called for a better geographical distribution of the benefits from the CDM, in particular for LDCs. 80% of HFC-23 credits and 60% of N_2O credits under the CDM come from China[40]. The majority of the remainder of these projects are in India or advanced developing countries. No HFC-23 or N_2O projects are currently hosted in Least Developed Countries (LDCs). Use restrictions would therefore be fully in line with an increasing focus of CDM on LDCs. As the overall EU ETS and Effort Sharing Decision levels of use for credits would not be affected, all but five G77/China countries would benefit from having a larger EU market for their non-HFC-23 and non-N_2O projects. The EU considers that OECD countries, such as South Korea and Mexico, should contribute through measures such as emissions trading, rather than host CDM projects.

3. OBJECTIVES

3.1. General objective

The general objective of the EU is to pursue emission pathways in line with the 2 degrees Celsius target. The global carbon market should be developed in a way that can deliver the necessary global reductions in an efficient manner, where international credits are truly additional and over time increasingly generated against baselines that represent appropriate own action by developing countries. There is a need for an overhaul of the JI and CDM, and the creation of a new generation of sectoral market mechanisms as an intermediate step towards cap-and-trade.

3.2. Specific objective

The specific objective is to improve the environmental merits and economic efficiency of international credits, and to make better use of the EU's demand-side power for credits in a way that is coherent with and in support of the EU's international negotiation positions. This is done by developing a more selective and targeted approach to the use of international credits in the EU ETS, starting with the introduction of use restrictions on international credits from HFC23 and N_2O projects.

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39 Article 11a(5) of Directive 2009/29/EC

40 www.newenergyfinance.com/Download/pressreleases/10/pdffile/

3.3. Operational objective

The operational objective is to restrict the use of international credits from HFC23 and N_2O projects from being used within the EU ETS as soon as legally possible using the powers conferred upon the Commissioner under the revised ETS Directive. Consistent with the line taken in the Commission Communication COM (2009) 475/3 *"Stepping up international climate finance: A European blueprint for Copenhagen"* and echoed in the October European Council conclusions, these use restrictions will encourage low cost abatements by developing countries outside the international carbon market based on their respective capabilities, improve the geographical distribution of CDM projects and the development of sectoral crediting mechanisms, and downplay criticism that developed countries are buying up the cheap emission reduction potentials and leaving only the more expensive options for appropriate own action by developing countries. These use restrictions will also address the low value for money from HFC-23 and N_2O projects, the lack of support they have to the transformation of energy systems in developing countries, and the concerns that they do not contribute to reducing global emission in an efficient manner due to the high profits not used for emission reductions.

Instead, use restrictions will encourage the destruction of these gases as own action by developing countries or on the basis of incremental costs. Use restrictions will also eliminate the undesirable environmental impacts of HFC23 credits on the phase-out of HCFC-22 under the Montreal Protocol and the net increase in global emissions from the displacement of production to developing countries. The timing is motivated by the need to align the EU's own actions in the carbon market with its objectives in the international negotiation position and the need to respond to prolonged calls from project developers for more clarity on the quality provisions in the EU ETS for international credits post 2012.

4. DESIGN OPTIONS

Three main design options for use restrictions are assessed in view of coming to a preferred option.

- Option 0: reference case of continued recognition in the EU ETS of HFC-23 and N_2O credits
- Option 1: introduction of a full use restriction from 1 January 2013
- Option 2: phase-in of a full use restriction by 2016 with a multiplier

We did not consider in this impact assessment an option that foresees a duplication of the project-by-project baseline and additionality testing performed by the CDM EB or JISC. The reason for this is that such duplication would be extremely resource intensive for limited added value[41]. The Commission does have a member of personnel as an independent member of the CDM EB, seeking to further improve the decision making process in the Board alongside efforts in the UNFCCC negotiation process. It should also be clear that use restrictions would not replace the function of the CDM EB. Rather, the restrictions applied would be on the use of these units for compliance purposes in the EU ETS, not their issuance

[41] For illustration, the UNFCCC secretariat employs more than 160 people for the task of improving proposed methodologies for baseline and monitoring, for accrediting DOEs and for registering and issuing the CERs.

by the Board. The Commission will continue to participate actively in the Board and its constituent bodies, and together with other Annex I Parties and proactive developing countries, push for improvements in the registration and issuance process as a complement to 'end-of-pipe' use restrictions under article 11.a(9) of the EU ETS directive.

5. ANALYSIS OF IMPACTS

Each option is assessed on the basis of the following criteria:

- Cost-efficiency of abatement
- Environmental integrity of the EU ETS and global emission abatements
- Coherence with the EU's international negotiation position
- Competitiveness concerns
- Synergies with the Montreal protocol
- Administrative feasibility
- Distributional impacts

Furthermore, an analysis is added on what the impacts could be on the price evolution and availability of credits in the EU ETS.

5.1. Option 0: reference case of continued recognition in the EU ETS of HFC-23 and N_2O international credits

The impacts of this option were described in detail in the section examining the need for use restrictions to be introduced in the EU ETS.

In sum, if no use restrictions on industrial gas credits would be introduced, the EU would have to rely entirely on the willingness of the CDM EB, the JISC or the Conference of Parties serving as the Meeting of Parties (CMP) to eliminate the concerns about competitiveness, cost-effectiveness and environmental integrity identified. The track record in the negotiations and the conflicting interests of Parties do not give much reason for optimism this could actually materialise. It is more likely that pressure from major beneficiaries of these credits to recognise new (post-2004) HCFC-22 and adipic acid plants under the CDM would continue to build up. This in turn would reduce the likelihood that cheap reductions become part of the own contributions by developing countries to the global emission reduction efforts.

The EU ETS would also not be compatible with positions taken in draft US bills, increasing the risks of fragmentation in the international carbon market in the event a US bill is adopted. Furthermore, the continued recognition in the EU ETS of industrial gas credits could undermine the credibility of the EU ETS as a cost-effective instrument to reduce emissions, and therefore also reduce chances of there being a US ETS adopted in the first place. Registered and future projects would continue to reap the unusually high rents up to the end of their 21 years crediting period, perpetuating the competitiveness and environmental concerns.

Table 3: summary of impacts of a continued recognition in the EU ETS of HFC-23 and N_2O international credits

	Pro	Con
Environmental integrity of the ETS and global emission abatements	- HFC-23 and N_2O would continue to be destroyed / abated	- Carbon leakage concerns remain an issue - Doubts about non-additional credits remain as potential new EB rules for crediting HFC-23 and N2O cannot be applied to existing projects within a crediting period - Slows down move towards sectoral crediting with own contribution from advanced DCs
Cost efficiency of abatement		- Excessive rents and transfers relative to environmental gains remain in place. - Continued resistance by DCs against alternative more cost-effective forms of financing HFC-23 and N_2O destruction e.g. HFC-23 destruction through Multilateral fund (MLF) under the Montreal protocol - Continued pressure to allow new HFC-23 projects under the CDM
Link to international negotiations		- Undermines our efforts to move away from CDM towards sectoral crediting and own action by advanced developing countries
EU competitiveness concerns		- Competitiveness concerns remain unsolved
Montreal protocol		- Phase-out of HCFC-22 as agreed under the Montreal Protocol would continue to be undermined by incentive to produce HCFC-22
Administrative feasibility	- N/A	– N/A
Distributional impacts	– project owners, financial intermediaries, compliance buyers maintain the value of their portfolio of HFC23 and N2O credits – Chinese government continues to receive revenues from taxing HFC23 and N2O credits	- No incentive to diversify supply portfolio to other credit types (in LDCs) with more sustainable development benefits and sectoral credits

5.2. Option 1: full use restriction on HFC-23 and N_2O credits in the EU ETS

In this design option, the use of HFC-23 and N_2O credits is prohibited as of 1 January 2013, with a notice period between the adoption of the decision and the cut-off date during which restrictions can not yet enter into force. This assures that there is sufficient lead-time for market actors to prepare for the upcoming restrictions. Table 4 summarises the effectiveness of this design option in dealing with the shortcomings identified in the previous section. It also assesses to what extent such use restrictions are easy to administer.

5.2.1. Environmental integrity of the EU ETS and global emission abatements

Full use restrictions would effectively deal with any doubts about the non-additional nature of credits. They would also eliminate an important obstacle to the acceptance by advanced DCs of appropriate own action or sectoral crediting, which have a more comprehensive and broad ranging price signal and provide net benefits to the atmosphere if the crediting threshold is set below the baseline emissions. Because competitive distortions would be substantially reduced, there would also be less scope for shifts in production and associated carbon leakage.

Credits would no longer have the same value, therefore some project owners may no longer use their existing incineration equipment to destroy emissions of HFC-23 and N_2O and instead vent them into the atmosphere. This would only be the case if they and the host countries were unwilling to make contributions themselves to reducing greenhouse gas emissions, they were willing to accept likely criticism for this position, action would not be foreseen under the Montreal Protocol and no buyers are found outside the EU ETS. Even if this were the case, as these emission reductions are currently used as offsets, the net effect on global emissions would be zero, and it would even be positive if in this way non-additional credits are eliminated. What's more is that these emission reductions will be replaced by reductions from other JI or CDM projects. HFC-23 and adipic acid N_2O abatements projects have also benefited from several years of credits. Therefore, they have already earned sufficient profits to compensate for the continued operating costs of these projects for the remainder of their life time.

Full use restrictions would also reduce pressure from developing countries to make new plants built after 2004 eligible for CDM crediting. Consequently, this would increase chances that these emissions are abated as part of the appropriate own action by developing countries, or that their abatement is financed by developed countries through more cost-effective means.

5.2.2. Impacts on cost-effectiveness of abatements

Full use restrictions should not affect abatement costs in the EU ETS for the reasons set out in section 5.4.1 below. However, global cost-efficiency will improve if abatement takes place in developing countries as part of their appropriate own actions, or if they are financed on the basis of their incremental costs.

Project developers would no longer reap excessively high profits from the price difference between abatement costs and secondary market prices in the EU ETS. The Chinese government that taxes the generation of these credits would also forego these earnings. To the extent that governments are willing to use them, the credits would still carry value outside the EU ETS for use under the EU effort sharing decision or compliance purposes by other Annex I countries[42]. Their lower market value would reduce pressure in international negotiations to recognise new HFC-23 plants under the CDM[43] and increase acceptance of alternative more cost-effective forms of financing HFC-23 and N_2O destruction[44].

Overall cost-effectiveness could reduce if the total number of credits available in the market is reduced. However, this is only the case when the marginal options determine the ERU/CER

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[42] Governments are often more willing to pay a premium for credits that are regarded as more sustainable. EU governments would have to justify their use, see Effort Sharing Decision 406/2009/EC

[43] Under the current rules of the CDM only HCFC-22 plants that have a running history of 3 years between 2000 and 2004 are eligible for HFC destruction under the CDM. This is meant to avoid that new HCFC-22 plants would be built merely to gain HFC-23 credits.

[44] e.g. HFC-23 destruction through Multilateral fund (MLF) under the Montreal protocol

price. This is clearly not the case in the EU ETS[45]. For more on market implications, see section 5.4.1.

5.2.3. Consistency with EU international negotiation position

A full use restriction would give the clearest signal to developing countries that we expect financing these cheap reductions beyond 2012 to be part of their own contributions to global emission reductions. The EU could also no longer be accused of increasing the costs of future abatements by these countries. It would open room for new projects from LDCs with more sustainable development benefits and for sectoral credits. Finally, the phase-out of HCFC-22 production in developing countries by 2030 as agreed under the Montreal Protocol would no longer be undermined by the urge to produce HCFC-22 for the sake of CDM revenues.

5.2.4. EU competitiveness considerations

A full use restriction would be most effective to eliminate competitiveness distortions in the fluoro-polymer market and the production of adipic and nitric acid. JI/CDM revenues would no longer be the determining factor for differences in the cost structure across plants within the EU and in Annex I and non-Annex I countries.

5.2.5. Administrative feasibility

A CER has the following elements that can be used to impose use restrictions in the registry: unit type, project ID and commitment period. A full use restriction as of January 2013 would be straightforward to implement by simply adding an automatic check on the credits that are surrendered for compliance based on the unit type and the commitment period. It would also be straightforward for EU ETS operators, market intermediaries and other market participants.

5.2.6. Distributional impacts

EU ETS compliance buyers that have purchased credits on the secondary market could see their assets depreciate in value, as they could no longer be used in the EU ETS beyond the notice period. Surrender of credits in the registry for compliance as well as swapping EU allowances or other ERUs/CERs for these credits would allow full use of the restricted credits prior to when restrictions set in. Governments in host countries that tax these credits will loose this source of revenue completely. In return, EU governments still willing to purchase these credit will have to pay a lower price, as will non-Annex I buyers.

For EU ETS compliance buyers purchasing on the secondary market, direct effects on compliance costs will not be significant. Modelling shows that sufficient other sources of supply remain in the JI/CDM pipeline of registered projects and in the unused abatement potential in developing countries at prices below those expected in the EU ETS (see section 5.4.1). Even if primary prices for ERUs and CERs would rise, this should not affect prices in the secondary market because the marginal abatement options do not determine the ERU and CER prices in the EU secondary market.

When breaking down the distributional impacts for Member States and sector under the EU ETS, the public availability of market information regarding CER and ERU holdings is limited. Information from the Community Independent Transaction Log (CITL) and from the

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[45] Bakker S.J.A. et al. (2009): *"Differentiation in the CDM: options and impacts"*, Climate Change Scientific Assessment and Policy Analysis, p.56

2010 progress report under Article 21 of the EU ETS only gives some insights on the past use of these credits by operators and the intended use of these units by Member States up till 2012. From this we can gather that:

– To date, a limited number of CERs and ERUs have been surrendered for compliance purposes in the EU ETS. In 2008, operators used 81.7 million CERs or ERUs which was 3.9% of all surrendered allowances. In 2009, operators used 82 million CERs or ERUs which was 4.39% of all surrendered allowance. 74% of all international credits surrendered in 2009 were done so by combustion installations. Cement sector was second with 9% and iron and steel third with 7%. Note this is all CERs and ERUs and not limited to those representing industrial gas projects. An extrapolation based on CERs or ERUs issued would suggest that around 75% of these units were from industrial gas projects (52% of issued units from HFC and 23% from N2O).

– The highest number of HFC23 and N_2O CERs surrendered were, in order of volume: Germany, Poland, Italy, Spain, UK and France. These Member States also represented the highest number of CER surrendered in general regardless of project type. From the 2010 progress report we can deduct that ten Member States of the EU-15 as well and Slovenia have decided to use Kyoto mechanisms to reach their Kyoto targets. Together, these EU-15 Member States would acquire 116.7 Mt CO_2-eq. per year for compliance under the first commitment period under the Kyoto Protocol. This represents approximately 2.7 percentage points towards the EU-15 Kyoto target of -8 %. However, when looking at the amount of credits already delivered to the Member States' accounts in the registry, so far, the figure is much smaller and amounts to about 28 Mt CO_2-eq. Also, at this point, it is difficult to determine which unit types each Member State will purchase as all have signalled that they will use all three Kyoto Mechanisms to satisfy their obligation. Further, the compliance obligation for Member States won't be completed until 2015 so implementation of purchasing plans are still in progress. However, the latest EU inventory indicates emissions are down to 17.3% below 1990 levels (excluding aviation). The Commission Communication going beyond 20% indicates that demand for international credits beyond 2012 could be limited due to the long position of most EU industries.

– Some project developers, financial intermediaries and compliance buyers have signed contracts for the delivery of credits by March 2013. This delivery date was chosen with a view to use the credits for compliance in April 2013. Use restrictions introduced as of 1 January 2013 would therefore necessitate adjustments by market participants which could entail some financial losses. Due to commercial interests of individual market participants, it was not possible to collect factual information on the importance of these delivery contracts. But in particular to the extent that they were agreed after the date of adoption of the revised EU ETS, these contracts may contain provisions in the event use restrictions are introduced.

The regional distribution of projects submitted for registration under the CDM would be positively impacted by such a use restriction as the current pipeline excluding HFC23 and N_2O shows a more diverse geographical scope. Furthermore, the potential for projects in other countries and project types is large. One of the main obstacles for a better uptake of CDM or sectoral credits is the uncertainty on future demand. Reducing the demand for HFC-23 and N_2O credits will shift demand to other project types, including energy efficiency, programmes of activity, fuel switch and renewables. There are more than 160 methodologies approved by the CDM Executive Board and the JI Supervisory Committee (90 large scales, 59 small scales, 10 large scales A/R and 7 small scales A/R), so it's relatively easy for project

developers to reorient supply towards different project types[46]. Once sectoral crediting mechanisms are put in place, this will add to the diversity.

By prohibiting use of units from HFC-23 and N_2O JI/CDM projects in the EU ETS, the quality and regional distribution of projects submitted for registration will likely be positively impacted. Due to change in the merit order of abatement options, there will also be an incentive to diversify the supply portfolio to other credit types with more sustainable development benefits.

Table 4: summary of impacts of a full use restriction

	Pro	**Con**
Environmental integrity of the ETS and global emission abatements	- Eliminates doubts about non-additional credits - Would reduce the sales risks for other project types, thus increasing their supply. - If emissions are no longer abated the effect on the atmosphere will be neutral because these are offsets. If it eliminates non-additional credits the impact may even be positive. - Eliminates carbon leakage concerns due shifts in production to CDM plants	- Non-additional credits could still be used by other Annex I countries [and in theory also by EU Governments under the Effort Sharing Decision if properly justified]
Cost efficiency of abatement	- Eliminates surplus rents for any newly generated credits or existing credits that were not used for compliance in the EU ETS by the time the use restriction is introduced. - Increases acceptance by DCs of alternative and more cost-effective forms of financing HFC-23 and N_2O destruction e.g. HFC-23 destruction through Multilateral fund (MLF) under the Montreal protocol - Reduces pressure in the international negotiations to recognise new HFC-23 plants under the CDM[47]	- Project developers owning credits would lose part of their future earnings. But credits could still be used by Governments in and outside the EU.
Consistency with EU international negotiation position	- Coherent with international position that cheap reductions should be part of appropriate own action of DCs and stimulates move to sectoral crediting mechanisms in DC and cap-and	

[46] Besides methodologies for the destruction of greenhouse gases such as HFC23 and N2O there are four other categories of abatement technologies for which methodologies have been developed. These are (1) energy efficiency improvement projects, e.g. light bulbs, efficient coal, etc, (2) fuel switch projects, e.g. from coal to gas or from fossil fuels to renewables, (3) recovery of GHG e.g. methane from landfills, coal mines or pig farms and (4) changes in production processes (e.g. blended cement).

[47] Under the current rules of the CDM only HCFC-22 plants that have a running history of 3 years between 2000 and 2004 are eligible for HFC destruction under the CDM. This is meant to avoid that new HCFC-22 plants would be built merely to gain HFC-23 offset credits.

	trade in other Annex I	
EU competitiveness considerations	- Effective way to alleviate competitiveness concerns arising from these projects	
Montreal protocol	- Eliminates one of the obstacles to a phase-out of HCFC-22 production in developing countries by 2030 as agreed under the Montreal Protocol	
Administrative feasibility	- Straightforward to implement in the Union registry on the basis of the project id of the credits - Clarity for operators on what credits are no longer accepted	
Distributional impacts	- There will be an incentive to diversify supply portfolio to other credit types with more sustainable development benefits and sectoral credits	– Project developers, financial intermediaries and compliance buyers will see the value of their portfolio reduce. But credits could still in theory still be used by government in and outside the EU – Host countries would see part of their benefits/tax revenues reduced.

5.3. Option 2: phase-in of full use restriction with a multiplier

In this option, full use restrictions would only apply after a transitional period in which credits could still be used, albeit subject to a multiplier. The full use restriction would apply as of 2016

5.3.1. Determining the level of the multipliers

The difficulty of this option lies in determining an appropriate level for the multipliers. The extent to which the environmental merits and economic efficiency of these credits are improved will depend on their stringency. The level of the multiplier would have to be chosen such that project owners still have an incentive to participate. In theory this would be the case for any level of the multiplier that results in the value of a credit above the abatement cost, including the costs to finance the assets used in the process.

Using the examples elaborated in Table 1, and assuming a weighted average cost of capital (WACC) of 20% and a project life time of 7 years, HFC-23 projects would break-even at a multiplier of 9. For adipic acid plant projects a multiplier of around 13 would be needed, while for nitric acid plant projects the multiplier would have to be lower, around 1.05 (table 5). Of course these multipliers do not take into account the fact that most of these projects already have an operational lifetime of several years, during which they earned low cost credits that were exchanged at face value for allowances. Consequently, many project owners will already have made a considerable amount of excessive profits before the multiplier is introduced. For nitric acid plants, however, that have been operating less than 7 years, using a multiplier would not be justified for WACCs beyond 20%.

Table 5: Multipliers guaranteeing a return on investment equal to the WACC

Project type	Multipliers setting the NPV of the projects equal to 0					
	WACC of 10%		WACC of 20%		WACC of 30%	
	Project lifetime		Project lifetime		Project lifetime	
	7 years	*21 years*	*7 years*	*21 years*	*7 years*	*21 years*
HFC-23 destruction	9.4	13.5	8.5	10.6	7.7	8.8
Nitric acid plant N_2O destruction	1.4	2.9	1.05	1.6	0.83	1.05
Adipic acid plant N_2O destruction	14.8	23.7	12.6	16.8	10.8	12.9

5.3.2. Environmental integrity of the EU ETS and global emission abatements

The use of a multiplier in theory could lead to higher overall emission reductions because several credits would have to be surrendered in return for one tonne of emissions in the EU ETS. These additional credits would no longer be available for use in the effort sharing sectors and in other Annex I countries. As a consequence, demand for internal reductions or for other international credit types in the effort sharing sectors or in other annex I countries would increase. It would effectively mean that the rents from these projects are used to reduce emissions.

However, these reductions are still paid for in full by developed countries and therefore do not help encourage developing countries to take appropriate own action. Furthermore, there is a risk that EU governments use the surrendered credits for complying with their Kyoto targets. This would result in fewer domestic reductions or demands for other credits. Furthermore, this option is not fully coherent with the phase-out of HCFC-22 under Montreal Protocol, as incentive to produce HCFC-22 remains. In the medium to long term, any short term "gains" in additional use (and thus cancellation) of this type of credits could therefore well be outweighed by slower or less consistent action to address the structural problems of the international carbon market and the flexible mechanisms due to the less clear signals that this option would imply.

5.3.3. Impacts on cost-effectiveness of abatements

The phase-in of a full use restriction with a multiplier would give investors during the transition period continued (but lower) value for their projects, while curtailing excessive rent. Again, there should be no impact on cost-efficiency of abatement in the EU ETS but global cost-efficiency would improve. For the price of one credit in the EU ETS secondary market multiple CO_2 eq tonnes are abated. However, resistance to more cost-effective ways of financing abatement and own appropriate action by developing countries would remain, as the value of credits would still be higher than actual abatement costs. A multiplier would also not eliminate pressures to recognise HFC-23 or N_2O plants built after 2004 under the CDM, in case the transition period is rather long.

5.3.4. Consistency with EU international negotiation position

A multiplier can be a step away from crediting every tonne reduced towards crediting only certain reductions below the baseline, but in this case the reductions would still be fully paid

for by developed countries. The use of a multiplier would therefore be less coherent with the position taken in the negotiations that cheap reductions should stay outside the carbon market and be part of own appropriate action by developing countries or financed on the basis of their incremental costs. Most host countries are sufficiently economically advanced to undertake such own action and bear some or all the full cost.

5.3.5. EU competitiveness considerations

A multiplier would reduce the competitiveness distortions caused by international credits because part of the project abatements will no longer be monetised. But if the multiplier is set at a level where project owners still earn a return on investment, some competitiveness concerns for fluoro-polymer, adipic and nitric acid producers may still prevail.

5.3.6. Administrative feasibility

With a multiplier, the credits eligible in the EU ETS would no longer all be considered to have the same value. This would require adaptations to the Community International Transaction Log (CITL) used to verify the validity of transactions between registries in the EU ETS. Intermediaries and final consumers will have to take this difference in value into account in their buying and selling strategies, which increases the complexity of the carbon market relative to a full use restriction. It would also be a very cumbersome negotiation process to agree on a discount level.

5.3.7. Distributional impacts

Project developers and project owners will see their rents decrease because these credits would become less attractive for EU ETS operators who need to surrender more than one credits for every tonne emitted in the EU. Host country governments will see tax revenues reduced. In return EU governments still willing to purchase these credit will have to pay a lower price, as will non-Annex I buyers.

The overall effects on compliance costs in the EU ETS should, however, not be significant because the EU allowance price is mostly determined by other factors and sufficient alternative credits remain available.. Even if the primary prices for ERUs and CERs would rise, this should not directly affect prices in the secondary market because the marginal abatement options do not determine the ERU and CER prices in the EU secondary market (see section 5.4.1).

By modifying EU ETS demand for HFC-23 and N_2O JI/CDM projects in favour of other projects, the quality and regional distribution of projects submitted for registration may be positively impacted, although this will depend heavily on whether there is sufficient demand for credits beyond those already in the pipeline. Due to change in the merit order of abatement options, there will also be an incentive to diversify the supply portfolio to other credit types with more sustainable development benefits, but this incentive will be less apparent than with a full use restriction.

Internal EU distributive impacts would be roughly similar to those described under the full use restriction option.

Table 6: summary of impacts of a phase-in of full use restriction with a multiplier

	Pro	Con
Environmental integrity of the ETS and global emission abatements	- Could result in net global greenhouse gas reductions as long as the multiplier is higher than the share of non-additional credits - Could be set at a level that the return of projects still fits the required WACC by private investors	- These extra reductions are paid for by developed countries - Difficulty to agree on the level of the WACC as this varies for every country. - Non-discounted credits could still be used by other Annex I countries and by EU Governments
Cost efficiency of abatement	- Allows giving continued limited recognition during a transition period to investors for ongoing projects.	- Value of credits may still be much higher than actual abatement costs - No incentive for own action or more cost-efficient ways of financing their abatement - Does not eliminate pressure from host countries to recognise new HFC-23 plants under the CDM, in case the transition period is rather long.
Consistency with EU international negotiation position	–	- No incentive for own action as reductions are still paid for by developed countries - Most host countries are sufficiently economically advanced to undertake own action and bare the full cost, certainly if reductions are cheap. If it would be appropriate that all costs would be carried by the countries, only a full use restriction would work.
EU competitiveness considerations	- Eliminates part of the competitiveness concerns for EU fluoro-polymer, adipic and nitric acid producers	– If the multiplier is set at a level where project still earn a return on investment equal to the WACC, competitiveness concerns may still prevail.
Consistency with Montreal protocol		– Not fully coherent with phase-out of HCFC-22 under Montreal Protocol as incentive to produce HCFC-22 remains
Administrative feasibility	– Can be implement in the Union registry on the basis of the project-ID of the credits	– Market participants (incl. exchanges) would have to distinguish between credits subject to a full use restriction and those subject to a multiplier
Distributional impacts	- Incentive to diversify supply portfolio to other credit types depends on level of the multiplier	

5.4. Cross-cutting considerations for both options

5.4.1. Market impacts

Restricting the use of HFC-23 and N_2O credits in the EU ETS would affect price formation on the EU ETS market. To analyse the potential magnitude this effect one needs to take several issues into consideration.

In a market where CERs, ERUs and EU allowances are fully fungible, the carbon price is determined by the abatement cost of the marginal JI/CDM project. However, in the EU ETS the price is determined by the marginal abatement cost inside the EU at the level where the limit for access to credits is reached. This ensures that some abatement takes place inside the EU and that JI/CDM projects higher in the merit order can sell their credits into the EU ETS. It also implies that the introduction of use restrictions on HFC23 and N_2O credits does not automatically imply a higher carbon price in the EU ETS. As long as there is sufficient supply of credits from other projects with abatement costs below the EU allowance price, prices will not see significant changes.

At present the EU is by far the dominant destination of credits. In its Reports State and Trends of the Carbon Market 2009 and 2010, the World Bank estimated that Europe was responsible for more than 90% of the volume of primary CDM and JI buying in 2008 and 85% in 2009[48]. Of this the private sector dominates transactions, with EU governments in 2008 only being responsible of 10% of total transactions.

A strategy in the secondary market in response to the introduction of restrictions will likely be to surrender and use any ERU/CERs in circulation from those projects that face restrictions in the future to receive allowances under the EU ETS before the restrictions enter into force. If the restriction would be introduced starting 1 January 2013, then one needs to estimate the number of potential issued ERUs/CERs up to the end of 2012 to assess what the maximum inflow of such credits could be.

Whereas registration of HFC-23 and N_2O projects indicates that the existing registered projects are expected to generate around 680 million CERs and 49.5 million ERUs for reductions up to 2012 (see chapter 2.1, basic data), issuance at present is a bit below this level. If as a proxy for 2010 to 2012 the average issuance of the years 2007 to 2009 is taken[49], then total issuance by the end of 2012 is expected to be 595.3 million CERs and 2.6 million ERUs.

Assuming that 85% of these credits would go to the EU and that 90% would end up in private sector hands and be surrendered for compliance in the EU ETS before the restriction enters into force, this would result in an inflow in the EU ETS by end 2012 of around 457.4 million HFC-23 or N_2O credits, or a bit less than a third of the expected total allowed amount of credits that can be used for compliance in the EU ETS over the period 2008-2012 (expected to be around 1.6 to 1.7 billion credits)[50]. This would mean that there is a remaining potential use of credits in the EU ETS up to 2020 of around 1.14 to 1.24 billion credits that need to come from other type of projects[51].

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48 This is predominantly coming from the EU even though the estimate can include other European countries such as Norway and Switzerland.

49 Calculated from http://www.iges.or.jp/en/cdm/report_cdm.html#cdm_a

50 http://ec.europa.eu/environment/climat/pdf/26-05-2010working_doc2.pdf

51 Note that it is unlikely that all HFC-23 and N_2O credits issued by the end of 2012 would be introduced in the EU ETS, for instance because they belong to government buyers that are still willing to use it for

The question therefore is whether the existing supply of all other JI and CDM projects and sectoral crediting[52] would be sufficient to cover this demand and whether this would result in a significant increase in primary credit prices because new and additional projects that are more expensive would need to be brought online. Even putting aside sectoral crediting, a look at the projects in the JI/CDM pipeline and the potential demand for them suggests this will not be the case.

Projects already registered other than HFC-23 and N_2O projects are estimated to potentially produce 3,616 million CERs by 2020 and 80.4 million ERUs by 2012 (see also chapter 2.1 basic data)[53]. Assuming that the EU would continue to receive 90% of these total credits (equal to 2.32 billion credits) and that the EU ETS would fully exploit the use limit, then an amount for government use in the EU would remain equal to 1526 to 1626 million over the period 2008-2020. Several elements indicate that this amount should pose no significant risk for shortages for compliance in the EU non-ETS sectors. Elements that clearly point to that are:

- EU governments in aggregate have no net need for credits for compliance for the Kyoto commitment period, even though some individual Member State governments might use credits for compliance and others will comply through the purchase of surplus AAUs from other countries.
- Despite future restrictions in the EU ETS and being prone to public criticism, some EU governments might still be willing to use credits from HFC-23 and N_2O projects for compliance both in the Kyoto commitment period and for commitments post-2012 under the EU Effort Sharing Decision. This would further free up credits from other type of projects for governments that are not willing to do so and for operators under the EU ETS.
- A full implementation of the renewable targets in the Climate and Energy package will significantly reduce the need of international credits for the non-ETS sectors[54].

Ultimately medium-term pricing of international credits and allowances is unlikely to be dominated by demand-side factors like use restrictions. An early decision on use restrictions for industrial gas credits will furthermore give the market ample time to adapt and provide a supply stimulus for alternative projects that can deliver credits for EU ETS compliance use in 2013 to 2020. The CDM Executive Board has taken measures to speed up the registration and issuance process e.g. by improving its guidance to DOEs, by streamlining the registration, issuance and review procedures, and by increasing the Secretariat's capacity to treat registration and issuance cases. Over time this should result in fewer delays in registration and issuance.

Nevertheless, a possible stagnation/slowdown of the rate of new start-up of projects in the coming years is likely to be due to the fact that the projects in the existing pipeline foresee more than sufficient supply. A further demand stimulus needs to come first and foremost from decisions on cap-and-trade systems in other major OECD countries (US, Japan, Australia,

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compliance. But if they would be used for compliance, this simply means more credits of other types would be available for the EU ETS given demand from them from other potential buyers is less.

52 In the event there is no international agreement by the end of 2009, the EU ETS Directive provides in article 11.a(5) the possibility to use credits from high-quality projects through agreements with third countries.

53 Effective issuance before the end of 2020 from these registered projects will probably be a bit lower, but on the other hand additional projects are already in the pipeline and should become registered before 2020.

54 See Commission Staff Working Document, part 2, accompanying the Communication *'Analysis of options to move beyond 20% greenhouse gas emission reductions and assessing the risk of carbon leakage'* (SEC (2010) 650).

Canada) and their related recognition rules for international credits. Given present circumstances, i.e. recent delays announced in the US and Australia, restricting the use of HFC-23 and N_2O credits in the EU ETS would therefore rather increase the likelihood that all projects in the pipeline would be fully executed and find a market in Europe.

5.4.2. Modelling the impact on price formation in the EU ETS

Modelling results estimating the mitigation potential available in major developing countries confirm that use restrictions on industrial gases, if introduced timely, are unlikely to have a major impact on the international credit supply pipeline and hence prices in the EU ETS.

For the Communication *'Analysis of options to move beyond 20% greenhouse gas emission reductions and assessing the risk of carbon leakage'* (COM(2010) 265 final) the Commission estimated what the carbon price should be in those countries that had pledged targets or actions under the Copenhagen Accord[55].

The table below gives the projections using the POLES model of the Copenhagen pledges of the 3 largest suppliers of CDM, i.e. China, Brazil and India. They could all meet their low end pledges at 2020 internal carbon prices of 12€ or lower and their high-end pledges at internal carbon prices of 23€ or lower. But the simulation also estimated how carbon prices would evolve, if a carbon market would be introduced. It was assumed that only those countries with pledges would be able to participate, thus including the Japanese pledge of -25% below 1990 emission levels by 2020 and the US pledge of -17% below 2005 levels by 2020. Those with high carbon prices could only buy a third of the difference between their pledge and baseline, while those with low carbon prices who could sell, no limitation would apply as long as credits were only generated for reduction beyond their pledge. The high pledges scenario illustrates what would happen with supply and demand for credits if the EU moves to a -30% reduction in emissions and other countries commit to their higher emission reduction pledges under the Copenhagen accord.

[55] See chapter 2.5 of the Staff working Document, part 2, accompanying this Communication.

Table 7: Impact pledges modelled in POLES

	Low pledges				
	Achieving pledges internally		Increased effort, additional reductions available for the carbon market		
	Carbon price (€/ton $CO_{2\text{-}eq}$)	GHG vs. baseline	Carbon price (€/ton $CO_{2\text{-}eq}$)	GHG vs. baseline	Reductions available for credit generation in the year 2020, other than HFC-23 and N_2O (million allowances)
Brazil	5	-3%	14	-10%	49
China	12	-9%	14	-10%	156
India	6	-8%	14	-16%	264
Total supply					465
	High pledges				
	Achieving pledges internally		Increased effort, additional reductions available for the carbon market		
	Carbon price (€/ton $CO_{2\text{-}eq}$)	GHG vs baseline	Carbon price (€/ton $CO_{2\text{-}eq}$)	GHG vs baseline	Reductions available for credit generation in the year 2020, other than HFC-23 and N_2O (million allowances)
Brazil	11	-8%	25	-15%	49
China	23	-16%	25	-17%	110
India	12	-14%	25	-23%	308
Total supply					467

Source: POLES, JRC

This resulted in 2 developed country regions being significant sellers as well as the three large developing country emitters. Specifically in those countries, potential to supply on the carbon market in case of the low pledges where as high as 465 million in the year 2020 at prices of only 14 €, not containing credits generated through HFC-23 and N_2O.

These would barely change in case of high pledges, to 467 million in the year 2020 only at prices of 25€. Whereas at these higher prices the reduction potential for India increased significantly resulting in significant additional supply on the carbon market, whereas in China the increase in reduction potential was not sufficient to compensate the higher internal reduction effort due to the higher pledge.

It is clear that the carbon market can continue to deliver large quantities of credits, even if own commitments by developing countries are fully taken into account and credits from

HFC-23 and N_2O are excluded, and this at prices which are similar to projected prices in the EU ETS[56]. Furthermore these estimates look at only the three main developing country emitters. Supply would increase significantly more, if other developing countries' potential to reduce emissions would also be included.

5.4.3. Applying restrictions to ERUs/CERs issued prior and after the restrictions set in

Some have been asking for restrictions not to apply to credits issued by the UNFCCC, calling this "retroactive". However, restrictions are on use, not issuance by the UNFCCC Secretariat. The EU restrictions would not be directed to the *issuance* of these credits but to their *use* for compliance under the ETS. Any Party under the UNFCCC at all times has the right to decide whether to use credits from a project type. The ETS directive foresees a notice period between 6 months and 3 years prior to the restrictions entering into force. This allows credit owners to make use of the credits that they have in their holding account, while avoiding the use at face value of credits issued from existing projects up to 21 years in the future. It is also important to note that limiting use restrictions to projects not registered prior to adoption of the directive would be totally ineffective in the case of industrial gases, as the vast majority of project potentials were already registered prior to that date.

5.4.4. Fragmentation of the market

As the EU is the major purchaser in this market and other developed countries want changes too, there is no large risk of fragmentation of the market. In fact measures could start a race to the top in countries providing for the use of international credits. Of course within the CER/ERU market a distinction will be made between EU ETS eligible and EU ETS non-eligible credits, just like is already the case for afforestation and reforestation credits. Credits from industrial gas projects are expected to sell at a discount, while eligible credits will track the EU allowance price until the EU ETS import limit is used up, after which prices will start to decouple[57]. An additional consideration relates to linking to other emission trading systems. A key design element with respect to linking is the treatment of international credits in each trading system. As the EU is working towards a transatlantic link as the core of an OECD-wide emissions trading market, it may want to consider coordinating in an early stage with our counterparts in the US and other OECD countries.

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[56] The carbon price in the EU ETS is estimated to be 16.5 € by 2020, if the package is fully implemented. Prices can be higher, if instruments are not put in place to meet the renewables targets. For instance if no additional efforts are taken to reach the renewables targets in the EU, prices in 2020 could be € 25 (see chapter 3 of Commission Staff Working Document, part 2, accompanying the Communication 'Analysis of options to move beyond 20% greenhouse gas emission reductions and assessing the risk of carbon leakage' (SEC(2010) 650)

[57] Bloomberg New Energy Finance (2010): "Impact of CER import restrictions on the EU ETS and international carbon market", Carbon Markets - Global - Research Note 20 October 2010.

6. COMPARING THE OPTIONS AND CONCLUSIONS

6.1. Continued recognition in the EU ETS of HFC-23 and N_2O credits at face value

The analysis has identified a variety of reasons for applying use restrictions on HFC-23 and N_2O international credits in the EU ETS. There are concerns that they may not be fully additional (and thus undermine the environmental integrity of the system), that they cause competitive distortions leading to carbon leakage, and that they undermine moves to sectoral crediting and appropriate own actions by developing countries. They stimulate production and associated HFC-23 emissions beyond the baseline of HCFC-22, both in the refrigerant industry and in feedstock use, instead of less polluting alternatives. The case for full use restrictions for N2O abatement from nitric acid production is less clear cut. Rents from these projects are clearly lower than those from adipic acid production, and there are less apparent undesirable consequences

Because the projects for HFC-23 abatement and N2O abatement from adipic acid production are so lucrative for host countries, there is not much appetite to accept alternative, more cost-effective ways of financing their destruction. Finally, their use also undermines attempts to use the carbon market for cost-effective reductions in other areas with higher impacts on technology transformation and changes in the energy balance of developing countries. .

Putting in place restrictions on the use of these credits from HFC-23 and N2O in the production of adipic acid in the EU ETS will align the use of international credits in the EU ETS with the EU's international negotiation position to encourage own commitments by advanced developing countries and move to a scaled up and geographically better balanced carbon market focussing on sectoral crediting mechanisms and linked emission trading systems. They will also improve the cost-efficiency of global abatement by setting payments at levels closer to actual costs of mitigation.

Because relative to the demand for credits in the EU ETS there is sufficient scope for international credits in other areas than industrial gases that are cheaper than abatement in the EU ETS, no long-term price impacts are to be expected from restrictions on HFC-23 or N2O from adipic acid production credits. The notice period prior to the entry into force of restrictions, will also ensure that credits issued before 1 January 2013 can be used for compliance and swapped for EU allowances. There may be specific concerns about short-term illiquidity for the ERU/CER market because of specifications in delivery contracts. However, overall liquidity is guaranteed by the fungibility between CERs and EU allowances and the average long position of operators in the EU ETS.

Consequently, the reference case of continued recognition in the EU ETS of HFC-23 and N_2O from adipic acid production credits at face value should be discarded.

6.2. Full use restriction vs. transitional multiplier

The strongest signal to developing countries that an overhaul of the CDM is needed with appropriate own action by developing countries, is to propose a full use restriction on HFC-23 and N_2O from adipic acid production credits as of 1 January 2013. This would best meet the operational objective of introducing restrictions as soon as possible using the existing legal powers of the Commission. It would also best encourage moves away from the CDM in advanced developing countries towards sectoral crediting, and thus improve the overall

environmental performance of the carbon market. Likewise, full use restrictions on ERUs from these projects would best encourage the move towards cap-and-trade.

Overall cost-efficiency of abatement would benefit most from full use restrictions, particularly from HFC-23 and N_2O from adipic acid production when combined with appropriate own action by developing countries or when incremental cost financing can be introduced instead. A multiplier could impede such moves, in particular if set too high. Full use restrictions will also deal most effectively with the low value for money and the competitiveness distortions and other undesirable consequences that they create. Multipliers carry the risk that their level is set too low.

Importantly, full use restrictions will be easier to administer by the market than a transitional multiplier. With a multiplier the credits eligible in the EU ETS no longer would be considered to all have the same value. Intermediaries and final consumers will have to take this into account in their buying and selling strategies. From a regulatory point of view, exemptions to full use restrictions will also be more complex. Applying a transitional multiplier will open discussions on the appropriate level of a multiplier and return on investment, and the timing and conditions for full use restrictions. If exemptions to full use restrictions are granted e.g. when a host country abates emissions in the non-CDM registered HFC-23 and N_2O emitting adipic acid plants, the conditions for such exemptions will have to be verified by an independent party. There may also be scope for undesirable consequences from these exemptions e.g. that more HFC-23 and N_2O abating adipic acid plants are constructed than otherwise would be the case. A final argument in favour of full use restrictions is that they best mirror the thinking about international offsets in the US. This should facilitate the evolution towards a transatlantic carbon market.

Some have claimed that multipliers score better than full use restrictions in preventing JI/CDM plant owners' simply stopping abating emissions and venting them into the atmosphere in order to save costs of operating the destruction equipment. If this were the case, in environmental terms the net effect would remain zero, as the emissions that were reduced under the JI/CDM project would be used to offset emissions elsewhere. Furthermore, the emission reductions no longer achieved in these HFC-23 and N_2O abating adipic acid plants would be achieved elsewhere in other JI/CDM projects or through sectoral crediting mechanisms. Finally, alternative ways can be found outside the carbon market to finance such reductions. For example, the EU, US Mexico and Canada have proposed to use the Multilateral Fund of the Montreal protocol to finance HFC-23 destruction at incremental costs.

A multiplier would results in additional reductions when several credits are surrendered for compliance with one tonne emitted in the EU ETS. However, as said before, this is only true provided the surrendered credits are not used by Governments for their Kyoto compliance. Furthermore, the extra reductions would still be paid by developed countries and, in a longer time perspective, might well prove not to be additional because of the delayed impulse it would give to reform the international carbon markets. The vast majority of these projects are precisely in developing countries that are sufficiently economically advanced to undertake own action and bear these cost, certainly where reductions are cheap. Finally, full use restriction would be more effective in eliminating any non-additional credits circulating in the market.

Based on the above, in order to maximise the incentive for own action and a move towards sectoral crediting, eliminate undesirable competitive and environmental consequences, and encourage the uptake and linking of cap-and-trade, a full use restriction as of 1 January 2013

on HFC-23 and N_2O from adipic acid production credits from JI and CDM projects is the preferred option.

ANNEX 1: FREQUENTLY STATED AREAS OF CONCERN WITH THE CDM

Largely thanks to demand from the EU ETS and from EU Member State Governments, the CDM has developed into a massive success, much bigger than expected at the time it was conceived. The CDM has helped reduce compliance costs for the EU with its targets under the Kyoto protocol, facilitated some technology transfer to developing countries and has extended the carbon price signal far beyond the EU. For several reasons JI projects have not known the same success. Those credits that were generated mainly have gone to EU Governments and EU ETS operators.

Acknowledging these merits, the system is by no means perfect, and the UNFCCC rules and modalities for setting baselines and testing additionality of projects have been criticised for a number of shortcomings.

– *Baseline setting and additionality testing:* the difficulty lies in the counterfactual nature of setting the baseline and in the lack of standardised parameters for performing the investment, barrier and common practice analysis used for determining the additionality of projects. For instance, the investment analysis hinges on the reliability of the costs and revenue estimates given by project developers, some of which are hard to verify. Similarly, the investment analysis may not always work properly in economies with regulated energy markets, where the feed-in tariff and the threshold for the IRR are set by the government, andfeed-in tariff could be set to ensure IRRs stays below the threshold for passes the additionality test. Within the CDM Executive Board and in the UNFCCC negotiations, the EU continues to push for more objective, credible and transparent ways of assessing additionality of projects e.g. through the use of standardised baselines that guarantee a high level of environmental integrity.

– *Governance structure:* the CDM has somewhat been the victim of its own success, as the system has not been able to absorb in a timely manner the large number of proposal for new methodologies for baseline setting and monitoring emission reductions, and requests for registration and issuance, while simultaneously working on further improvements of the rules, standards and procedures. These have several causes, such as the limited capacity of the support structures, the case-by-case nature of assessments, and the large number of projects that are put under review. The latter reveals poor performances by the Designated Operational Entities (DOE) who are responsible for scrutinising the projects prior to their submission to the Board. In turn, DOEs have complained about insufficient clarity of the rules and guidelines for registration and issuance. Those most affected by these shortcomings are the project developers who miss out on credits due to the delays. But these governance problems are also a strong indication that the system has reached the limits of its capacity. The EU has therefore called for more use of standardised baselines and a shift away from CDM towards a sectoral crediting system as a way to increase efficiency and reach the scale of abatements that are necessary to reach the 2°C target.

– *Offsetting nature of the CDM:* the CDM is designed to displace GHG emission reductions from Annex I to non-Annex I countries, but lacks any element of own contribution by developing countries, needed to limit global temperature increase to 2 degrees Celsius.

– *Other areas of concern:* these include competitive distortions, lack of economic efficiency and low value for money, insufficient transfer of technology and contribution to sustainable development, and skewed geographical distribution of projects in favour of a

few large advanced developing countries. These concerns are particularly relevant for industrial gas projects.

As the largest purchaser of Kyoto credits in the world, to safeguard the integrity of its ETS, the EU has provided leadership in the UNFCCC process to reform the CDM in order to improve its environmental value, economic efficiency, regional distribution and contribution to sustainable development. The EU consistently seeks to improve the governance structures and has been a major advocate for the increased use of standardised approaches for a more objective and transparent baseline determination and assessment of additionality.

The CDM Executive Board has also put large efforts in strengthening the level of scrutiny of projects, but more fundamental changes are hampered by the lack of agreement at the level of the COP/MOP, opposed by major host Parties of the CDM, who resist changes in the rules, guidelines, modalities and procedures that may result in fewer credits issued.

GLOSSARY

- *Additionality*: when a project or activity is additional, it can be built only because it receives money from selling carbon credits. When a project or activity is "non-additional," it is being funded by sales from carbon credits even though it would have happened without revenues from those credits.

- *Adipic acid*: an organic compound, mainly used as a precursor for the production of nylon.

- *Annex I*: developed countries and countries with economies in transition (EIT) listed in this Annex have accepted emission targets for the period 2008 - 2012 as per Article 3 and Annex B of the Kyoto Protocol.

- *Baseline*: defines the greenhouse gas emissions of projects or activities that would have been implemented in the absence of a JI or CDM project.

- *Business-as-usual*: the rate of greenhouse gas emissions, assuming no climate regulations.

- *Carbon credits*: credits represent the right to emit a specific amount of greenhouse gases. Credits can be exchanged between businesses or bought and sold in the international market at the current market price.

- *Carbon offsets*: a polluter can receive credit for supporting a project that either reduces emissions abroad or reduces emissions in an industry domestically that is not mandated to reduce emissions instead of reducing their own emissions.

- *CDM Executive Board*: the CDM Executive Board approves CDM projects, certifies operational entities (DOEs) and issues carbon credits for CDM projects.

- *Certified Emissions Reductions (CER):* a certified emission reduction or CER is a unit issued under the CDM that is equal to one metric ton of carbon dioxide equivalent, calculated using global warming potentials defined by the Kyoto Protocol.

- *Clean Development Mechanism (CDM):* an arrangement under the Kyoto Protocol that allows industrialized countries with a greenhouse gas reduction commitment (called Annex 1 countries) to invest in projects that reduce emissions in developing countries as an alternative to more expensive emission reductions in their own countries.

- *Community International Transaction Log (CITL):* a mechanism set up to verify the validity of transactions between registries in the EU ETS.

- *Conference of Parties serving as the Meeting of Parties (CMP):* the supreme body of the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol.

- *Designated Operational Entities (DOE):* an entity designated by the Kyoto Protocol Conference of the Parties, based on the recommendation by the Executive Board, as qualified to validate proposed CDM project activities as well as verify and certify reductions in anthropogenic emissions by sources of greenhouse gases (GHG) and net anthropogenic GHG removals by carbon sinks.

– *Effort Sharing Decision (ESD)*: the climate and energy package decision on the reduction of greenhouse gases in non-trading sectors (non-ETS). It obliges Member States to contribute to the EU target for reducing greenhouse gas emissions from sources outside the EU emission trading system. These include the agriculture, transport and waste sectors, which account for a large proportion of the total emissions of greenhouse gases.

– *Emission reduction unit (ERU):* the trading unit under the Kyoto Protocol representing the reduction of greenhouse gases under Joint Implementation, where it represents one tonne of CO2 equivalent reduced.

– *EU allowance*: European Allowance Units are issued to installations which have a cap on their emissions under the EU Emissions Trading Scheme (EU ETS).

– *EU Emissions Trading Scheme (EU ETS):* the largest multi-national, emissions trading scheme in the world, and it forms a major pillar of EU climate policy. Under the ETS, large emitters of carbon dioxide within the EU must monitor and annually report their greenhouse gas emissions, and they are obliged every year to return an amount of emission allowances or international credits under the Kyoto Protocol to the government that is equivalent to their CO_2 emissions in that year.

– *Global Warming Potential (GWP):* a measure of how much a given mass of greenhouse gas is estimated to contribute to global warming. It is a relative scale which compares the gas in question to that of the same mass of carbon dioxide (whose GWP is by convention equal to 1).

– *HCFC-22*: mainly used as a refrigerant in a wide range of refrigeration equipment from room air conditioners to large centrifugal chillers. HCFC-22 has an ozone depletion potential of 0.05 and a global warning index of 0.34.

– *HFC-23:* highly potent greenhouse gas emitted formed as a by-product during the manufacture of HCFC-22. The HFC-23 has a Global Warming Potential (GWP) of 11700

– *Joint Implementation (JI):* one of three flexibility mechanisms set forth in the Kyoto Protocol to help countries with binding greenhouse gas emissions targets (so-called Annex I countries) meet their obligations. Annex I country can invest in emission reduction projects (referred to as "Joint Implementation Projects") in any other Annex I country as an alternative to reducing emissions domestically.

– *Joint Implementation Supervisory Committee (JISC):* supervises the Joint Implementation (JI) mechanism and the verification of emission reductions generated by JI projects.

– *Montreal Protocol:* the Montreal Protocol on Substances That Deplete the Ozone Layer (a protocol to the Vienna Convention for the Protection of the Ozone Layer) is an international treaty designed to protect the ozone layer by phasing out the production of a number of substances believed to be responsible for ozone depletion.

– *N_2O:* a potent greenhouse gas that is emitted as a by-product in the production of adipic acid and nitric acid. The primary abatement method in nitric acid plants is through catalytic destruction, or through thermal destruction

– *Net Present Value (NPV):* a primary investment decision criterion. NPV is defined as the difference between the present value of a stream of benefits and that of a stream of costs. A

positive NPV occurs when the sum of the discounted benefits exceeds the sum of the discounted costs.

– *Nitric acid:* a highly corrosive and toxic strong acid used especially in the production of fertilizers and explosives and rocket fuels.

– *POLES model:* Prospective Outlook on Long-term Energy Systems (*POLES*) is a world simulation model for the energy sector. It is a techno-economic model with endogenous projection of energy prices, a complete accounting of energy demand and supply of numerous energy carriers and associated technologies, and a carbon dioxide and other greenhouse gases emissions module.

– *Primary carbon market*: that part of the carbon markets that deals with the issuance of new credits

– *Secondary carbon market*: is the financial market where previously issued credits and allowances, and their derivatives are bought and sold

– *UNFCCC:* United Nations Framework Convention on Climate Change

– *WACC:* the weighted average cost of capital (WACC) is the rate that a company is expected to pay on average to all its security holders to finance its assets. It is calculated taking into account the relative weights of each component of the capital structure and is used to see if the investment is worthwhile to undertake.

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