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Assessment of supply-demand balance for Kyoto offsets (CERs and ERUs) up to 2020

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Abstract

The purpose of this document is to estimate the supply and potential demand as regards Kyoto carbon credits (CER and ERU) up to 2020. Two distinct periods have been pinpointed: 2008-2012, the first commitment period of the Kyoto Protocol, and 2013-2020, the phase when the climate-energy package will be implemented in Europe, and the period for compliance with international commitments agreed in Cancún.

Demand for Kyoto credits is estimated at between 2.2 and 4.4 billion for the 2008-2020 period. The large spread reflects 1) uncertainty about the size of European demand (EU ETS and Member States), which could rise from 1.3 to 2.2 billion credits if Europe's 2020 emissions reduction target were increased from 20% to 30%; and 2) uncertainties regarding the use of Kyoto credits by other actors.

The estimate of Kyoto credit supply by CDC Climat Research is 1.3 billion between now and 2013 (1.1 billion in CER and 0.2 billion in ERU). By 2020, Kyoto projects could generate up to 4 billion credits.

All in all, we estimate that the credit market will be in deficit by 2013 and should be in surplus by 2020, unless there is an increased European commitment, or new sources of demand appear throughout the world.

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1 – Carbon credit demand

The potential demand for carbon credits comes from players involved in greenhouse gas emission reduction systems on an international scale (Kyoto and Cancún agreements), regional scale (EU ETS) and national scale up until 2020. It is estimated in two steps:

- the technical demand: the maximum demand constituted by the ceilings for use imposed by various legislations;

- the actual demand: the technical demand less credits that cannot be used due to market constraints. This must factor in the economic situation and the real carbon constraint in existing or future commitment systems in order to estimate any arbitrage between carbon assets.

1.1 Pré-2012 demand for Kyoto credits

The pre-2012 demand for Kyoto credits corresponds to the total demand for EU ETS installations, countries in Annex B of the Kyoto Protocol (European Union states and Japan) and Japanese businesses participating in voluntary agreements.

1.1.1 EU ETS

The European directive governing the EU ETS stipulates that industrial installations can use Kyoto credits between 2008 and 2012 to ensure part of their compliance. The ceiling for use of Kyoto credits is set on average at 13.5% of allowances, i.e. a maximum import of Kyoto credits of 1,418 Mt. To this is added the possible use of credits for operators in the aviation sector, to enter the EU ETS in January 2012. Their use of credits is limited to 15%[1] of their verified emissions in 2012, i.e. an estimated use of 31.9 Mt. **Thus, the maximum demand for Kyoto credits through the EU ETS comes to 1,451 Mt between 2008 and 2012.**

However, some of the industrial installations of the EU ETS should ignore this possibility, particularly the smallest ones, for which the transaction costs would be too high. If we assume a non-use rate of 20%, the actual demand for Kyoto credits between 2008 and 2012 is estimated at 1,160 Mt.

1.1.2 European Member States

The deployment of the Kyoto Protocol imposes on each State in Annex B of the Protocol an emissions objective, to be complied with by the holding of equivalent carbon assets (assigned amount units: AAU, together with CDM (CER) or JI (ERU) and removal units: RMU).

To respond to the additional requirement laid down by the Marrakech Agreements of 2001, the European Union decided only to authorise the use of Kyoto credits to

[1] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32008L0101:EN:NOT

the order of 50% of the emission reduction effort. In line with this decision, the **European countries**, led by Spain, Italy, the Netherlands and Austria, **announced their intention to use 117 million credits per year, i.e. 584 Mt, during the 2008-2012 period** (Source: EEA, 2010).

In principle, this amount should be considered a maximum: the economic crisis of 2008-2009 limited countries' need for cover, and prompted them to cover their possible residual deficits by AAU purchases. **The World Bank's estimate of credits contracted – to date, 238 Mt – thus seems more realistic** (source: World Bank, 2010), even if it remains considerably higher than the 53 million credits held on 31 December 2010 by European public entities[2].

1.1.3 Japanese demand

In Japan, the demand for Kyoto credits has been stimulated by voluntary agreements between the government and major industries. **The total volume of credits contracted by private and public Japanese players is estimated by the World Bank at 372 Mt for the 2008-2012 period** (source: World Bank, 2010). On 31 December 2010, private and public Japanese players as a whole held 105 million credits (source: SEF report transmitted to the UN on 26 April 2011).

Assuming that purchases continue at the same pace during the last years of the Kyoto period, their demand could lie between 175 and 245 million credits. This estimate will need to be revised with regard to recent events, which may well affect the energy mix and economic growth in Japan, and thus its emissions. Although it is not envisaged that Japan will bring the Kyoto protocol into question, a number of private/public Japanese actors could seek to reduce the cost of their compliance:

- by selling off credits to buy AAUs, thus benefiting from the difference in price between these two assets: around 4€ at present. This possibility, which would reduce the demand for Kyoto credits, remains to be confirmed.
- by selling their "high quality" primary CER positions to become purchasers of CER not eligible in EU ETS phase 3 (see below).

In view of this information, we estimate the low range of credit use by Japanese actors at 200 Mt over the 2008-2012 period.

1.2 Post -2012 demand for Kyoto Credits

1.2.1 EU ETS

a) Quantitative restrictions, 20% reduction scenario (with no international agreement as regards the climate and energy package)

[2] Source: SEF reports transmitted by the countries to the UN on 20 April 2011; not all the reports are yet available, but those of the principal requesters are (Spain, Italy, the Netherlands and Austria).

Only the balance of unused credits authorised for the 2008-2012 period (phase 2) can be used between 2013 and 2020. If the national limit is lower than 11% of the total national allocation, a number of credits will be added, corresponding to the difference between the use rate of phase 2 and this rate of 11%, multiplied by the number of phase 2 allowances[3].

These provisions will raise the ceiling for use of Kyoto credits in phase 3 by 93 Mt, **bringing the ceiling for the entire 2 and 3 periods (2008-2020) to 1,511 Mt for EU ETS installations (1 543 Mt by adding potential demand from airline companies in phase 2).** This ceiling is further increased by:

- the possibility for **the newly included sectors in EU ETS phase 3** (production of organic chemicals, hydrogen, ammonia and aluminium) of using credits of at least 4.5% of their verified emissions during 2013-2020. With the conservative assumption that verified emissions will correspond to the allowances distributed, **we estimate the potential for credit use at a minimum of 36 Mt**.

- the possibility for **new entrants[4] in phase 3** to use credits of at least 4.5% of their verified emissions between 2013 and 2020. With the conservative assumption that verified emissions will correspond to the allowances set aside for the reserve to new entrants, **we estimate the potential for the use of credits at a minimum of 34 Mt**.

- the possibility for airline companies to use credits of at least 1.5% of their verified emissions. Assuming that their emissions correspond to their allowances, the **minimum potential for the use of credits could be 25 Mt** in phase 3. *We should note the existence of disputes between non-European airlines and the public authorities in charge of transposing the aviation directive. These could result in the cancellation of part of the demand for credits.*

All in all, in a 20% reduction scenario, **the technical demand coming from EU ETS over the entire 2008-2020 period is estimated at 1,638 Mt (188 Mt more than in the 2008-2012 phase).** In practice, we still estimate (see section 1.1.1) that around 20% of this technical demand might not materialise for the installations of EU ETS phase 2; however, we assume that the other sectors of phase 3 will use their entire potential: **in the end, the lower range of credit demand between 2008-2020 comes down to 1330 Mt.**

[3] This minimum of 11% could be raised (according to conditions to be verified) for installations that received only a few free quotas in phase 2. However, the impact of this measure on total demand should remain a minor one.

[4] Including the new entrants of phase 2 benefiting from neither free allowances nor the option of using credits in phase 2. We are making the conservative assumption that the corresponding credit demand is zero, as the number of installations concerned should be very low, and will not significantly change the overall demand.

b) Quantitative restrictions, 30% reduction scenario (with international agreement as regards the climate and energy package)

The percentage of credits authorised can be revised to cover up to 50% of the additional emission-reducing efforts demanded. The Directive only stipulates this provision for industrial installations present in phase 2.

However, we have applied this reasoning to all sectors and installations in phase 3, estimating that a further effort to reduce emissions would give rise to a political negotiation during which all the sectors would demand to be treated identically. But we have not raised the technical constraint on the use of credits by the aviation sector. This is considered separately in European texts, essentially because of its separate status in international climate negotiations. We therefore consider that even if Europe increases its internal efforts to reduce emissions, it cannot politically go any further as regards the constraint imposed on this international sector.

In the end, this scenario results in a further potential use of credits of 771 Mt, implying **a maximum total use of 2,222 Mt for the entire 2008-2020 period.**

In the same way as with the 20% reduction scenario, we estimate an actual demand lower than the technical demand for the industrial installations covered in phase 2. In this conservative scenario, we also consider that a higher credit import ceiling should not apply to the installations not included in phase 2 (and thus that it is maintained as regards the technical constraint imposed in the 20% reduction scenario). **All in all, our low estimate for the use of credits in the 2008-2020 period comes to 1,774 Mt**.

c) Qualitative restrictions, 20% reduction scenario (with no international agreement as regards the climate and energy package)

Only the following can be used in phase 3:

- **credits (CER or ERU) arising from projects registered before 2013 and compatible with the conditions of use in phase 2.** The corresponding emission reductions can take place in phase 2 or 3. In practice, credits must be converted into phase 3 quotas at the request of the competent authority. The request for conversion is only possible up to 31 March 2015 for credits corresponding to emission reductions before 31 December 2012.

- **CER credits (only) arising from projects "launched"(*sic*) as from 2013 in the least developed countries (LDCs)**[5], which concern the same type of projects accepted in phase 2, until the ratification of an agreement between these countries and the European Union or 2020 at the latest.

- **credits whose use is defined by possible bilateral agreements between the European Union and third countries**. It is specified that these agreements could stipulate only the issue of credits to projects whose reference scenario integrates

[5] See the list on: http://www.unohrlls.org/en/ldc/related/62/

emission levels as least as stringent as the benchmarks chosen for the free allowance in the EU ETS or the standards imposed by European legislation.

- **credits or quotas arising from domestic projects** (art. 24b of the EU ETS Directive), with no limitation as to quantity laid down at this stage.

To date, the European Commission has not drawn up a schedule for introducing bilateral agreements and domestic projects.

On 25 November 2010, the European Commission also proposed limiting the types of credits that can be used in the EU ETS from 2013. Credits arising from projects to reduce HFC 23 and N_2O linked to the production of adipic acid will no longer be accepted for the compliance of installations, as from 1 May 2013.

d) Qualitative restrictions, 30% reduction scenario (with international agreement as regards the climate and energy package)

As from 1 January 2013, CDM credits accepted within the EU ETS can only come from countries that have ratified the international agreement.

1.2.2 European member states

a) Quantitative restrictions, 20% reduction scenario (with international agreement as regards the climate and energy package)

Each year, Member States can use credits to the order of 3% of their verified 2005 emissions excluding the ETS and excluding forestry emissions, i.e. 740 Mt over the period. Twelve Member States can use a further 1% but only for credits arising from projects developed in LDCs or small island developing states (SIDS)[6]. **These 52 million in additional credits help to bring the potential demand of States to 792 Mt over 2013-2020**.

Credits arising from potential domestic projects are subject to no limitations.

We believe that as in the 2008-2012 period, States will seek to limit their credit purchases to ensure their compliance, so as not to dig into their budgetary resources. Their real demand will depend on the gap between their objectives and their real emissions. **As an initial calculation, we estimate an actual demand 50% lower than the potential, i.e. 396 Mt over the 2013-2020 period.**

b) Quantitative restrictions, 30% reduction scenario (with international agreement as regards the climate and energy package)

The Directive indicates neither the additional quantity of usable credits, nor the procedure that might possibly fix it. However, we can assume that a higher emission reduction target will entail the authorisation to use additional credits. If, as with the EU ETS, half the effort can be covered by credits, additional demand would come to 373 Mt, i.e. a total of **1,165 Mt over the 2013-2020 period.**

[6] See the list on: http://www.un.org/special-rep/ohrlls/sid/list.htm

As with the previous 20% reduction scenario, we have considered that part of this potential will not be used: **the actual demand is estimated to be lower by 50% i.e. 396 Mt over the 2013-2020 period.**

c) Qualitative restrictions, 20% reduction scenario (with no international agreement as regards the climate and energy package)

The credits used by the Member States could arise from:

- projects registered before 2013 and compatible with the rules for use in EU ETS phase 2,
- projects carried out in LDCs and compatible with the rules in phase 2 until the signature of an agreement with these countries (by 2020 at the latest),
- projects developed as part of possible agreements with third countries.
- reforestation or afforestation projects **(temporary CER credits),** if these credits are renewed or replaced by credits with permanent validity when they expire.

In the absence of an international agreement on 31 December 2010, the Commission was tasked with studying the inclusion in community objectives of the land-use and forestry sector. Its report is expected before 30 June 2011. The options discussed included a specific mechanism for forest sector emissions, which can be extended on an international scale (sector-based mechanism) or their inclusion in the objectives of Member States apart from the EU ETS.

The qualitative restriction of usable credits in EU ETS phase 3 does not apply to Member States. Some States have nevertheless announced, on a voluntary basis, that they will not use credits forbidden in the EU ETS (Denmark, Austria, Belgium, Estonia, Germany, Greece and the UK). Furthermore, States using credits not authorised in the EU ETS must provide "detailed reasons" in their annual report to the Commission on their emissions and the achievement of their objectives.

d) Qualitative restrictions, 30% reduction scenario (with international agreement as regards the climate and energy package)

In the event of an international agreement, as from 1 January 2013, credits used by Member States could only come from countries that have ratified the international agreement.

1.2.3 Other countries

The use of Kyoto credits by other countries after 2012 remains uncertain. Among the existing quota exchange systems, the Japanese voluntary systems could help to maintain demand, but one that is lower, because the Japanese government is seeking to develop bilateral agreements to supply itself with credits. The New Zealand quota exchange system is the only compulsory system to authorise Kyoto assets (AAU, CER, ERU and RMU)[7]. It also accepts the use of national forestry credits, limiting the demand for Kyoto credits.

[7] Except for temporary forestry credits arising from CDM and ERU projects and CER arising from nuclear projects and non-recognised foreign AAU/RMUs (*sic*).

We thus estimate the range of use for Kyoto credits in the Japanese and New Zealand markets to lie between 0 and 12 Mt per year i.e. 0 to 96 Mt over the 2013-2020 period.

All the other systems currently being developed stipulate the possible use of not only Kyoto assets but also domestic project mechanisms, which could enter into competition with the use of Kyoto credits. There are two notable exceptions:

Australia, whose current project (not approved) only authorises CER; this position seems difficult to maintain, as it is isolated among the Asia-Pacific zone projects.

California, which does not authorise Kyoto credits and is planning for positive lists of labelled projects, with a predilection for projects developed on the American continent.

Some quota exchange systems projects include the possibility of using forestry credits, particularly those arising from projects for combatting deforestation. It is also possible that NAMA (Nationally Appropriate Mitigation Action) systems, which issue carbon credits, could be used by States to achieve their 2020 reduction objectives.

1.3 Assessment of Post-Kyoto credit demand

Table 1 shows an estimate of the potential use of Kyoto credits between now and 2020. The results do not include potential demand in credits or quotas arising from domestic projects.

Table 1 – Estimate of Kyoto credit demand from 2008-2020

		2008-2012 (in Mt)		2013-2020 (in Mt)			
		Low scenario	High scenario	-20 % scenario low	-20 % scenario high	-30 % scenario low	-30 % scenario high
EU ETS	**Installations existing in phase 2**	**1 135**	**1 419**	**74**	**92**	**518**	**648**
	Sectors included in phase 3			**36**		**36**	**67**
	New entrants in phase 3			**34**		**34**	**32**
	Aviation	**26**	**32**	**25**			
	EU ETS total per sub-period	1 160	1 451	169	188	614	771
	Total EU ETS for 2008-2020			*1 330*	*1 638*	*1 774*	*2 222*
Other demand	**European Member States**	**238**	**584**	**396**	**792**	**583**	**1 165**
	Japan	**200**	**372**	**0**	**80**	**0**	**80**
	Other countries	**0**		**0**	**16**	**0**	**16**
Total per sub-period		**1 598**	**2 407**	**565**	**1 076**	**1 196**	**2 032**
Total 2008-2020				***2 164***	***3 483***	***2 795***	***4 439***

Source : CDC Climat Research.

The uncertainty in the demand for Kyoto credits between 2008 and 2020 is due mainly to a possible in the EU ETS reduction target from -20% to -30% and for Member States, economic growth.

1.4 Comparison with other analyses

We have compared our analyses with those of two major financial analysts, Point Carbon and Orbeo. All the analyses are shown in Table 1 next page.

To be noted, concerning the actual credit demand in the EU ETS between 2008 and 2020:

- the estimated technical constraint is similar, except for the Point Carbon 30% reduction scenario resulting in a higher demand, up by 1 Gt. The difference probably comes from the fact that Point Carbon adds other types of credit, to the demand for Kyoto credits, such as credits resulting from bilateral agreements between the European Union and third countries.

- our low estimate of actual demand (1.3 to 1.8 Gt for the 20% and 30% reduction scenarios respectively) does not differ fundamentally from that of Point Carbon (1.4 and 2.5 Gt) and Orbeo (1.2 Gt in both scenarios, due to the expected insufficiency of the supply of credits compatible with the EU ETS).

The views of analysts as regards demand outside Europe vary a great deal more because of uncertainties. Point Carbon does not integrate constraints linked to the purchase of credits (even if Kyoto credits are not sufficient, other types of credit can be mobilised by States), while Orbeo adopts a very cautious approach by limiting the demand to the quantities of Kyoto credits they anticipate. The minimum demand is thus estimated as between 2.0 Gt (Orbeo) and 2.4 Gt (Point Carbon), with our estimate lying between the two (2.2 Gt). The same goes for the maximum demand: between 2.2 Gt (Orbeo) and 3.9 Gt (Point Carbon), with our estimate being 2.8 Gt.

Table 1 – Comparison of the CDC Climat Research, Point Carbon and Orbeo scenarios as regards Kyoto credits from 2008 to 2020

CDC Climat Research	**2008-2012**	**2013-2020**				**Comments**
		-20% scenario low	20% scenario high	-30% scenario low	-30% scenario high	
EU ETS	1 160- 1 451	169	188	614	771	
EU ETS total for 2008-2020		*1 330*	*1 638*	*1 774*	*2 222*	
Etats membres européens	238-584	396	792	583	1 165	
Japan	200-372	0	80	0	80	
Other countries	0	0	16	0	16	
Total	**1 598 - 2 407**	**565**	**1 076**	**1 196**	**2 032**	
Total 2008-2020		***2 164***	***3 483***	***2 795***	***4 439***	

Point Carbon	**2008-2012**	**2013-2020**				**Comments**
		-20% scenario low	-20% scenario high	-30% scenario low	-30% scenario high	
EU ETS						The high 20% and 30% reduction scenarios result in demand ranges of 1.7 - 1.8 and 2.7 - 2.8 Gt respectively. They are then corrected by a factor of non-use of the potential (80% to 90% of the demand)
Total EU ETS 2008-2020		*1 400*	*1 750*	*2 500*	*2 750*	
European Member States	300-500	400		800		
Japan	300	0-1 000				Including other assets than Kyoto
Australia, Canada and United States	600-800	0-600				Including other assets than Kyoto
Total		**400-2 000**		**800-2 400**		
Total 2008-2020		***2 400***	***4 550***	***3 900***	***5 950***	

Orbeo	**2008-2012**	**2013-2020**				**Commentaires**
		-20% scenario low	-20% scenario high	-30% scenario low	-30% scenario high	
EU ETS	658	570		570		2013-2020 demand limited by the unavailability of credits meeting quality requirements. The high scenarios (supply with no constraints) are only given for the entire 2008-2020 period
EU ETS total for 2008-2020		*1 228*	*1 750*	*1 228*	*2 195*	
European Member States	268	732		940	1 032	Only half the additional use of credits can be covered in the 30% reduction scenario because of the deficit of credits in the market
Japan (State and private companies)	83	0		0		Post-2012 demand in other markets is too uncertain to be used in the model
Total	**1 009**	**1 302**		**1 510**		
Total 2008-2020		***1 960***	***2 482***	***2 168***	***3 227***	

2. Carbon credits supply

2.1 Estimates of expected amount of JI carbon credits

The issuing of JI credits is based on the AAUs of Annex B countries. In principle, this can take place throughout the first commitment period of the Kyoto protocol (2008-2012), and could be extended until the end of the compliance period in mid-2015.

On 1st April 2011, 249 JI projects had been registered, and 171 were in the process of being registered. The actual quantity of ERU credits issued was 114.8 million. If the issue of ERUs continues at the same rate, **it is estimated that the total supplied during the 2008-2012 period will reach at least 164 million credits, and 245 million credits if the trend is maintained till mid-2015**.

There is, however, a significant risk that some states may try to sell as many surplus AAUs as possible as ERUs, with a higher market value, and thus increase the rate at which additional credits become available on the market. The risk is all the greater as:

- no international decision has yet been agreed which would specify how to deal with residual AAUs;
- the JI includes a process known as Track 1, which allows sovereign states to determine the quantity of ERUs they wish to allocate to emission reducing projects.

Russia in particular, which up to now has not taken a very active role in the JI mechanism, has announced that it wishes to sell 300 million AAUs as ERUs. The other main potential suppliers are the Ukraine and Central and Eastern European countries, with a potential in the order of 100 million credits. **We therefore estimate that the supply of JI credits is between 245 and 645 million by 2015**. There is also the probability of an even greater number of ERUs reaching the market; this cannot be calculated yet, but our estimate of the volume of the potential surplus of AAUs exceeds 8 billion between 2008 and 2012.

In the absence of an international agreement for the post-Kyoto period, we have been unable to estimate the potential supply of JI credits after 2015.

2.2 Estimates of the actual quantity of expected CDM credits

2.2.1 Methodology

The potential supply of CDM credits was estimated from the emissions reductions found in project descriptive documents (Project Design Document or PDD) for all registered CDM projects (2,867 projects) or projects in the process of being developed (7,212 projects).[8]

[8] Unless otherwise mentioned, the number of projects and their corresponding estimated emission reductions in this section are based on data available on the 1st March 2011.

A more refined estimate, known as **risk-adjusted supply**, is calculated from a model developed by the CDC Climat Research, using empirical data published by UNEP-Risoe. It integrates the sectoral and geographical characteristics of a project and determines:

- the risks and the delays in registering the project with the United Nations. The projects are assigned a validation delay (347 days on average) and a registration delay (173 days on average), thus specifying the date of the actual supply of credits.

- the actual project performance in terms of emissions reduction (on the basis of the verifications carried out in order to obtain credits).

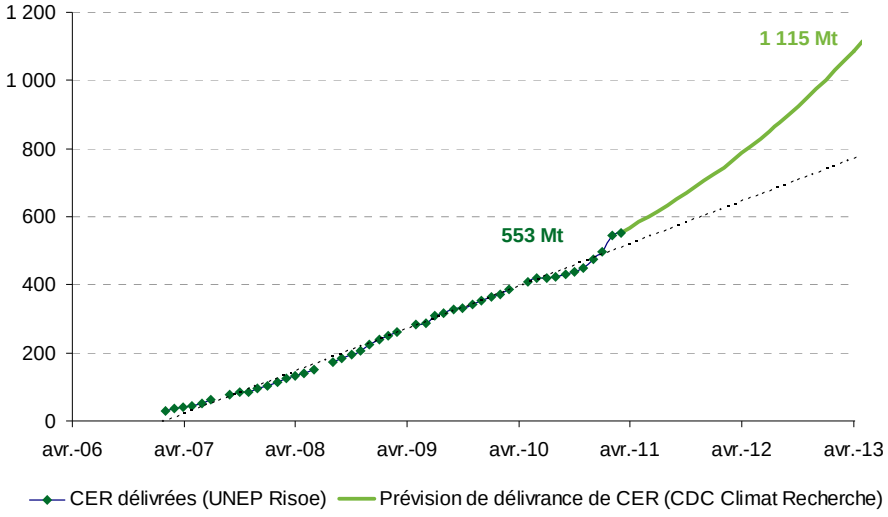
The risk-adjusted supply is also calculated by assuming that projects whose seven year accounting period ends before 2012 are reviewed by the UN using the same parameters, unless otherwise mentioned. The calculation also takes into account new projects entering the UN registration process.

2.2.2 Results

The potential quantity of CDM credits supplied is estimated to be around 2.8 billion by 1st January 2013, 1,985 million of which come from projects already registered with the UN. **At a 2020 horizon, the potential supply of JI credits could reach 8.9 billions.**

Our CDC Climat model estimate for the risk-adjusted supply of credits is 1.1 billion by 30 April 2013, which is the timeframe for compliance of installations under EU ETS (see Figure 1, light green line). This is slightly more than the second estimate obtained from a linear projection of the actual supply of UN credits, which is slightly more than 800 Mt by end of April 2013 (see Figure 1, dotted line on the right). **By 2020, our estimates suggest that the risk-adjusted supply would reach 7 billion credits.**

Figure 1 – Estimate of cumulative supply of CDM credits by March 2013



Source: CDC Climat Research model, based on CDM Pipeline UNEP-Risoe, 1st March 2011.

2.3 Impacts of the main Cancun decisions relating to credits supply

The December 2010 Cancún conference adopted two decisions to take immediate effect:

- **Setting up of a loans programme for countries with less than ten projects registered as of 31 December 2010**. These loans will be funded by revenues from investments made by the CDM Trust Fund and through voluntary donations. They will cover the cost of developing PDDs, of validating the projects and of initial verifications. UNFCCC Secretariat will oversee the programme.

- **Bringing forward the date of the beginning of the project to that of the registration application date**. Project promoters will no longer be penalised for delays occurring between the application and the actual registration. On 18 February 2011, the CDM Executive Council specified that this modality will apply to projects having applied for registration on 11th December 2010 or later.

These two decisions will not have a significant effect on the development of CDM projects and bringing additional credits on the market.

The conference also began the process of ensuring the continuation of the CDM and the JI after 2012. The mandates of the CDM Executive Council and of the JI Supervisory Committee are not necessarily guaranteed by the Kyoto Protocol if there are no commitments to undertake emission reductions, i.e. at present after 31 December 2012.

2.4 Estimate of supply compatible with the EU ETS Phase 3 (2013-2020)

In its Climate and Energy Package, the European Union adopted two types of provisions in order to restrict the use of credits after 2012.

- Geographical restriction for credits offsetting projects set up from 2013 onwards in countries other than LDCs, unless an international or bilateral agreement with the European Union is in place;

- Possibility of limiting the types of refundable credits within the EU-ETS. A first decision was endorsed on 21 January 2011 by the Climate Change Committee, representing all Member States: from the 1st May 2013, credits offsetting HFC-23-type projects and N_2O from adipic acid production projects will be banned. There may be further qualitative restrictions.

2.4.1 Current typology of CDM credits

a) Host countries

China leads the market with 56% of all credits emitted up to 1st March 2011. It should be the biggest supplier of CERs by end of April 2013, with over 60% of CERs issued. India should become the second biggest CER supplier (14% of the supply), followed by South Korea, Brazil and Mexico. Those five countries should supply about 80% of expected CERs by end of April 2013.

The Least Developed Countries (LDC) only represent 0.3% of the risk-adjusted supply between now and end of April 2013, i.e. about 3 million credits.

b) Types of project

Industrial gas incineration technologies (HFC and N_2O adipic acid) represent 68% of CERs issued up to now. They still represent 66% of all credits to be issued by 30 April 2013 (50% for HFC projects and 16% for N_2O adipic acid projects).

2.4.2 Estimate of the EU ETS compatible supply, from 2013 onward

Our model is used to assess the consequences of recent qualitative restrictions. The supply scenario used is pessimistic, as it does not integrate new projects and does not renew the accreditation periods of current projects. Moreover, the model does not take into account programmatic approaches (PoA). A new version of the model is being developed to include new elements and will be available during 2011.

Our estimate is that qualitative restrictions on the types of credits usable for EU-ETS Phase 3 will prevent the use of some 133 million CERs (see Table 2). As a comparison, on 3 February, Deutsche Bank analysts estimates for this amount was 220 million CER, 50 million of which being issued for reductions prior to 1st January 2013.

Other qualitative restrictions could be decided through comitology for Phase 3 of EU ETS. The Commission's Communication of 26 May 2010 indicates that "energy-intensive" sectors which are "exposed to a high risk of carbon leakage" may be affected. Based on this Communication and on the Commission's Decision C (2009) 10251 which gives an indicative list of sectors at risk of carbon leakage, we have classified CDM projects into three categories:

- those excluded after 1st May 2013: HFC, N_2O adipic acid, forestry projects.
- sectors at risk of carbon leakage: cement, mines, etc.
- sectors not at risk of carbon leakage: transport, renewable energy, agriculture, etc.

Table 2 – Impact of qualitative restrictions on CER supply

Sector	CERs issued up to 1st March 2011	CERs expected by 2020	CERs excluded after 1st May2013 (including pre-2013 reductions)	CERs potentially excluded after 1st January 2015
HFC	267	637	90 (13)	
N_2O – Adipic acid	113	233	32 (6)	
Sub-total	***380***	***884***	***133 (19)***	
Sectors at risk of carbon leakage	52	716		240
Sectors not at risk of carbon leakage	122	2 432		1 026
Total	**554**	**4 022**	**133 (19)**	**1 266**

CER quantities are expressed in millions. The scenario used is pessimistic because it does not take into account new projects or renewal of accreditation periods of existing projects.

Source: CDC Climat Research model based on data from UNEP-Risoe, 1st March 2011.

According to our estimates, the projects not at risk of carbon leakage will produce most of the expected CERs by 31 December 2020 (2.4 billion as opposed to 700 million from sectors at risk of carbon leakage). **New restrictions which will affect the sectors at risk on 1st January 2015 should therefore reduce the supply of compatible CDM credits by approximately 250 million tonnes at horizon 2020.**

2.5 Comparaison with other analyses

Table 3 presents a comparison of estimates calculated by Point Carbon, Orbeo and CDC Climat Research. Note that the CDC Climat model is in the process of being developed.

Table 3 – Comparison of estimates from CDC Climat Research, Point Carbon and Orbeo

CER / ERU Supply		2008-2012		2013-2020	2008-2020
		CER	CER+ERU		
Point Carbon	*EU ETS eligible*				*2 900*
	not EU ETS eligible				*400*
	Total	**1 160**	**1 360**	**1 940**	**3 300**
Orbeo			**900**	**2 090**	**2 990**
CDC Climat Research	*EU ETS eligible*			2 534	3 854
	not EU ETS eligible			373	373
	Total	**1 115**	**1 320***	**2 907**	**4 227**

*CER and ERU quantities are expressed in millions. *The estimate used for the ERU supply is 205 Mt, which is the median value of our supply range.*

Source: CDC Climat Research.

Orbeo uses a regression against the historical data for different types of projects and location, but does not publish its methodology in detail. Point Carbon uses a much more complete set of data than the one supplied by UNEP Risoe or other institutes, and includes projects still in the pipeline which have not yet entered the registration process. For projects which are already part of the registration process, Table 4 shows the estimated risks based on the historical data.

Table 4 – Risks estimated by CDC Climat Research and Point Carbon

	Point Carbon	CDC Climat Research
Pre-validation success rate	X	
Delay at validation stage		X
Validation success rate	X	X
Delay at registration stage		X
Success rate at validation stage	X	X
Difference between initial CER estimates from the PD and final number registered	X	
Delay between the beginning of the CER generating period forecast in the PDD and the registration period	X	
Generating success rate : CER generating probability of a project	X	
Duration of certification		X
Performance rate	X	X

Source: CDC Climat Research.

The delays at the validation stage and at the registration stage (calculated by CDC Climat Research) correspond approximately to the delay between the beginning of the CER generating period forecast in the PDD and the registration period (calculated by Point Carbon). CDC Climat Research does not take into account the generating success rate. The new forecasting model will include this datum. These two factors explain the difference between CDC Climat Research and Point Carbon estimates.

CDC Climat Research assumes that none of the projects will have their generating period renewed, and calculates the number of new projects by replicating the previous years up to 2013. Point Carbon is able to add new projects more accurately by using their database of projects in the pipeline. After 2013, Point Carbon believes there will be few new projects and that between 50 and 70% of the projects will have their crediting period renewed.

3. Evaluation

3.1 Estimation in volume

According to our estimates, at horizon end 2012, the demand for Kyoto credits could outstrip the available supply. At horizon end 2020, the supply could catch up with demand, unless the European Union agrees on an increase of its emission reduction targets.

Table 5 – Supply-demand balance at world level, 2008-2020

	2008-2012	2008-2020	
		Low estimate	High estimate
EU ETS Phase 3-compatible supply	1,3	3,9	
EU ETS Phase 3-non-compatible supply		0,4	
Total supply	1,3	4,2	
Low Demand scenario	1,6	2,2	3,5
High Demand scenario	2,4	2,8	4,4

CER and ERU quantities are expressed in billions.

Source: CDC Climat Research.

This global evaluation will need further adjustments to take into account regional constraints on demand.

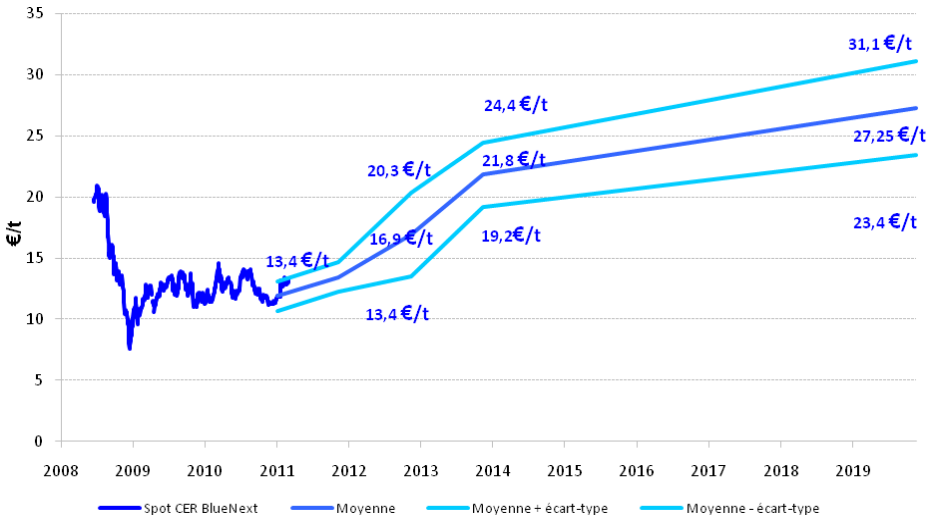
3.2 Price estimates

The Kyoto credit prices anticipated remain below European allowance prices. However the difference between the two sets of assets will vary according to whether the credits originate from projects subject to EU ETS qualitative restrictions or not. Société Générale-Orbeo believes that the price of a credit eligible under the EU ETS could become comparable to the EU allowance price with a difference of between 1 and 1.5€; changes in the price of industrial gas

carbon credits should de-correlate from the EU allowance fluctuations and reach a maximum of 12€ by the end of 2011.

Analysts' current previsions should be used with caution. They are likely to change rapidly with future European Union decisions about additional qualitative restrictions.

Figure 2 – Trend of CER price forecasts (April 2011)



Source: CDC Climat Research-Club Tendances Carbone based on analyses by BlueNext, Barclays Capital, Reuters, Deutsche Bank, Société Générale – Orbeo and Point Carbon.

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