

# THE INTEGRATION OF LULUCF IN THE EU'S EMISSIONS TRADING SCHEME IN A POST 2012 REGIME TO MITIGATE CLIMATE CHANGE

## A REPORT FOR THE SWEDISH ENVIRONMENTAL PROTECTION AGENCY

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## Abbreviations

AAU	Assigned Amount Unit
ARD	Afforestation, Reforestation and Deforestation
BAU	Business as Usual
CCM	Climate Change Mitigation
CDM	Clean Development Mechanism
CER	Certified Emission Reduction (generated through the CDM)
COP	Conference of the Parties (Parties to the UNFCCC)
ERU	Emission Reduction Unit (generated through JI)
ETS	Emissions Trading Scheme
EU	European Union
EUA	EU GHG emission allowances
FCCC	Framework Convention on Climate Change under the United Nations
GHG	Greenhouse gases
JI	Joint Implementation
KP	Kyoto Protocol
LUCF	Land-Use Change and Forestry
LULUCF	Land Use, Land-Use Change and Forestry
MSR	Multi-Stage Regime
NAP	National Allocation Plan (for EUAs)
NC	National Communication
NGO	Non-Governmental Organisation
NIR	National Inventory Report
PAM	Policies and Measures
REDD	Reducing Emissions from (forest) degradation and deforestation
RMG	Rules, Modalities and Guidelines
UNFCCC	United Nations Framework Convention on Climate Change

## Units and Conversions

1 Gg	1 Gigagramme = $10^9$ gramme
1 Gt	1 Gigatonne = $10^9$ tonnes = 1 Pg = $10^{15}$ gramme
1 Pg	Petagramme = 1 Gt
1 Mt	1 Megatonne = 1 million tonnes = 1 Tg = $10^{12}$ gramme
tC	Tonne carbon
TWh	Tera Watt hours ( $10^{12}$ Wh: one trillion watthours)
1 tCO <sub>2</sub>	0.27 tC
1 tC	3.67 tCO <sub>2</sub>

## Limited Glossary

**Banking:** not using units in the commitment period in which they have been generated but taking them across to future commitment periods.

**Fungibility:** the inter-exchangeability of different types of credits. For instance, if all types of credits can be traded and used to get into compliance by all Parties, fungibility is 100%. t/ICERs are examples of credits that are not 100% fungible.

**Swapping:** exchanging one type of unit for another; for instance if ERUs from JI are changed into AAUs the units are swapped. The advantage is that different rules may apply to different kinds of units, e.g. banking.

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## SUMMARY

### Objective

To date the Emissions Trading Scheme (ETS) from the European Union (EU) allows trade in emission reductions generated in particular industries but specifically prohibits trade in emission reductions generated in the land use, land-use change and forestry (LULUCF) sector. This study reviews the possibilities and ramifications of allowing trade in such emission reductions generated in the LULUCF sector and in particular those generated in the forestry sector. The results may assist EU Parties under the United Framework Convention on Climate Change (UNFCCC, or short FCCC) when reviewing the 1<sup>st</sup> phase of the EU ETS and when thinking about a future climate change mitigation (CCM) regime in the post-2012 era: the period following the completion of the 1<sup>st</sup> commitment period under the Kyoto Protocol.

The report is based on the EU directive 2003/87/EC and the associated "linking directive" (2004/101/EC) which allows non-LULUCF credits from Joint Implementation (JI) and the Clean Development Mechanism (CDM) in the approved sectors to be used under the EU ETS. The study reviews in general how integration of LULUCF could work and gives a rough estimation of the order of magnitude that could be contributed by forestry in the EU in several scenarios if LULUCF credits were allowed to be traded under the EU ETS.

### Units and their compatibility

Each Annex I Party of the Kyoto Protocol (KP) has a maximum allowed amount of greenhouse gases (GHG) which may be emitted during the 1<sup>st</sup> commitment period (CP1: 2008-2012) of the KP: the assigned amount (AA). In order not to exceed this AA Parties must reduce net emissions and/or enhance removals. To assist Annex 1 Parties to meet their obligations cost-effectively, the KP has established three flexible mechanisms: an emissions trading system (Article 17) which will become operational in 2008 and two project-based mechanisms: Joint Implementation (JI: Article 6) and the Clean Development Mechanism (CDM: Article 12). Besides these, other articles of the KP that are relevant to LULUCF are articles 3.3 and 3.4: respectively afforestation, reforestation and deforestation (ARD); and additional activities under art.3.4 including forest management (FM).

Article 3.3 or 3.4 can generate Removal Units (RMUs: 1 RMU = 1 metric tonne of CO<sub>2</sub> equivalent). Accounting for ARD is mandatory, whilst FM needs to be elected by Parties for CP1.

Certified Emission Reductions (CERs) can be generated through the CDM by reducing emissions or increasing removals against a monitored baseline on project level and also equal 1 metric tonne of CO<sub>2</sub> equivalent. Once generated, these credits can be transferred to an "acquiring entity", e.g. a country or an investor. CERs can be added to the AA for compliance purposes. CERs can also be "surrendered" into the EU ETS.



CERs generated through afforestation or reforestation, the only eligible CDM activities in the LULUCF sector in CP1, are referred to as either temporary CERs (tCERs) or long-term CERs (lCERs). The main differences are that: tCERs expire at the end of the next commitment period, whilst lCERs expire at the end of the project; and, lCERs need to be replaced by the owner, the Annex I Party, if the project fails to maintain the level of carbon sequestration on the basis of which the credits have been issued, whilst in the case of tCERs the appropriate amount of tCERs is not renewed during the next verification.

CDM credits that are transferred to Annex I Parties do not lead to a reduction of the AA of the host country because only non-Annex I countries can host CDM projects and they do not have a target.

JI projects are undertaken by Annex I countries, mainly between an Annex II Party and an economy in transition (countries that have both accepted an emission reduction target). The implementation of a JI project results in a transfer of Emission Reduction Units (ERUs equalling 1 metric tonne of CO<sub>2</sub> equivalent) from one country to the other, but the total emissions permitted in the countries remains the same (a "zero sum transfer").

The key difference between credits generated by JI and under the CDM is that while the CDM generates **additional** emission rights that flow into the emissions trading system, a JI project establishes a transfer of emission rights from one Annex I party to another. In essence, the CDM raises the cap established by the KP for all Annex I Parties together, while JI is a transaction within the cap.

From the above it can be concluded that RMUs are equal to AA units, as are ERUs. The only two that differ are tCERs and lCERs.

### **The Emissions Trading Scheme of the European Union**

In an effort to ensure collective compliance with the KP targets by all EU member States, the EU instituted a European Emissions Trading Scheme (EU ETS), creating an EU internal cap-and-trade system in emission reductions, in line with article 17 of the Kyoto Protocol. Under this system absolute quotas are issued to emitters and allowances can be bought and sold. Allowances are created by the National Allocation Plans but on the national level these allowances have to fit in with the emission reduction target of the individual country.

The EU ETS is defined through Directive 2003/87/EC. In April 2004 the Directive was amended by the 'Linking Directive' (2004/101/EC), which provides for the use of CDM and JI credits for compliance use within the EU ETS. Both Directives explicitly exclude the trade of credits generated in the LULUCF sector during its 1<sup>st</sup> phase (up to 2008), and possible amendments for the 2<sup>nd</sup> phase (2008-2012 (CP1)) must be based on a Commission review.

Member States remain free to decide whether and how to limit the number of CDM and JI credits that businesses or firms can buy, whilst respecting the principle of complementarity that was agreed in Article 17 of the Kyoto Protocol. CERs can be used from 2005 onwards and ERUs from 2008. The percentage of the allocation to each installation must be specified by each Member State in its National Allocation Plan (NAP).

Although credit from LULUCF activities cannot be used during the 1<sup>st</sup> phase of the EU ETS, Article 30.2 of directive 2003/87/EC should have triggered a review process to be conducted by the European Commission for the further development of the EU ETS. In that article, and through



article 1.8 of the Linking Directive, the Commission was asked to, amongst other things, review the issues surrounding LULUCF credits, with particular reference to the temporary nature of credits. The commission was to "submit this report [read: report on the review. Eds] to the European Parliament and the Council by 30 June 2006, accompanied by proposals as appropriate". However, to date no document has come forward, at least not in the public domain. The implication is that the entire process is delayed with at least a year. This delay is particularly regretful because an amendment to the Directive, and the process of transferring that into domestic legislation in the EU Member States, is a lengthy process. Consequently, it is unlikely that the Directive will change before the start CP1 (only 1½ year away from now). This means that no major push for JI and/or CDM project activities can therefore, be expected as a result of an amendment to the Directive and that the impact of such a change will be limited to domestic activities: only the number of RMUs that could be used in the EU ETS could potentially go up for CP1. Most impact should be expected for the period beyond the 1<sup>st</sup> commitment period. Furthermore, this is an additional missed opportunity because allowing LULUCF credits into the EU ETS will contribute to strengthening the effectiveness of the EU ETS: it is the temporary nature of the LULUCF CDM credits which provides operators of EU ETS installations with the additional flexibility which will benefit the system as a whole (Climate Focus, 2006).

If text amendments were to be formulated they would be relatively simple and limited to three clauses: 1) a definition of tCERs would need to be included; 2) the clause that explicitly excludes the use of LULUCF needs to be deleted; and 3) a clause would need to be introduced to ascertain the tCERs once they expire. For the exact wording of the clauses see section 4.3 of this report.

#### **The possible scale of LULUCF in the 1<sup>st</sup> commitment period**

As it stand in spring 2006, forest management under Art.3.4 will definitely be used by 6 countries (Denmark, France, Ireland, Portugal, Sweden and the United Kingdom) whilst Belgium, Finland and the Netherlands will definitely not use forest management. At the time, Austria, Greece and Ireland were undecided. The new Member States do not need to decide until the end of this year. According to the estimates of the countries itself, dating back to 2000 this will only contribute 178.005 Gg CO<sub>2</sub> during the entire CP1 (UNFCCC, 2000).

The number of JI LULUCF projects that has been initiated to date is extremely low, resulting in a very small number of LULUCF ERUs in CP1, if any at all.

The number of forestation projects that has been approved under the CDM is also very small (4 to date). Considering trees take time to grow also in terms of tCERs the expectations are extremely low for CP1.

In conclusion, the scale at which LULUCF can contribute to compliance during the 1<sup>st</sup> commitment period is limited. Consequently the risk that LULUCF credits will push other options out of the market is very small and should therefore, not be a barrier for the inclusion of LULUCF under the EU ETS. On the other side of the equation, even though the credits might be few, allowing such credits into the EU ETS could mean an important push domestically for good forest management.

#### **The possible scale of LULUCF beyond the 1<sup>st</sup> commitment period**

A possible amendment to the Directive, now or in the future, may make LULUCF project activities more interesting for investors in the long term. Therefore, it is interesting to look at the study of

the European Forestry Institute (EFI) that made an assessment of the potential for forest management in Europe up to 2050. Four 'what-if' scenarios have been studied that try to predict the consequences of different management policies in combination with different demand for harvested wood (Nabuurs, 2003). The study shows that over time forest management under Article 3.4 could contribute to achieving climate change mitigation (CCM) targets. Projections in most scenarios show a continuous build-up of growing stock, with a gross annual increment reaching a level of around  $4.8 \text{ m}^3 \text{ ha}^{-1} \text{ yr}^{-1}$  in 2050 providing a total increment varying between 637 million  $\text{m}^3 \text{ yr}^{-1}$  in the maximum sustainable production scenario and 729 million  $\text{m}^3 \text{ yr}^{-1}$  in the multi-functional scenario. This confirms the future continuation of the difference between increments and fellings. If fellings remain at the current total level of just under 400 million  $\text{m}^3 \text{ yr}^{-1}$ , which is the business as usual scenario, the average growing stock in Europe will rise from 137 in 1990 to 226  $\text{m}^3 \text{ ha}^{-1}$  in 2050. If the fellings rise to 450 million  $\text{m}^3 \text{ yr}^{-1}$  by 2030, as foreseen in one of the scenarios, then the average growing stock in Europe for all forests (managed and set-aside) still rises to 218  $\text{m}^3 \text{ ha}^{-1}$  in 2050, with total dead wood in this scenario amounting up to 83 million  $\text{m}^3 \text{ yr}^{-1}$  in 2050. The study further shows that within the limits of sustainable forest management there are opportunities, in most of the countries, for increased economic utilisation of harvesting possibilities while at the same time ensuring the nature conservation objectives. (Nabuurs, 2003) Hence, depending to some extend on the developments regarding future CCM regimes and methodologies to account for harvested wood products the contribution of article 3.4 in future could be moderate to significant.

### **Forestry and future climate change mitigation regimes**

The inclusion of sinks in a future CCM regime is important because article 2 of the UNFCCC cannot be achieved if sinks are not included; currently, tropical deforestation still accounts for a significant amount of the global carbon emissions. If the role for LULUCF is to increase in future there are two possible avenues that should be used in parallel: 1) extent the list of participating countries that can use LULUCF (non-Annex I countries); and, 2) broaden the list of eligible activities beyond afforestation and reforestation. This implicitly means that accounting for improved forest management or reducing emissions from forest degradation or deforestation in non-Annex I countries should be considered again.

Besides the fact that reducing emissions from the forestry sector has climate benefits, it is also clear that wise forest management is the best way to conserve all forest functions and values. They are conserved best if the forest is used in a sustainable manner and actively managed. Promoting the sustainable use of forests can be assisted by allowing LULUCF credits under the EU ETS - not just from the EU's own Member States but also from outside the EU. An additional advantage of such an inclusion is that the collective target can be higher if LULUCF is included.

In the case that no agreement can be reached regarding a future CCM regime, emitters/installations or projects generating LULUCF credits will look at the EU ETS as the sole market for the credits. To continue to provide incentives to good forest management in such a scenario it would be beneficial to create tough targets under the EU ETS, to simplify the rules, modalities and guidelines and to broaden the list of eligible LULUCF activities.

### **Linking the EU ETS to other emissions trading schemes**

The EU ETS Directive recognises the potential cost effectiveness of linking the EU ETS to other GHG trading schemes in Article 25 and the directive paves the way for agreements to be made for mutual recognition of allowances with third countries listed in Annex B to the KP that have also ratified the KP. Potential economic benefits arise from the creation of a larger emissions trading



market. Giving access to a greater range of emission abatement opportunities should allow GHG targets to be met at lower overall cost. A larger market should also be more liquid and therefore, more efficient in allocating resources in the most cost-effective way.

Design features that are relevant for possible linking of different ETSs include: coverage of the scheme (sectors and emitters), mutual recognition of trading units (maximum fungibility), absolute vs. relative targets, stringency of the scheme (it must be environmentally effective), initial allocation method and update, banking rules (transferring left-overs to future CPs), monitoring/reporting and verification requirements, and the penalty regime.

There are quite a number of options to link the EU ETS to other domestic or regional trading schemes. Only in the case units are transferred out of the EU ETS into a country that has not ratified the KP problems may arise from 2008 onwards once CP1 starts: transfers would then imply that AAUs have to be cancelled.

Linking schemes may strengthen initiatives at the national and sub-national level as it reduces overall abatement costs which may assist the international negotiations: if all Parties benefit, the willingness to act will go up. Linking schemes may also have that added bonus that the overall quality of the schemes will go up as some schemes will need to be improved to be able to meet a particular standard before they are allowed to join in. On the down-side, all systems now work with a selection of emitters and sectors and as the current allocations induce very low reductions in the covered sectors, an additional burden is put on the non-covered sectors.

### **Next steps**

In order to move the process forward, a number of recommendations have been made. First of all EU Member States should seek clarification from the Commission what the status is of the review of the 1<sup>st</sup> phase of the EU ETS. Subsequently, EU Member States should request the inclusion of LULUCF in the 2<sup>nd</sup> phase of the EU ETS. The National Allocation Plans (NAPs) for the 2<sup>nd</sup> phase could then take on tougher targets to stimulate action and to avoid the extra burden on emitters and installations not included under the NAP. EU Member States should also start to investigate how it can benefit optimally from the LULUCF sector in future without jeopardizing the achievement of non-climate change related objectives in its forestry sector, such as landscape aesthetics, protection of bio-diversity and watershed functions, energy crop production, etc. One way of benefiting to a larger extent, both Annex I as well as non-Annex I, is to extend the list of eligible LULUCF project activities, predominantly under the CDM, and predominantly in the area of reducing emissions from forest degradation and deforestation (REDD). And finally, links with other emission trading schemes, such as those of Switzerland and Norway, could be explored and pursued in the near future.

**In conclusion** it can be said that LULUCF can contribute to cost-effective climate change mitigation; that its full potential will not be deployed in CP1 under the current structure and process under the EU ETS; that efforts should start soon to improve the situation for the post-2012 era; that broadening the list of eligible activities is an important step in optimizing the utilisation of LULUCF; and, that both industrialised and developing countries can benefit from such an approach, while providing stronger positive incentives towards good forest management in all countries.





# 1 INTRODUCTION

## 1.1 Objective

To date the Emissions Trading Scheme (ETS) from the European Union (EU) allows trade in emission reductions generated in particular industries but specifically prohibits trade in emission reductions generated in the land use, land-use change and forestry (LULUCF) sector. This study reviews the possibilities and ramifications of allowing trade in such emission reductions generated in the LULUCF sector and in particular those generated in the forestry sector. The results of this study may assist EU Parties under the United Framework Convention on Climate Change (UNFCCC, or short FCCC) when reviewing the 1<sup>st</sup> phase of the EU ETS and when thinking about a future climate change mitigation (CCM) regime in the post-2012 era: the period following the completion of the 1<sup>st</sup> commitment period under the Kyoto Protocol.

## 1.2 Scope

This study reviews the EU ETS as it stands today (summer 2006) in the LULUCF context set by the agreements made at Marrakech and Milan (the 7<sup>th</sup> and the 9<sup>th</sup> Conference of the Parties (COP) to the UNFCCC) that led to the entry into force of the Kyoto Protocol in February 2005. It is based on the EU directive 2003/87/EC and the associated "linking directive" (2004/101/EC) which allows non-LULUCF credits from Joint Implementation (JI) and the Clean Development Mechanism (CDM) in the approved sectors to be used under the EU ETS.

When reviewing the incorporation of emission reductions generated in the LULUCF sector in the post-2012 era this study does not elaborate all possible architectures for future climate change mitigation regimes but in general reviews how integration might work in future. This is so as not to prejudge ongoing debates related to the architecture of a future CCM regime or pre-empting particular architectures at this stage of the debate.

In addition, this study does not make a full assessment of the potential of the forestry sector within the EU in terms of offsetting emissions in non-LULUCF sectors, but gives a rough estimation of the order of magnitude that could be contributed by forestry in the EU in several scenarios if such credits were allowed to be traded under the EU ETS.

## 1.3 Description

The report starts with an explanation of the articles of the Kyoto Protocol that relate to LULUCF and what the different LULUCF units are that reflect net emission reductions and what the

associated accounting rules are.<sup>1</sup> The report continues with a review of the history of the EU ETS and highlights what the relevant clauses of the directives determine. A comparison will be made between LULUCF units and other units and how those differences play out under the EU ETS. This is to indicate what provisions under the EU ETS would need to be amended if LULUCF credits were to be traded under the scheme. Proposals for amendments to the Directive are presented to facilitate the inclusion of LULUCF under the EU ETS if a decision was made to do so. This chapter will also contemplate in retrospect whether the fear of some Parties in the past that LULUCF credits would "flood the market" was justifiable.

Looking at the EU Member States that have decided to use forest management under Article 3.4 of the Kyoto Protocol to get into compliance in the 1<sup>st</sup> commitment period, a review is made of the possible scale of the use of LULUCF units in the 1<sup>st</sup> commitment period (CP1).

After having looked at the situation for CP1, the forestry sector in a number of EU member states has been analysed in more detail for the purpose of estimating the potential magnitude of the contribution of the sector up till 2050 if more sustainable types of forest management were promoted. Furthermore, the ways and means that EU member states employ to promote more sustainable forest management are presented.

Subsequently, a reflection of possible policy options for CCM regimes for a post-2012 era is presented, in particular in relation to different types of accounting that may emerge. With an estimate of the offset potential of the forest sector in individual member states, an assessment can be made how that sector can contribute to climate change mitigation toward 2050 and how it ties in with the EU burden sharing.

After having dealt with most of the issues on the EU level, a brief elaboration of forestry in the international context post-2012 is presented, completed with a review of some emissions trading initiatives in other parts of the world.

A conclusions and recommendations section completes the report.

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<sup>1</sup> It is assumed that most readers of this report are familiar to some extent with the Kyoto Protocol and the LULUCF provisions. Therefore, only details that are crucial for the correct understanding of the subject of this particular report are explained.



## 2 LULUCF UNDER THE KYOTO PROTOCOL

### 2.1 History of the Kyoto Protocol

In December 1997 Parties to the UNFCCC agreed through the Kyoto Protocol, amongst many other things, that industrialised countries and countries with economies in transition to a market economy – together known as “Annex I Parties” as listed in Annex I to the Kyoto Protocol – were to reduce their overall emissions of six greenhouse gases by at least 5% below 1990 levels between 2008 and 2012, with specific targets varying from country to country. Subsequently most Parties to the FCCC signed the Kyoto Protocol but not all ratified. Some even turned away from earlier commitments, but eventually the Protocol entered into force on 16 February 2005 and now has 155 Parties, including 35 Parties that account for 61.6% of the total carbon dioxide emissions subject to reduction targets.

To assist those Annex 1 Parties in meeting their obligations cost-effectively, the Kyoto Protocol has established three flexible mechanisms: an emissions trading system (Article 17) which will become operational in 2008 and two project-based mechanisms: Joint implementation (JI: Article 6) and the Clean Development Mechanism (CDM: Article 12). JI allows Annex I Parties to implement emission reduction projects (e.g. an energy efficiency scheme) or e.g. projects that increase net greenhouse gas (GHG) removal by sinks (e.g. a reforestation project) jointly with another Annex I Party, and count the resulting emission reduction units (ERUs) against its own target whilst it is being deducted from the assigned amount of the Party hosting the project.

The CDM allows Annex I Parties to implement projects that reduce emissions in developing countries (Parties without quantified emission limitations and reduction commitments or non-Annex I countries) and use the resulting emission reductions that need to be certified by an independent 3<sup>rd</sup> party (CERs: certified emission reductions) to help meet their own targets whilst contributing to the sustainable development of the host country.

A number of articles in the KP are relevant in relation to LULUCF and discussed in the following sections.

### 2.2 Relevant Articles

Although LULUCF activities are explicitly included under the Kyoto Protocol (KP) as a way of meeting reduction targets (Article 3.3, 3.4, and 6 whilst Article 12 is not referring to any sector in particular), several questions remained how to operationalise their inclusion and how to account for

the net emissions and removals within the Kyoto framework. In Marrakech in 2001 rules, modalities and guidelines (RMGs) were agreed for the inclusion of LULUCF activities in Annex I countries and agreement was reached on the basic principles for the inclusion of afforestation and reforestation under the CDM. However, the detailed RMGs for the CDM were not finalised until COP 9 in Milan in 2003.

The agreement reached in Marrakech contained the following elements:

**Box 1: Key features of the LULUCF agreement as laid out in the Marrakech Accords**

At COP 7 (Marrakech, October/November 2001), Parties were able to take a decision on LULUCF and related issues. The rules for LULUCF activities, agreed as part of the Marrakech Accords, include three main elements:

1. A set of principles to govern LULUCF activities;
2. Definitions for Article 3.3 activities and agreed activities under Article 3.4; and
3. A four-tier capping system limiting the use of LULUCF activities to meet emission targets.

The principles in the Marrakech Accords respond to concerns that the use of LULUCF activities should not undermine the environmental integrity of the Protocol. These principles underscore, for example, the need for sound science and consistent methodologies, as well as the importance of conserving biodiversity. They also specify that naturally-occurring removals, including removals as a consequence of indirect anthropogenic effects, should be excluded from the system and that any re-release of greenhouse gases (e.g. through forest fires) must be promptly accounted for.

The extent, to which Parties can account for emissions and removals from specific LULUCF activities, for the first commitment period, is limited by the following four-tier capping system:

**Tier 1:** If a Party's afforestation, reforestation and deforestation activities result in more emissions than removals, then the Party may offset these emissions through forest management activities, up to a total level of 9 megatons of carbon per year for the five year commitment period.

**Tier 2:** The extent to which forest management activities can be accounted for to help meet emission targets beyond 9 megatons of carbon per year, offsetting a possible "ARD debit" from Tier 1, is subject to an individual cap for each Party, listed in the Marrakech Accords. This cap includes joint implementation projects involving forest management.

**Tier 3:** Emissions and removals from cropland management, grazing land management and revegetation can be accounted for to help meet emission targets on a net basis (e.g. changes in carbon stocks during 1990, times five, will be subtracted from the changes in carbon stocks during the first commitment period, in the lands where these activities will take place).

**Tier 4:** Only afforestation and reforestation projects are eligible under the clean development mechanism. Greenhouse gas removals from such projects may only be used to help meet emission targets up to 1% of a Party's baseline for each year of the commitment period. Definitions and modalities for the inclusion of afforestation and reforestation activities under the CDM will be developed by the SBSTA, with a view to recommending a decision to COP 9.

Source: <http://unfccc.int/issues/lulucf.html>

The subsequent debate regarding LULUCF under the CDM centred on quite some issues of which the following four played a dominant role: scale, non-permanence, uncertainty and the question of credibility (Graichen, 2005).

The most relevant here - in the context of trade - is the issue of non-permanence. Reduction strategies in sectors like energy, transport and/or industrial processes directly reduce emissions.



LULUCF activities on the other hand exist of a two-way process: emissions and removals. On one hand CO<sub>2</sub> is removed from the atmosphere and stored in biomass but at the same time, in the same system, carbon is released due to the decay of biomass (e.g. dead leaves and (parts of) trees). The net balance may well be positive but it is always a combination of emissions and removals. This also means that the net balance may be negative at some point in time or that even all carbon benefits achieved by the project activity may be undone. This is where LULUCF differs from all other sectors: emission reductions may not be permanent. Some experts draw a parallel to the delay in emissions from the combustion of fossil fuels and argue that emission reductions in other sectors are rather a delay that a permanently avoided emission and hence, similar to the delay in emissions in the LULUCF sector. But discussing this dichotomy is outside the scope of this report.

### 2.2.1 Article 3.3.

Article 3.3 of the Kyoto Protocol determines that afforestation, reforestation and deforestation (ARD) in Annex I countries must be reported.

### 2.2.2 Article 3.4.

Article 3.4 of the Kyoto Protocol determines that an Annex I Party may choose to account for additional LULUCF activities in the 1<sup>st</sup> commitment period. In future commitment periods accounting for such activities is mandatory. In Marrakech it was agreed that 4 broad categories were added to those defined by Art. 3.3, being: forest management, cropland management, grassland management and revegetation.

### 2.2.3 Article 6.

Article 6 of the Kyoto Protocol determines that Annex I Parties may jointly implement Art.3.3 and Art.3.4 activities, whereby assigned amount units (AAUs) are converted into Emission Reduction Units (ERUs) (see section 2.3 for a description of the units), lowering the host country's allowed emissions level and adding the same amount to the acquiring country's emissions budget.

### 2.2.4 Article 12.

Article 12 of the Kyoto Protocol defines the CDM whereby non-Annex I Parties can assist Annex I Parties in achieving their emission reduction target in a cost-efficient manner, whilst the Annex I Party's investment in such activities shall contribute to the sustainable development of the economy of the host country. Article 12 is not specific about the type of activities that can be undertaken, whilst the other articles all refer to both emissions and removals. In Marrakech it was agreed that only afforestation and reforestation are eligible activities under the CDM for the 1<sup>st</sup> commitment period and only up to the ceiling of 1% of the collective Annex I countries' base year emissions times five.

## 2.3 Accounting Units and Rules<sup>2</sup>

Each Annex I Party has a maximum allowed amount of greenhouse gases which may be emitted during the 1<sup>st</sup> commitment period of the Kyoto Protocol (KP): the period 2008-2012. This is known as the assigned amount (AA). The assigned amount allocated to Annex I Parties is equivalent to its emissions level in the base-year (as listed in the back of the Kyoto Protocol; expressed in terms of CO<sub>2</sub> equivalent) multiplied by the ceiling implied by its quantified emission limitation or reduction commitment as listed in Annex B to the Kyoto Protocol, multiplied by 5 (the number of years in the 1<sup>st</sup> commitment period). Formal language is contained by the 1<sup>st</sup> sentence of Article 3.7 of the KP.

Prior to any transactions taking place for a particular commitment period, each party included in Annex I shall issue a quantity of Assigned Amount Units (AAUs) equivalent to its Assigned Amount. Each unit, in global warming potential, is equivalent to one tonne of carbon dioxide (CO<sub>2</sub>), hence for each AAU, 1 tonne of CO<sub>2</sub> may be emitted. Or to put it in other words, for each tonne of CO<sub>2</sub> emitted, a Party should hold one AAU in order to comply with its commitments and targets under the KP.

Whereas the AA and AAU can be considered as a starting budget, Parties can obtain additional credits/units to cover emissions in excess of their AA in various ways: through domestic LULUCF activities, through undertaking project activities in accordance with article 6 and 12 of the KP, and/or through trading in accordance with article 17 of the KP.

### 2.3.1 Additional units from domestic LULUCF activities: RMUs

Removal Units (RMUs) can be generated either through Article 3.3 or 3.4. One RMU is equal to one metric tonne of CO<sub>2</sub> equivalent. RMUs may be added to a Party's AA for compliance purposes. However, they can only be used for the commitment period in which they were issued and cannot be banked for future commitment periods.

#### a. Articles 3.3 and 3.4

Article 3.3 allows for afforestation - establishing forest on land that has not been forest for the last 50 years - and reforestation: establishing forest on land that was not a forest on 31 December 1989. On the other side of the equation countries do have to report and account for deforestation. The activities must have started on or after 1 January 1990 and before the 31 December of the

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<sup>2</sup> All references to units and accounting rules are taken from the following decisions: Decision 5/CMP.1 Modalities and procedures for afforestation and reforestation project activities under the clean development mechanism in the first commitment period of the Kyoto Protocol; Decision 13/CMP.1 Modalities for the accounting of the assigned amounts under article 7, paragraph 4 of the Kyoto Protocol; Decision 15/CMP.1 Guidelines for the preparation of the information required under article 7 of the Kyoto Protocol; Decision 16/CMP.1 Land use, land-use change and forestry; and, Decision 17/CMP.1 Good practice guidance for land use, land-use change and forestry activities under article 3, paragraphs 3 and 4, of the Kyoto Protocol.



last year of the commitment period. Accounting for ARD in the 1<sup>st</sup> commitment period is mandatory.

Article 3.4 defines additional activities that may be used for compliance purposes, being: cropland management, grazing land management, revegetation and forest management. Accounting for each of these activities is voluntary in the 1<sup>st</sup> commitment period. The choice whether or not to account for one, several or all of these activities has to be made before the start of the commitment period and remains fixed for the duration of the commitment period. The activities are subject to the same "1990 clause" as goes for ARD: they must have started on or after 1 January 1990.

Accounting of activities under Article 3.4, which have already been accounted for under Article 3.3, is not allowed. This is particularly relevant for afforestation, reforestation and deforestation, which could also be considered as part of forest management.

For both Art.3.3 and 3.4 the following rule applies: once land is included in the accounting regime, it must remain included: "once in, always in". This is to avoid that removals are counted and emissions are not.

#### **b. Accounting for Articles 3.3 and 3.4**

The art.3.3 and 3.4 activities are subject to different accounting approaches: "gross-net" and "net-net".

ARD and forest management under Art.3.4 are accounted on a "**gross-net**" basis. This means that emissions/removals from these activities are not accounted in the base year (gross) but only in the commitment period (net). In addition, only the change in the carbon stock and emissions of non-CO<sub>2</sub> gases which occur during the first commitment period (between 1 January 2008 and 31 December 2012) are relevant; not the changes since 1990 or since the year the activity started. (Höhne *et al.*, 2006)

Cropland management, grazing land management and revegetation under Art. 3.4 are accounted for on a "**net-net**" basis. This means that the accountable quantity is equal to net emissions/removals in the commitment period minus five times the emissions/removals in the base year (paragraph 9 of the annex to Decision 16/CMP.1).

In addition to these general accounting rules some additional provisions were agreed to deal with specific LULUCF features and the issues of non-permanence and scale:

- ❖ "The article 3.3 debit": because emissions from deforestation are accounted directly at the moment of deforestation and because uptake from forestation takes place gradually, a negative carbon balance may occur even if the total forested land area has increased. In that case, whereby activities under Article 3.3 still represent a net source of emissions, emissions/removals from forest management under Art.3.4 may be accounted for in the 1<sup>st</sup> commitment period up to a level equal to this net source of emissions but not greater than 9.0 MtC times five (paragraph 10 of the annex to Decision 16/CMP.1);
- ❖ A cap on forest management: the use of credits from forest management under Article 3.4 together with credits acquired from JI forest management projects is limited to country-specific caps (caps are listed in the appendix of Decision 16/CMP.1). This cap (times five) is

applied after applying the article 3.3 debit rule described above (paragraph 11 of the annex to Decision 16/CMP.1); and,

- ❖ In the case of forestation with fast growing species there is a possibility that if carbon is sequestered before the start of the commitment period (and therefore, not accounted), and then harvested during the commitment period (and therefore, accounted as an emission), net emissions could occur during the commitment period from this unit of land, even though net removals occurred since 1990 to the end of the commitment period. This could be a disincentive to plant forest crops, and therefore, an additional rule was agreed that "for the 1<sup>st</sup> commitment period, debits resulting from harvesting during the 1<sup>st</sup> commitment period following afforestation and reforestation since 1990 shall not be greater than credits accounted for on that unit of land." In such a case the lowest accountable emissions and removals will be zero for this unit of land (paragraph 4 of the annex to Decision 16/CMP.1).

### 2.3.2 Additional units from CDM project activities: CERs (tCERs or ICERs)

CERs can be generated by reducing emissions or increasing removals against a monitored baseline on project level. Once generated, these credits can then be transferred to the acquiring entity, e.g. a country or an investor. CERs acquired by Parties through public purchase or in the EU through "the surrender" of CERs into the EU ETS, can be added to the assigned amount for compliance purposes.

Project activities under the CDM are located in non-Annex I countries. Non-Annex I countries do not have a quantified emissions limitation and reduction commitment, hence, CDM credits that are transferred to Annex I Parties do not lead to a reduction of the assigned amount of the host country. Consequently, it would be beneficial for both Parties to inflate the numbers: the host country would receive more money and the acquiring Party obtains more allowances. Hence, to ensure the environmental integrity of the KP (credits must truly reflect emission reductions or increases in removals) the carbon benefits from CDM project activities must be certified by an independent 3<sup>rd</sup> party, resulting in Certified Emission Reductions (CERs).

#### a. accounting for CERs

As stated before, only afforestation and reforestation activities are eligible under the CDM for the 1<sup>st</sup> commitment period but the use has been limited to 1% of the base year emissions of the acquiring Party times five.

The crediting period of projects is 20 years with the option to renew two times or 30 years with no option for renewal (Decision 5/CMP.1, Annex, para 23). This is to encourage long-term projects. The crediting period begins at the start of the afforestation or reforestation project activity under the CDM.

Potential reversal of the carbon sequestration is addressed by the rule that emission credits from these projects are of a temporary nature, expire and have to be replaced after a specified period. Credits from afforestation or reforestation CDM project activities therefore, only postpone the obligation of a Party to reduce emissions; they do not fulfil the obligation to reduce emissions as credits from other CDM project types do (e.g. in the energy or waste sector). This implies that the

value of those credits is lower than for other CDM projects. Höhne (2006) estimated the value of the temporary units compared to the value of a permanent unit to be as shown below in table 1 at various interest rates, assuming that the price for permanent units is the same today as in x years.

Table 1:

Year	Interest rate			
	2%	3%	5%	10%
5	9%	14%	22%	38%
10	18%	26%	39%	61%
15	26%	36%	52%	76%
20	33%	45%	62%	85%
30	45%	59%	77%	94%
40	55%	69%	86%	98%
50	63%	77%	91%	99%
60	70%	83%	95%	100%

Project participants may select to use "temporary certified emission reduction units" (tCERs) or "long-term certified emission reduction units" (lCERs). The main differences are that:

- ❖ tCERs expire at the end of the next commitment period, whilst lCERs expire at the end of the project; and,
- ❖ the Party that has used the lCERs to get into compliance must replace the units in case the carbon sequestration has been reversed, whilst in the case of tCERs the appropriate amount of tCERs is not renewed during the next verification.

### 2.3.3 Additional units from JI: ERUs

JI projects are undertaken by Annex I countries, mainly between an Annex II Party and an economy in transition, but in general between two countries that have accepted an emission reduction target. Emission reductions from JI projects are called Emission Reduction Units (ERUs) and are issued by the country in which the project is implemented (the "host country"). The



implementation of a JI project results in a transfer of ERUs from one country to the other, but the total emissions permitted in the countries remains the same (a "zero sum transfer").

With respect to the environmental integrity of the KP, no risks are embedded by JI activities in the LULUCF sector, because any possible discrepancy between the amount of ERUs that is issued on one hand, and the real amount of emission reductions that are achieved, will be accounted for by one of the Parties. Therefore, these emission reductions do not need to be certified.

As with CERs, ERUs acquired by Parties through public purchase or in the EU through the surrender of ERUs into the EU ETS can be added to the assigned amount of the acquiring Party and be used for compliance purposes or be traded again.

The key difference between credits generated by JI and under the CDM is that while the CDM generates **additional** emission rights that flow into the emissions trading system, a JI project establishes a transfer of emission rights from one Annex I party to another. In essence, the CDM raises the cap established by the Kyoto Protocol for all Annex I Parties together, while JI is a transaction within the cap.

While specific provisions were adopted for LULUCF activities under the CDM, the general RMG for JI LULUCF projects are the same as those that govern domestic LULUCF activities.



## 3 THE DIRECTIVE, LINKING DIRECTIVE AND LULUCF

### 3.1 The European Trading Scheme: the Directive and the Linking Directive

In an effort to ensure collective compliance with the KP targets by all EU member States, the EU agreed on a text for a European Emissions Trading Scheme, creating an EU internal cap-and-trade system in emission reductions, in line with article 17 of the Kyoto Protocol. Under this system absolute quotas are issued to emitters and allowances can be bought and sold. Allowances are created by the National Allocation Plans but on the national level these allowances have to fit in with the emission reduction target of the individual country.

According to EU Directive 2003/87/EC the European Emissions Trading Scheme (EU ETS) aims to contribute to fulfilling the commitments of the European Community and its Member States more effectively, through an efficient European market in greenhouse gas emission allowances, with the least possible diminution of economic development and employment. (Directive 2003/87/EC, (5))

In April 2004 the Directive was amended by the so-called 'Linking Directive' (2004/101/EC), which provides for the use of Clean Development Mechanism (CDM) and Joint Implementation (JI) credits for compliance use within the EU ETS. According to the Linking Directive, operators of installations participating in the EU ETS are able to buy, starting from 2005 onwards, CDM credits to help them fulfil their emission reduction obligations. Credits from JI projects may only be purchased from 2008 onwards. By further increasing the diversity of low-cost compliance options, the Linking Directive intends to further reduce the costs of meeting commitments under Directive 2003/87/EC. In addition, it is also expected that the Linking Directive will boost JI and the CDM by providing additional incentives for business to engage in these mechanisms. It thereby also promotes technology transfer from industrialised countries to developing countries and countries with economies in transition to a market economy.

The EU ETS was officially launched in January 2005: before the Kyoto Protocol entered into force. This illustrates the commitment of the EU to reach its Kyoto commitments even if the Protocol had not entered into force.

Both the EU ETS Directive and the Linking Directive explicitly exclude the trade of credits generated in the LULUCF sector during its 1<sup>st</sup> phase, and the possible subsequent introduction of any amendments to that must be based on a Commission review.

The 1<sup>st</sup> phase of the EU ETS covers the period 2005-2007, while the 2<sup>nd</sup> phase coincides with the Kyoto Protocol's 1<sup>st</sup> commitment period, from 2008 to 2012. The 1<sup>st</sup> phase of the EU ETS applies to some 7,300 companies and 12,000 installations in six major industrial sectors across the enlarged EU. These industrial sectors include: utility combustion plants; oil refineries; coke ovens iron and steel plants; energy-intensive industry, such as cement, glass, lime, brick and ceramics production facilities; and the pulp and paper industries.

## 3.2 Description of the Directive and the Linking Directive

The EU ETS allocates greenhouse gas (GHG) emission allowances (EUAs) to specific industrial sectors through national allocation plans (NAPs). NAPs set out the overall emissions cap for the country and the allowances that each sector and individual installation covered under the Directive receives. Allowances can be bought and sold, and the emitter must hold sufficient allowances to cover its emissions. The trading system allows operators who reduce emissions beyond their obligations to save unused allocations for future use or sell them to other companies that need a cost effective way of achieving their emission reduction targets. In each calendar year, the operator must surrender allowances equal to the total emissions of the installation.

Through the provisions under the Linking Directive operators can also obtain additional allowances converted from Certified Emission Reductions (CERs) from the CDM and/or Emission Reduction Units (ERUs) from JI. These units can be generated by the Party itself or be purchased on the market. The conversion takes place through the issuance of allowances by the Member State in exchange for CERs or ERUs held by that operator in its national registry account. Operators will be able to convert JI and CDM credits in any Member State that foresees in such a conversion.

Member States remain free to decide whether and how to limit the number of CDM and JI credits that businesses or firms can buy. However, the use of CDM and JI credits must respect the principle of supplementarity that was agreed in Article 17 of the Kyoto Protocol. Operators may use CERs from 2005 onwards and ERUs from 2008 onwards up to a percentage of the allocation to each installation, which must be specified by each Member State in its NAP.

## 3.3 LULUCF and the Directive

Under the current provisions of the Directive and the Linking Directive land use, land-use change and forestry activities (LULUCF) are excluded. This holds both for LULUCF activities that are implemented domestically as well as LULUCF activities that are implemented through project activities under the provisions of JI and/or the CDM.

During the negotiations on the Linking Directive that took place in 2003 and 2004 the question whether or not to include LULUCF credits in the EU ETS was debated fiercely. In the end, the balance tilted in favour of the opponents on the ground that carbon is only temporarily stored through LULUCF activities: at some point in time the stored carbon will be released again into the atmosphere. This would be contrary to the central aim of the EU ETS which aims at achieving



permanent reductions from emission sources. Moreover, the Community's trading scheme is designed as a technological driver for long term emission abatement improvements from energy and industrial sources. Hence, it was stated that recognising credits from LULUCF activities would not be consistent with the approach taken by the Council and the European Parliament on emissions trading.

In addition, at the time uncertainties still existed as to how to account for and monitor emission removals by sinks under the Kyoto Protocol between EU member states, both under JI and the CDM, both at the country level as well as at the project level: it was not clear how the temporary and reversible nature of LULUCF carbon sequestration could be reconciled with entity-level emissions trading, as this would have to involve the attribution of subsequent releases of greenhouse gases to the beneficiary from the initial sequestration.

Finally, because LULUCF credits are expected to be cheaper than credits generated by projects in other sectors - activities that also involve the transfer and/or deployment of technologies - opponents argued that allowing credits from LULUCF projects would be at the expense of promoting such transfers to other countries: one of the key issues for the success of JI and the CDM and the long-term goal of stabilising global levels of greenhouse gas concentrations in the atmosphere.

Although it was decided not to recognise any credit from LULUCF activities during the 1<sup>st</sup> trading period of the EU ETS, the European Commission was also asked to review the issues surrounding LULUCF credits, with particular reference to the temporary nature of credits and the risks associated with *Genetically Modified Organisms (GMOs)* and invasive species, and to make appropriate proposals by July 2006 to allow operators to use CERs and ERUs resulting from LULUCF projects in the 2<sup>nd</sup> phase of the EU ETS (2008-2012). Thus, the use of credits derived from activities in the LULUCF sector should be on the EU agenda again as part of the overall review of the EU ETS which is to take place in the 2<sup>nd</sup> half of this year, in order to make appropriate changes - if deemed desirable - to the trading scheme for the period 2008-2012.

The following section will briefly discuss the relevant clauses in the Directive and the Linking Directive which may also provide opportunities for integrating LULUCF activities in the EU ETS in future.

## 3.4 Clauses relevant to LULUCF

### 3.4.1 Relevant clauses from Directive 2003/87/EC

There are a number of relevant clauses in directive 2003/87/EC<sup>3</sup> when changing the scope of the directive is considered or when links are sought with other emissions trading schemes. These are articles 24, 25 and 30.

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<sup>3</sup> For the full text of Directive 2003/87/EC see annex 2.

Article 24, regarding "Procedures for unilateral inclusion of additional activities and gases" determines that:

1. From 2008, Member States may apply emission allowance trading in accordance with this Directive to activities, installations and greenhouse gases which are not listed in Annex I<sup>4</sup>, provided that inclusion of such activities, installations and greenhouse gases is approved by the Commission in accordance with the procedure referred to in Article 23(2)<sup>5</sup>, taking into account all relevant criteria, in particular effects on the internal market, potential distortions of competition, the environmental integrity of the scheme and reliability of the planned monitoring and reporting system. From 2005 Member States may under the same conditions apply emissions allowance trading to installations carrying out activities listed in Annex I below the capacity limits referred to in that Annex.
2. Allocations made to installations carrying out such activities shall be specified in the national allocation plan referred to in Article 9.
3. The Commission may, on its own initiative, or shall, on request by a Member State, adopt monitoring and reporting guidelines for emissions from activities, installations and greenhouse gases which are not listed in Annex I in accordance with the procedure referred to in Article 23(2), if monitoring and reporting of these emissions can be carried out with sufficient accuracy.
4. In the event that such measures are introduced, reviews carried out pursuant to Article 30 shall also consider whether Annex I should be amended to include emissions from these activities in a harmonised way throughout the Community.

Article 25 regarding "Links with other greenhouse gas emissions trading schemes", determines that:

1. Agreements should be concluded with third countries listed in Annex B to the Kyoto Protocol which have ratified the Protocol to provide for the mutual recognition of allowances between the Community scheme and other greenhouse gas emissions trading schemes in accordance with the rules set out in Article 300 of the Treaty.
2. Where an agreement referred to in paragraph 1 has been concluded, the Commission shall draw up any necessary provisions relating to the mutual recognition of allowances under that agreement in accordance with the procedure referred to in Article 23(2).

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<sup>4</sup> Annex I of this directive lists the categories of activities that are allowed (energy activities, processing and production of metals, mineral industry and other activities (including pulp and paper industries)).

<sup>5</sup> This article refers to 2 paragraphs of the standard rules and procedures; these relate to voting procedures and the procedure for the establishment of working groups to investigate a particular issue.



Whilst Article 30, referring to "Review and further development", determines that:

1. On the basis of progress achieved in the monitoring of emissions of greenhouse gases, the Commission may make a proposal to the European Parliament and the Council by 31 December 2004 to amend Annex I to include other activities and emissions of other greenhouse gases listed in Annex II.
2. On the basis of experience of the application of this Directive and of progress achieved in the monitoring of emissions of greenhouse gases and in the light of developments in the international context, the Commission shall draw up a report on the application of this Directive, considering:
  - a. how and whether Annex I should be amended to include other relevant sectors, *inter alia* the chemicals, aluminium and transport sectors, activities and emissions of other greenhouse gases listed in Annex II, with a view to further improving the economic efficiency of the scheme;
  - b. the relationship of Community emission allowance trading with the international emissions trading that will start in 2008;
  - c. further harmonisation of the method of allocation (including auctioning for the time after 2012) and of the criteria for national allocation plans referred to in Annex III;
  - d. the use of credits from project mechanisms;
  - e. the relationship of emissions trading with other policies and measures implemented at Member State and Community level, including taxation, that pursue the same objectives;
  - f. whether it is appropriate for there to be a single Community registry;
  - g. the level of excess emissions penalties, taking into account, *inter alia*, inflation;
  - h. the functioning of the allowance market, covering in particular any possible market disturbances;
  - i. how to adapt the Community scheme to an enlarged European Union;
  - j. pooling;
  - k. the practicality of developing Community-wide benchmarks as a basis for allocation, taking into account the best available techniques and cost-benefit analysis.

The Commission shall submit this report to the European Parliament and the Council by 30 June 2006, accompanied by proposals as appropriate.

3. Linking the project-based mechanisms, including Joint Implementation (JI) and the Clean Development Mechanism (CDM), with the Community scheme is desirable and important to achieve the goals of both reducing global greenhouse gas emissions and increasing the cost-effective functioning of the Community scheme. Therefore, the emission credits from the project-based mechanisms will be recognised for their use in this scheme subject to provisions adopted by the European Parliament and the Council on a proposal from the Commission, which should apply in parallel with the Community scheme in 2005. The use of the mechanisms shall be supplemental to domestic action, in accordance with the relevant provisions of the Kyoto Protocol and Marrakech Accords.

### 3.4.2 Relevant clauses from the Linking Directive 2004/101/EC

In its pre-ambular the Linking Directive (2004/101/EC, see annex 3 for the full text) determines under item (9) amongst other things that "the Commission should consider, in its review of Directive 2003/87/EC in 2006, technical provisions relating to the temporary nature of credits and the limit of 1% for eligibility for land use, land-use change and forestry project activities as established in Decision 17/CP.7, and also provisions relating to the outcome of the evaluation of potential risks associated with the use of genetically modified organisms and potentially invasive alien species in afforestation and reforestation project activities, to allow operators to use CERs and ERUs resulting from land use, land-use change and forestry project activities in the Community scheme from 2008, in accordance with the decisions adopted pursuant to the UNFCCC or the Kyoto Protocol."

According to Article 1.2 of the Linking Directive the following text is to be added to Article 11 of Directive 2003/87/EC: "All CERs and ERUs that are issued and may be used in accordance with the UNFCCC and the Kyoto Protocol and subsequent decisions adopted there under may be used in the Community Scheme" ..... "except for CERs and ERUs from land use, land-use change and forestry activities." (2004/101/EC, 2004)

Article 1.8 of the Linking Directive determines that the following addition is made to Article 30.2 of directive 2003/87/EC (for Article 30.2 see section 3.4.1 of this report):

"(o) technical provisions relating to the temporary nature of credits and the limit of 1% for eligibility for land use, land-use change and forestry project activities as established in Decision 17/CP.7, and provisions relating to the outcome of the evaluation of potential risks associated with the use of genetically modified organisms and potentially invasive alien species by afforestation and reforestation project activities, to allow operators to use CERs and ERUs resulting from land use, land-use change and forestry project activities in the Community scheme from 2008, in accordance with the decisions adopted pursuant to the UNFCCC or the Kyoto Protocol."

## 3.5 The review process & the 2<sup>nd</sup> phase of the EU ETS ('08-'12)

Article 30 of directive 2003/87/EC should trigger a review process for the further development of the EU ETS. According to Article 30, paragraph 2 of the Directive 2003/87/EC "the Commission shall submit this report to the European Parliament and the Council by 30 June 2006, accompanied by proposals as appropriate". The report should consider *inter alia*:

- ❖ how and whether Annex I [of the Directive] should be amended to include other relevant sectors, *inter alia* the chemicals, aluminium and transport sectors, activities and emissions of other greenhouse gases listed in Annex II, with a view to further improving the economic efficiency of the scheme;
- ❖ the use of credits from project mechanisms; and,
- ❖ (via an insertion decided in article 1.8 of the Linking Directive): technical provisions relating to the temporary nature of credits and the limit of 1% for eligibility for land use, land-use



change and forestry project activities as established in Decision 17/CP.7, and provisions relating to the outcome of the evaluation of potential risks associated with the use of genetically modified organisms and potentially invasive alien species by afforestation and reforestation project activities, to allow operators to use CERs and ERUs resulting from land use, land-use change and forestry project activities in the Community scheme from 2008, in accordance with the decisions adopted pursuant to the UNFCCC or the Kyoto Protocol.

However, to date no document has come forward, at least not in the public domain. During the preparation of this report several member states have been consulted on this matter but none were aware of any document or agenda item for that matter related to a serious review (status of the information mid September 2006). It must be concluded, therefore, that the Commission is not fulfilling its obligation in this respect.

It has been stated by an informal contact with the Commission that it is their intent to publish a comprehensive document by mid 2007 containing the results of a "stakeholder process" (in this contact's view meaning: comments from the Council and Parliament) which will summarize the different proposals for an amendment of the EU ETS Directive. This is however, not formally confirmed. It would mean that the entire process is being delayed with at least a year in comparison to the formal mandate laid down in the last sentence of Article 30.2 of the Directive. This is regretful because an amendment to the Directive, and the process of transferring that into domestic legislation in the EU Member States, is a lengthy process: it would take at least a couple of years. Therefore, even if the Commission would start its work in the very near future and work fast, it is unlikely that the Directive will change before the start of the commitment period.

DG Environment of the European Commission did previously commission a review of the EU ETS, which was executed by McKinsey & Company and Ecofys in 2005. This resulted in a report (DG Environment, 2005) that brought to bear a number of technical issues as a result of a survey amongst 517 companies, government bodies, industry associations, market intermediaries and Non-Governmental Organisations (NGOs)). The overall response rate of the survey was around 60%. However, the survey did not address all the issues that need to be covered according to the Directive and the Linking Directive.

Considering that no major push for JI and/or CDM project activities can therefore, be expected as a result of an amendment to the Directive, the impact of such a change will be limited to domestic activities: only the number of RMUs that could be used in the EU ETS could potentially go up. In any case, most impact should be expected for the period beyond the 1<sup>st</sup> commitment period. Hence, it is worthwhile to see how the EU ETS could work in the period beyond Kyoto.



## 4 LULUCF and non-LULUCF: comparing units for use in the EU ETS

### 4.1 Comparison between LULUCF and non-LULUCF units

The EU ETS allocates GHG emission allowances (EUAs) to emitters. EUAs are parts of the assigned amount (assigned amount units), are permanent and equal 1 tonne of CO<sub>2</sub> equivalent. EUAs are part of the national system and the annual GHG inventory of the Annex I Party to which it belongs.

RMUs also equal 1 tonne of CO<sub>2</sub> equivalent and are part of the national system and the annual GHG inventory of the Annex I Party to which it belongs. The amount of RMUs in a national registry can vary, even if no changes in a country occur in terms of area reported under Art. 3.3 or 3.4. This may be the consequence for instance of differences per year in harvesting levels, the speed of growth of trees or the age-class distribution of forests. This can be compared with the situation of the electricity supply sector: in warm years fewer emissions occur because less heating is required in winter. So, even though the amount of energy plants is the same, the amount of emissions in that sector varies from one year to the next.

t/ICERs from forestation project activities under the CDM also equal 1 tonne of CO<sub>2</sub> equivalent but are not permanent: tCERs always have a validity of 5 year (1 commitment period) and ICERs can have varying lifetimes depending on the choice the project makes in this regard. But both expire at some point in time, a moment that is known upfront, and need to be compensated by other credits or units when they expire at that very moment. If the forestation effort fails after ICERs have been transferred, the owner of the ICER holds the liability and needs to replace that unit with another unit or with emission reductions; not the project.

t/ICERs are not part of a national system or an annual inventory that is part of the compliance regime, but their quality is assured by independent periodic verification. t/ICERs belong to the Party or entity to which they have been transferred and can be used for compliance purposes in the commitment period in which they have been issued. tCERs expire at the end of the next commitment period, while ICERs may last several commitment periods, but as stated, if the forest through which the ICER has been generated disappears after the ICER has been used for compliance, the Party that has used the ICER for compliance must replace the ICERs with an equal amount of other units or emission reductions. In that sense the ICER is a liability in terms of compliance: it holds a compliance risk for the Annex I Party that wishes to use ICERs.

ERUs are part of a national system or an annual inventory of an Annex I Party. The quality of the ERU therefore, is similar to that of RMUs, AAUs or EUAs. They are permanent, equal 1 tonne of CO<sub>2</sub> equivalent and are owned by the Party who has acquired them. Until that transfer they are RMUs and belong to the Party where the JI project is located.

Table 2 below summarises the above.

Table 2: Characteristics of the different units

	AAU/EUA	RMU	tCER	ICER	ERU
Part of national system and annual inventory	YES	YES	NO	NO	YES
Reliable quality	YES	YES	YES	YES	YES
Unit 1 tonne of CO <sub>2</sub> equivalent	YES	YES	YES	YES	YES
Permanent	YES	YES	NO	NO	YES
Compliance risk with Annex I Party	NO	NO	NO	YES	NO

## 4.2 Options for the integration of LULUCF into the EU ETS

From the above it can be concluded that RMUs are equal to EUAs, as are ERUs. The only two that differ are tCERs and ICERs.

Although tCERs and ICERs are not part of a national system and annual inventory system, their quality is assured by the validation, verification and certification RMGs under the CDM. Therefore, this should not be an obstacle for the inclusion of these units into the EU ETS.

tCERs and ICERs are not permanent emission reductions. This is the most significant difference between units from LULUCF and non-LULUCF project activities under the CDM. The tCER unit with its 5 year validity is a reliable unit that allows the Annex I Party to determine its abatement strategy in a more cost-efficient manner. The ICER unit has the advantage of having a validity of more than 5 years and Annex I Parties can plan their abatement strategy further ahead whilst knowing the associated costs of the ICERs. As tCERs need to be replaced after 5 year and as the market at that moment determines the price, this is a more uncertain factor in the planning process. However, ...

The risk associated with ICERs in terms of compliance is another important factor in the consideration of Annex I Parties when planning the way to meet their emission reduction target. As stated, ICERs need to be replaced by the owner, the Annex I Party, if the project fails to maintain the level of carbon sequestration on the basis of which the credits have been issued. This may put the Annex I Party in a complicated situation whereby it is confronted with non-valid units at a point in time that the market may be unfavourable for buyers. It is also difficult to trade these units within the EU ETS as a notification system needs to be in place to keep track of the project performance that is associated with the units in the system. tCERs do not have this disadvantage.

In conclusion: all units except for the ICER can be used in the EU ETS without major complications.



### 4.3 Required text amendments to the Directive and Linking Directive to facilitate the inclusion of LULUCF credits

If EU Members States and the Commission were to agree on the inclusion of LULUCF in the EU ETS a number of changes would need to be made to facilitate that inclusion in the text of the Directive and Linking Directive. The latter introduced additional text in the former to allow JI and CDM credits to be used to a limited extent in the EU ETS.

Climate Focus, a consultancy firm and knowledge company that provides services in the carbon market, has proposed text amendments in the past already (see also <http://www.climatefocus.com>) that need no further changes. Their 1<sup>st</sup> proposed amendment relates to the definitions in article 3 of the directive. A number of additional definitions were already added here through the Linking Directive. An additional definition would need to be introduced here:

*(o) "temporary certified emission reduction" or "tCER" means a unit issued from afforestation or reforestation project activities and will expire at the end of the commitment period following the one during which it was issued pursuant to Article 12 of the Kyoto Protocol and the decisions adopted pursuant to the UNFCCC or the Kyoto Protocol. (Climate Focus, 2006)*

In addition, the article 11a(3)(b), as introduced in the Directive through the linking Directive which reads: "except for CERs and ERUs from land use, land use change and forestry activities" should be deleted, clearing the way for the inclusion of LULUCF credits under the EU ETS.

Finally a 3<sup>rd</sup> amendment would need to be made introducing a new Article 11(a)(4) reading:

*An operator that has used a tCER shall surrender a CER, tCER<sup>6</sup> ERU or allowance at least 30 days before the tCER expires to cover the emissions which had been covered by the expired tCER. If the operator has not replaced any tCERs it has used to cover its emissions by the time they expire, the operator shall be held liable for the payment of the excess emissions penalty in accordance with Article 16. (Climate Focus, 2006)*

As stated, allowing LULUCF credits into the EU ETS will contribute to strengthening the effectiveness of the EU ETS. According to Climate Focus, it is the temporary nature of the LULUCF CDM credits which provides operators of EU ETS installations with the additional flexibility which will benefit the system as a whole.

<sup>6</sup> The Kyoto Protocol rules allow an expired tCER to be replaced by another tCER. Climate Focus however, in response to discussions at a workshop early 2006, placed tCERs here in square brackets, indicating that replacement of tCERs could be limited to "permanent" credits if this were preferred.





## 5 The possible scale of LULUCF in the 1st Commitment Period

### 5.1 Who choose what activity for CP1?

At the end of March 2006 an inventory was made which EU member states intend to use additional activities under Art.3.4 of the KP in the 1<sup>st</sup> commitment period. This survey was only conducted amongst the EU15. New Member States did not need to make a decision until the end of this year. The outcome of the survey was the following:

- ❖ Forest management will definitely be used by 6 countries: Denmark, France, Ireland, Portugal, Sweden and the United Kingdom. Belgium, Finland and the Netherlands will not use forest management. Austria, Greece and Ireland were undecided yet.
- ❖ Grazing land and cropland management will be used by Denmark and Portugal. Belgium, Finland, France, the Netherlands, Sweden and the United Kingdom will not use these options. Austria, Greece and Ireland were undecided yet.
- ❖ With respect to revegetation Austria, Greece and Ireland were undecided yet. None of the other Member States intend to use this option.

### 5.2 What does that mean in terms of offsets during CP1?

#### a. Article 3.3 and 3.4: ARD and additional activities

In the year 2000 Parties were requested to provide submissions containing an assessment of net changes in carbon stocks, and changes in emissions by sources and removals by sinks, associated with the activities under Articles 3.3 and 3.4 during the 1<sup>st</sup> commitment period.

For Art.3.3 a number of data could be submitted: activity-based or land-based data, and data for IPCC and FAO definitions. This led to a large amount of variation in numbers for individual Parties. Therefore, this data has been left out of this assessment.

For Article 3.4 the data that have been submitted at the time was very scarce. Even so, it is presented below. Revegetation has not been included as Parties were not requested to submit data for this additional activity. Hence, only a limited indication can be obtained from these submissions

of the possible scale according to the Parties themselves. In addition, quantification methodologies may have changed significantly since, possibly resulting in current numbers that deviate from those submitted at the time. Cells for countries that have indicated that they will apply a particular option in CP1 have been shaded.

Table 3: estimates of scale of Art.3.4 activities during CP1\* (FCCC, 2000)

	Forest Management		Cropland Management		Grazing Land Management	
	CO <sub>2</sub> (Gg CO <sub>2</sub> )	Non-CO <sub>2</sub> (Gg CO <sub>2</sub> e)	CO <sub>2</sub> (Gg CO <sub>2</sub> )	Non-CO <sub>2</sub> (Gg CO <sub>2</sub> e)	CO <sub>2</sub> (Gg CO <sub>2</sub> )	Non-CO <sub>2</sub> (Gg CO <sub>2</sub> e)
Austria	NR	NR	NR	NR	NR	NR
Denmark	NR	NR	NR	NR	NR	NR
Finland	40.000	NR	NR	NR	NR	NR
France	49.505	NR	NR	NR	NR	NR
Germany	155.000	NR	NR	NR	NR	NR
Ireland	NR	NR	NR	NR	NR	NR
Italy	NR	NR	NR	NR	20.321	NR
Netherlands	563	NR	230	NR	-13.500	NR
Portugal	NR	NR	NR	NR	NR	NR
Spain	NR	NR	NR	NR	NR	NR
Sweden	83.500	NR	NR	NR	NR	NR
United Kingdom	45.000	NR	4.600 (bio-energy crops)	NR	NR	NR
Total of all	373.568		230		6821	
Amount for CP1**	178.005		0		0	

\* Numbers are a total over the entire 1<sup>st</sup> commitment period (5 years) and are provided by the countries themselves in 2000.

\*\* Total of those Parties that indicated they intend to apply the option under Art.3.4.

#### **b. Article 6: JI**

With respect to JI the number of projects that has been initiated to date is extremely low. Therefore, the number of credits generated by LULUCF JI project in the 1<sup>st</sup> commitment period will be very small, if existent at all.



**c. Article 12: CDM**

The number of forestation projects that has been approved by the Executive Board under the CDM is also very small. Considering that any AR project that is initiated from this day forth is barely going to yield any removals during the commitment period, the scale of the contribution in terms of credits resulting from forestation project activities under the CDM is negligible. Looking at the current CDM AR project pipeline the scale is not likely to exceed 1% of the 1% of the allowed base year emissions times 5.

### 5.3 In conclusion...

In conclusion, the scale at which LULUCF can contribute to compliance during the 1<sup>st</sup> commitment period is limited. Consequently the risk that LULUCF credits will push other options out of the market is very small. This means that scale is also not a valid argument to prohibit LULUCF credits from entering the EU ETS. On the other side of the equation, even though the credits might be few, allowing such credits into the EU ETS could mean an important push domestically for good forest and land management.

A possible amendment to the Directive may make LULUCF project activities more interesting for investors in the long term. But considering this is not likely to happen before the start of the commitment period in the most optimistic case, and considering projects take time to be started and trees take time to grow, the number of additional JI or CDM LULUCF credits that would result from such a change for use in CP1 will be close to zero.





## 6 FORESTRY IN EUROPE TOWARDS 2050

### 6.1 European Forestry and contributing to climate change mitigation

Consistent data on the forest resource in general, but also for the EU, are hard to find: different sources provide deviating data. The data below (table 4) are derived from the Global Forest Resource Assessment compiled by the FAO on the basis of information provided by countries.

The countries listed are the EU25 plus Norway, Switzerland and Turkey and for the purpose of this report the following parameters are compiled for the period 1990 to 2005: the total carbon stocks (mmtC), the annual change in growing stock ( $\text{m}^3 \text{yr}^{-1}$ ) and the annual change in growing stock per hectare ( $\text{m}^3 \text{ha}^{-1} \text{yr}^{-1}$ ). This provides a number of insights.

The 1<sup>st</sup> parameter indicates what the absolute magnitude of a country's carbon stock was in the three years. Comparing the values gives an indication whether a country's overall carbon stocks are increasing or decreasing and with how much. All countries report an increase which may be due to various reasons.

The 2<sup>nd</sup> parameter (annual change in growing stock) indicates with how many cubic meters per year the stock is growing and compares the value for the period 1990-2000 with the value over the period of 2000-2005 giving an indication whether the change is increasing or not. In the cases of Czech Republic, Cyprus, Denmark, Estonia, Hungary, the Netherlands, Portugal, Slovenia, Spain, Switzerland and Turkey the annual change in growing stock is less in the more recent period, with Cyprus, Denmark, Hungary, Slovenia and Turkey showing quite significant drops in the amount of increment. This can be due to various reasons, including a change in inventory method, but may indicate increasing harvesting levels or problems with droughts or die-back as reported for e.g. Czech Republic. This may be the case in particular in countries like Hungary and Slovenia with strong developments in the forestry sector.

The 3<sup>rd</sup> parameter - annual change in growing stock per hectare ( $\text{m}^3/\text{ha}/\text{year}$ ) - may give an indication of harvesting strategy, with a declining trend signalling stronger harvesting interventions and sometimes even harvesting levels exceeding the annual increment, which may be unsustainable. However, it may also indicate a larger proportion of young stands with lower increments. Decreasing values of change in growing stock are noted for Belgium, Czech Republic (mainly due to die-back caused by air pollution), Denmark, Estonia, Greece, Hungary, Ireland, Lithuania, Poland, Slovenia, Spain, Switzerland and Turkey with Denmark, Estonia, Hungary, Slovenia and Turkey showing stronger decreases in annual increment. Ireland, although still in the negative, is showing a milder negative trend.

Table 4: selected forestry parameters for the EU25 plus Norway, Switzerland and Turkey.

Country	Overall trend*	Carbon Stock (million metric tonnes in forest)**			Annual change in growing stock (1000 m <sup>3</sup> /year)		Annual change in growing stock per hectare *** (m <sup>3</sup> /ha/year)	
		'90	'00	'05	'90-'00	'00-'05	'90-'00	'00-'05
Austria	+	783	825	853	14.100	14.200	3.27	3.32
Belgium	+/-	114	123	128	2.940	2.980	4.69	4.47
Czech Republic	+/-	520	555	572	7370	7360	2.73	2.56
Cyprus	+/-	6	7	7	52	15	-0.01	-
Denmark	+	22	25	26	940	440	0.70	0.02
Estonia	-	-	528	532	-	-2120	-	-1.66
Finland	+	738	798	831	16260	17600	0.62	0.76
France	++	2124	2207	2305	17500	42200	0.38	2.33
Germany	+	1854	2086	2188	62200	-	4.84	-
Greece	-	52	56	59	1400	1400	-0.01	-0.01
Hungary	+/-	267	292	302	3716	2367	1.06	0.01
Ireland	+/-	16	18	20	740	1120	-2.06	-0.09
Italy	+	1179	1470	1608	23800	31560	1.11	1.71
Lithuania	+	300	325	341	5270	5400	2.00	1.18
Luxembourg	?	7	9	9	557	-	6.16	-
Malta	NA	-	-	-	0	0	0	0
Netherlands	+	66	74	75	900	800	1.87	1.73
Norway ****	+	299	342	363	10800	10800	1.02	0.99
Poland	+	725	841	902	25120	25660	2.44	2.24
Portugal	+	77	102	114	7500	7400	1.06	1.03
Slovakia	+	462	494	510	6160	6240	3.22	3.03
Slovenia	+/-	214	247	260	6122	4532	4.00	2.50
Spain	+	276	353	392	19800	19600	0.41	0.30
Sweden	+	1341	1450	1505	24240	24240	0.84	0.84
Switzerland ****	+	235	256	267	4400	4000	2.45	1.99
Turkey ****	+	743	800	817	9890	5679	0.50	0.23
United Kingdom	+	778	832	858	4200	6400	0.84	1.85

Data source: FAO, Global Forest Resources Assessment 2005



- \* + : overall positive trend; - : overall negative trend; +/- : positive trend in some categories whilst a negative trend in others; ++ : very positive trend; ? : no or not enough information provided; and, NA: nothing or zero reported.
- \*\* Excluding "other wooded land".
- \*\*\* Pools included are: carbon in above ground biomass, below-ground biomass, dead wood and litter and soil carbon.
- \*\*\*\* These countries are not EU members (yet) but some may wish to join the EU ETS.

In summary, as indicated by the data provided by table 4, all countries had growing carbon stock levels over the reported periods, which is positive, but may be caused by different reasons. However, to qualify for carbon offsets under Article 3.4 forest management must improve over time over a business as usual scenario. Hence, looking at the trend between the periods 1990-2000 and 2000-2005 the countries that could have qualified, if 2000-2005 were a commitment period, include: Austria, Finland, France, Italy and the United Kingdom with France being the absolute champion.

From these countries only France and the United Kingdom have elected to apply forest management for the 1<sup>st</sup> commitment period. This means that if these trends persist, the offsets from Article 3.4 forest management are limited unless management strategies in the other countries that elected to use forest management under Art.3.4 (Denmark, Ireland, Portugal and Sweden) improve significantly between now and the end of the 1<sup>st</sup> commitment period.

## 6.2 Domestic incentive structures to promote SFM

A strict national climate policy directed towards forestry may help to improve sustainable forest management (SFM) and reach conservation objectives at the same time, but forest owners need some incentives for this. Such incentives might be carbon sequestration credits (RMUs) with access to the ETS. This would result in achieving a couple of objectives at the same time: more sustainable forest management, conserving/enhancing conservation values, contributing to the mitigation of climate change, and generating income through creating carbon credits.

In order to be able to anticipate the trends in forest management strategies for the near future, information has been extracted for a number of countries from the national inventory reports (NIR) and national communications (NC) as reported to the UNFCCC, Nabuurs et al. (2003) and Schelhaas et al. (2004), the latter two both being Research Reports of the European Forestry Institute. All countries that have elected forest management for the 1<sup>st</sup> commitment period are discussed (Denmark, France, Ireland, Portugal, Sweden and the United Kingdom). In addition, a number of countries with remarkable or promising trends in the forest sector have been included, as well as countries for which forestry is an important economic sector (Austria, Czech Republic, Finland, Hungary, Slovenia and Turkey).

## **Austria**

According to the 3<sup>rd</sup> NC (NC3) and the NIR forests make up about 47% of the Austrian total territory whilst the agricultural area, including grassland and alpine pastures, has a share of approximately 41%. Austrian agriculture and forestry is small scale with two thirds of the land holdings comprising less than 20 hectares. The Austrian Forest Inventory 1992-1996 showed an increase in wooded area of 7700 hectares per year, mainly in agricultural areas and alpine pastures, and a trend towards mixed forest stands with a higher percentage of broadleaves. During recent years, the annual felling quantity has been less than the annual growth resulting in an increase in standing stocks to approximately one billion m<sup>3</sup>. Mountain forests are of great importance to Austria due to their protective function but a third of these sensitive ecosystems needs restoration. This is complicated due to damage caused by game and grazing. According to the NC and NIR Austrian forests represent a large carbon reservoir and have been a net carbon sink during recent decades.

Austrian forest management mainly focuses on the maintenance of biodiversity, productivity, regeneration capacity and vitality of forests and to improve adaptation to changing conditions, in particular those related to climate change. That implies a continuation of what is referred to as "the well-proven sustainable management" as well as improved protection of forests from air pollutants, reduction of damage from deer and cattle and specific measures to preserve and increase biological diversity. Specific climate adaptation strategies have to be initiated in regions with decreasing precipitation and rising temperatures, especially in the north-eastern parts of Austria, where specific forests already show significant stress symptoms.

The NC/NIR also refers to a future key role for agriculture and forestry as suppliers of renewable energy sources and other sustainable raw materials. Some 17% of Austrian households use bio-energy in individual heating systems. In addition, several hundred agricultural district heating plants run on bio-fuels (wood chippings, straw etc.) which are clear indications that the agriculture and forestry sector is an emerging partner in the energy market. Public promotion for renewable energy projects highlights the political efforts to support and accelerate that process. Depending on how these future wood markets and increased use of biomass as a renewable energy source develop, Austrian forests will play an increasing role in that sector.

## **Czech Republic**

According to the 4<sup>th</sup> NC (NC4) the area of forest land has continuously increased, be it only slightly, since 1990 and equalled 2644 thousand ha in 2003, corresponding to about one third of the area of the Czech Republic. Most existing forest stands were planted and do not contain the original, natural species composition. They consist mostly of monocultures with a predominance of spruce and pine. Natural ecosystems are scarce. Some 78% of the forest area consists of conifer species like spruce, pine, larch and fir, whilst the remaining 22% consists of broadleaf species such as oak, beech and birch. In more recent years, reforestation has been characterized by an attempt to increase the proportion of broadleaves at the expense of the soft wood species. According to the NC4 the total standing stocks have continuously increased and equalled 650 million m<sup>3</sup> in 2003.



In the last few decades forests have been damaged substantially, especially by industrial emissions ( $SO_2$ ). In spite of a substantial reduction in emissions of pollutants the condition of the forests is improving only ever so slowly. The currently occurring damage to forests is caused primarily by long-term accumulative degradation of forest soils as the joint effect of pollution levels and unsuitable and excessively intense forest management. The high concentrations of tropospheric ozone currently also contribute to the damage to forest tree stands.

Policies and measures adopted by the Czech Republic in these sectors result in decreasing emissions of  $CO_2$ ,  $CH_4$  and  $N_2O$  (in agriculture) and the increase in the level of  $CO_2$  uptake in forest management. In the "Strategy of Protection of the Climate System of the Earth" the Ministry of Agriculture pledged to implement measures related to afforestation of uncultivated agricultural land, support the maintenance of permanent grasslands, the use and production of alternative motor fuels and the introduction of new soil cultivation technologies and production methods.

Furthermore, support is provided for afforestation of uncultivated agricultural land and agricultural land which is not suitable for agricultural systems (steep slopes and rocky, waterlogged and/or shallow soils). Finally, the Ministry of Agriculture provides financial assistance for afforestation of unused agricultural properties, including the protection of established forest cultures. As a result the area of forest increased by about 5000 hectares in the period 1990 - 1998.

### **Denmark**

According to the 4<sup>th</sup> NC, approximately 11% of Denmark is forested. Originally the focus was mainly on the potential of conifers but in recent years focus has changed towards indigenous, deciduous tree species offering greater long-term production and natural potential. Denmark's forests are managed as closed canopy forests. The main objective is to ensure sustainable and multiple-use management of the forests and to manage them in line with the overall management of the countryside. Instead of clearcut systems, forest owners are to a large extent applying near-to-nature forest management regimes however, Denmark is not a country in which forestry plays an important role in the national economy. The Danish Forest Act protects a very large part of the existing forests against conversion to other land uses. New forest areas, the establishment for which public subsidies are made available, is normally protected as forest reserve. In principle, this means that most of the forest land in Denmark will remain forest. The ambition is to have about 25% of Denmark's area forested by the end of the 21st century. A considerable increase in the forest area is therefore, to be achieved.

The national forest programme includes an evaluation of the possibilities offered by the Kyoto Protocol for economically viable  $CO_2$  sequestration in forests. Such measures should be implemented without undermining the Protocol's environmental integrity or counteracting established measures in support of sustainable forest management. The forests are managed with a view to multiple-use and sustainability and carbon sequestration is one of several objectives. The political goal with the most direct influence on increased carbon sequestration is the declaration of intent from 1989 to double the forested area in Denmark within 100 years. Various measures have been taken towards achieving this goal. For instance, a government grant scheme has been established that supports forestation on private agricultural land. In addition, the state itself establishes new forests and some private landholders choose to establish forests on agricultural land without a government grant.



The Danish Forest and Nature Agency is responsible for forestation policies on private agricultural land and on state-owned land. Afforestation of some 12,000 hectares of privately owned farmland, corresponding to an additional uptake of 131,000 tCO<sub>2</sub>, was subsidised between 1990 and 2004. The state, counties, and municipalities have contributed approx. 6,400 hectares of new forest since 1990. Only little is known about private afforestation without subsidies. It is assumed that about 600 ha are planted annually. Both the subsidised private afforestation and afforestation by public authorities will be less in the next 6-8 years, since the funds for this period have been allocated to international obligations in the area of nature conservation. Despite all the efforts and intent, it is not considered realistic to increase removals significantly through afforestation as early as 2008-2012.

## **Finland**

According to the 4th NC and NIR as much as 74% of the land area is classified as forest land in Finland; only 9% is cropland. There are about twenty indigenous tree species growing in Finland, the most common ones being pine (*Pinus silvestris*), spruce (*Picea abies*) and birch (*Betula pendula* and *B. pubescens*). Usually, two or three tree species dominate a forest stand but natural pure pine stands are found on rocky terrain, on top of arid eskers, etc. whilst natural spruce stands are found on richer soils. Birch is commonly found as a mixture but can occasionally form pure stands. Over half of the forest land area consists of mixed stands. Rarer species are found mostly as solitary trees. The south-western corner and the south coast of Finland have a narrow zone where oak, maple, ash and elm grow.

Tree growth has increased in Finland. The increment in the stem volume was some 11% higher in 2003 than in 1990. The main reasons for the enhanced growth are more efficient forest management practices and forest improvement measures, for instance, drainage ditching. In addition, the share of young forests currently at the stage of rapid growth has increased especially in northern Finland.

The total volume of stock in Finnish forests amounts to over two billion m<sup>3</sup>. For decades, the increment of stock has exceeded harvesting volumes and natural mortality. Today, the annual increment of all forests is about 87 million m<sup>3</sup>. Almost half of the original peat land area in Finland has been drained for forestry purposes, which has considerably increased the annual increment of stock. Although not mentioned in the NC/NIR this must have caused significant quantities of non-CO<sub>2</sub> GHG emissions negating most, if not all or more of the positive effects of the increased CO<sub>2</sub> uptake. However, according to the 4th NC/NIR, in 2003 the LULUCF sector as a whole was a sink of about 17.8 Tg CO<sub>2</sub> equivalents, which is about one-fifth of the total greenhouse gas emissions from other sectors in Finland.

In today's forest sector, Finland's success on the market is based on close cooperation among the forest industry, equipment manufacturers, raw material suppliers and research and development. The sector's contribution to the Finnish economy is almost 10% of GDP, about 30% of industrial production and about 35% of net export revenue.

The main objectives in the forestry sector, besides production, are to promote sustainable forest management and to meet multiple objectives set by different stakeholders and society in general. A number of Policies and Measures (PAMs) have been implemented to achieve this.

The Finnish Forest Research Institute has estimated that the afforestation of agricultural lands and grasslands would create an average annual carbon sink of 0.3-0.6 Tg CO<sub>2</sub> during the 1<sup>st</sup>



commitment period. On the other hand, the clearing of forest land for agricultural purposes would create a carbon source of 0.3–0.5 Tg CO<sub>2</sub> in the same period. Hence, the net effect from these two activities on carbon storages would also be very small. In addition, the clearance of forests for settlements would cause an annual net source of 0.9 Tg CO<sub>2</sub>. The ceiling for Finland for Article 3.4 forest management is 0.59 Tg CO<sub>2</sub> per year over CP1, so even though the measures related to forest management can partially be taken into account according to the Article 3.4. of the Kyoto Protocol, due to a number of uncertainties and risks, Finland is not going to use this option.

### **France**

According to the NIR2006 and the NCs French territory is covered by 80% farmland and forests. However, between 1982 and 1990, urban landscapes have strongly increased: + 23.5% for built areas, +17% for non-built areas and +9.7% for roads and parking. In 2004 forests in France covered around 15 million ha; a figure which only relates to managed forests, although it is estimated that about 95% of forest cover in France is managed.

According to Nabuurs et al. (2003), France, with excellent growing conditions and 28% of its land covered with forests (some 15.2 million ha), is one of the larger forest countries in Europe. Three-quarters of the forest area is privately owned and France is the 2<sup>nd</sup> largest producer in Europe with some 60 million m<sup>3</sup> roundwood per year, about equally distributed between coniferous and deciduous species.

Biomass growth in France, largely compensates for forest exploitation. In 2004 CO<sub>2</sub> removals by forests reached 163 Mt while emissions were reduced to 98 Mt. This results in a net sink of 54 Mt CO<sub>2</sub>. This is an increase compared to 1990 level, even though severe storms in 1999 have clearly affected the balances since 2000.

In 1999, removals by sinks amounted to some 11% of the GHG emissions. According to NC3, the sinks have increased by 19 per cent between 1990 and 1999, but as said the 1999 storms had a severe impact on forests and data may need to be revised.

Before 1999, a project existed to promote (through grants) afforestation to reach an annual rate of 30,000 ha by 2006. However, the 1999 storms led to a reconsideration of this policy. A new National Plan for French Forests stipulates measures to rehabilitate the damaged 300,000 ha of forest over 10 years. Therefore, the funds for afforestation were reduced in favour of forest restoration and the planned afforestation rate was reconsidered to 20,000 ha per year by 2006. The initial target of 30,000 ha per year remains a long-term objective (which was to be re-evaluated in 2005).

The current production in France is rather close to its biological maximum given the management regimes that keep the age class distribution rather stable: a maximum sustainable production of 62.2 million m<sup>3</sup> yr<sup>-1</sup> may be achieved. Under this level (with 92% of the increment harvested) the growing stock will slightly increase to 160 m<sup>3</sup> ha<sup>-1</sup> in 2050, and natural mortality amount to 8.3% of the gross annual increment. (Nabuurs et al. 2003)

### **Hungary**

Hungary, with 19% of its land area now being forest, has increased its proportion of forest in the past 70 years significantly due to forestation of agricultural land. Of the total forest area,



approximately 50% is semi-natural forest. The tree species composition is dominated by broadleaves (85%). About 70% of the forest area is managed as high forest and 30% as coppice. (Schelhaas et al., 2004).

In 1998 the growing stock was 323 million m<sup>3</sup>, which increased by approximately 12% between 1986 and 1998. The annual increment is 11.7 million m<sup>3</sup>, of which 7.3 million m<sup>3</sup> is harvested annually (2000): 62% of the gross annual increment. Of the management systems, the shelterwood system represents 19% and clearcutting 81% (Schelhaas et al., 2004).

The state owned forests represent 59% and 40% is privately owned; the remainder belongs to municipalities and the church. About 43% of the legally private forest has still to be given back to their legal owners (Schelhaas et al., 2004).

Many serious problems of the Hungarian forests are associated with drought and in semi-natural forests regeneration is difficult because of the large amount of game. In 1998 the contribution of forestry to the GDP was approximately 0.2%. The investment in forestry as a proportion of the total investment into the national economy is less than the forestry sector's contribution to GDP, indicating that the forestry sector is largely under-invested. In addition, the country imports raw materials, saw-and veneer logs and other timber products whilst exporting saw logs of poplars, oaks, beech, ash, alder and fruit trees as well as pulpwood, fiberwood and fuel wood.

In the 1980s removals in the forest sector were on the rise, as a result of a gradual increase in the overall forest size. Since 1994, however, the trend is downward. In 1996 new Laws on Forests and Forestry, Nature Conservation, and Hunting and Game management were passed. Increasing the area of forests is in the national interest for several reasons. Afforestation within the scope of alternative land use primarily furthers the objectives of agricultural policy as it is considered environmentally friendly land use. Overmore, it produces environmentally friendly raw materials while contributing to the GHG mitigation effort of Hungary. Afforestation is also of key importance in areas affected by water and wind erosion as well as the region of the Great Plain that is often covered by internal water and floods. Therefore, massive afforestation efforts were made in the past and afforestation is among the key priorities of rural development. Hungary itself, as stated in its NC/NIR, estimates the potential net CO<sub>2</sub> removals to rise from 55 kt in 2005 to 630 in 2010 and 1857 in 2015. If additional measures are implemented values may be as high as 82 in 2005, 945 in 2010 and 2800 in 2050.

## **Ireland**

Most forest in Ireland is publicly owned and consists of Sitka spruce plantations. Forestation is mainly done by private land owners. Rotations are mostly 40-45 years and fellings consist for 98% of coniferous wood. The forestry sector contributes only 0.3% to the GDP. Ireland has a forest policy that aims at further expansion of the forest area, investments in forest industry, but also at a wider diversity of tree species, and a more nature-oriented forest management. (Nabuurs et al., 2003)

Large-scale afforestation programmes push national average values for growing stock and increment downward as large areas with no growing stock and low increments are added to the totals. This may well be the case for Ireland. Although Sitka spruce is still the dominant species, broadleaves comprise close to 20% of new plantings. This will go up to 30% by the end of 2006 according to the



NC3/NIR2006. Furthermore, the current policy is an afforestation rate of 20.000 ha per year, to reach a national forest cover of 17% by 2030.

In the Government's National Climate Change Strategy, forestry has been allocated a significant role in mitigating emissions. Forest sinks resulting mainly from afforestation since 1990 (Article 3.3) are to remove 1.01 M tonnes of CO<sub>2</sub> annually. This represents 7% of the target annual reduction of 15.4 M tonnes of CO<sub>2</sub>. It is now estimated that afforestation since 1990 can sequester over 1.5 M tonnes of CO<sub>2</sub> over the first commitment period, 2008-2012. These estimates will be further updated following the completion of the national forest inventory sampling phase and as further results come on stream from the running R&D programme. No more detailed estimates for Art. 3.4 activities are provided.

### **Portugal**

Portugal has approximately 3.3 million ha of woodland, corresponding to over 37% of land cover. Forest cover has increased since the beginning of the 20<sup>th</sup> century as a result of the efforts carried out by private and public entities. Over the last decade, such growth has resulted in 10% increase of forest cover and 4% increase in forestation rate. This trend is expected to continue as a result of agriculture policy which is leading to a reduction in agricultural land use.

Most of the forestland in Portugal is privately owned (around 87%) and the main species are *Pinus pinaster*, cork oak and eucalypts. Only 3% of the forestland is owned by the State. More than 85% of the individual held plots are on average less than 5 ha, creating serious challenges to forest management and protection. Only 1% of individual held plots occupy more than 100ha. Large areas of forests are managed as plantations (Nabuurs, 2003). Forestry and forest products processing industries are of some importance to the national economy: 2.6% of the GDP. Some 55% of the Portuguese forest's main objective is timber supply. The biggest threats to the sector are forest fires and a sharply increasing demand for wood products.

Forestry policy in Portugal include a wide range of policies and measures that are directly relevant for mitigating climate change, especially through the increase in the carbon sink capacity of forests as a means or reducing atmospheric CO<sub>2</sub>. Within the framework of the strategic orientation document "Conserving Nature and Raising the Value of the Environment in Forest Spaces", one of the identified objectives is the increase in carbon sequestration. To operationalise this objective targets include:

- ❖ Carbon sequestration through increasing forest cover land (expansion of forest cover by 2% in the next 10 years);
- ❖ Promoting the use of timber (long life products);
- ❖ Expanding the life-cycle of timber derivate products (recycling and reusing);
- ❖ Promoting assessments of the contribution of forests to the carbon cycle.

Modelling by the EFI (Nabuurs, 2003) forecasts there is limited potential for increased production in Portugal and that maximum sustainable production levels may be below the felling levels on the basis of inventory data used for the modelling: inventory data from 1992. The report further suggests that production may need to be reduced before fellings can increase towards the 2<sup>nd</sup> half



of this decade. In addition, the gross annual increment shows a declining trend and the age class distribution barely shows any aging of the forest as utilisation ratios are almost 100%. This will result in large regeneration areas and consequently large areas of forest in the young age classes in 2050. All together, the choice of Portugal to apply Article 3.4 management in the 1<sup>st</sup> commitment period can be considered an interesting decision.

### **Slovenia**

In 2001 forest was covering 56% of Slovenia's territory. Since 1990 the forest cover has grown with 2%. Average annual increment is just over 6 m<sup>3</sup> ha<sup>-1</sup>: divided approximately 50-50 over conifers and broadleaves. Standing stocks were approximately 234 m<sup>3</sup> ha<sup>-1</sup> in 2001 and increased with 21% since 1990. Some 68% of the forestland is privately owned and 31% state-owned. The share of privately-owned forest is expected to rise eventually to 80% as the process of denationalisation is still not completed. The average size of forest property is less than 3 ha and most private properties are split into several parcels. (Source: 2<sup>nd</sup> and 3<sup>rd</sup> NC of Slovenia)

The forest area totals 1.1 million ha and according to Nabuurs (2003) 2/3 of the forests are broadleaved or mixed species forest, producing high quality timber. Some 10% of the forests are managed in a coppice system. The forest sector contributes 0.5% to the national GDP but is very important in terms of protection values and for local needs for fuelwood collection and tourism.

Projections for Slovenia show that a maximum sustainable production of 5.3 million m<sup>3</sup> yr<sup>-1</sup> may be achieved. This is much higher than present levels (Nabuurs, 2003). In addition, the modelling shows that already high standing stock values will further increase. Fellings will also go up significantly but will still only amount up to 43% in terms of utilisation level. Finally, increment will also go up from 5.2 to 5.8 m<sup>3</sup> ha<sup>-1</sup> yr<sup>-1</sup> towards 2050 due to an increase in the area of young forests. (Nabuurs, 2003). In conclusion, it can be stated that Slovenia does hold some promise with respect to Art.3.4 forest management in future CPs.

### **Sweden**

Sweden is the largest forest country in Europe with 27.2 million ha of forest (FAO, 2000) of which some 23 million ha is classified as production forest. However, its total national wood increment (94 million m<sup>3</sup> yr<sup>-1</sup>) is in the same order of magnitude as France and Germany (Nabuurs et al., 2003). Some 39% of the forest is owned by companies, 51% by private owners and the rest is owned by the state and the dominant tree species are Norway spruce and Scots pine (46 and 38% of the growing stock). Since 1990 the forest area has decreased with 0.2% due to set-aside for reserves. Increased demand from the forestry industry however, meant that felling increased sharply between 1990 and 2003, while the level of growth rose modestly. The increase in the stock of timber consequently declined over the same period. The Swedish forestry industry at present imports 10-15% of its raw-material needs, whilst the forest sector contributes 20% to the total national export value. The forest industry and forestry together account for more than 4% of Sweden's GDP and nearly 11% of industrial employment (National Board of Forestry, 2004).

The area of land on which logging residuals are harvested for biomass fuel purposes was small at the start of the 1990s. It has since grown steadily, and in 2000-2002 logging residuals were harvested on around 25000 ha yr<sup>-1</sup>, which was around 15% of the felled land area. At present



approximately 45% of the total harvest from the Swedish forests is used in energy generation. Of this large quantities come from the by-products of the forest industry (National Board of Forestry, 2004). Ashes are returned to the land with the aim of counteracting the acidification and nutrient-depleting effect of the harvesting of logging residuals. In 2004 ashes were returned to some 5000 ha. The total use of biomass fuels from the forests has increased by nearly 30 TWh since 1990 and now accounts for almost 95 TWh. Around 10% of the consumed biomass fuel is imported.

As an aggregate for all the types of land use reported in the LULUCF sector, the sector contributes to an annual sink for  $CO_2$  in Sweden over the period 1991-2004. The removal of  $CO_2$  in 2004 was 17 million tonnes. The utilisation rate in Swedish forests is around 60% of the increment only, but this is unlikely to go up due to the move towards nature-oriented forest management (Nabuurs et al., 2003). For the period 2005-2014 the potential felling is estimated to be 85 million  $m^3 yr^{-1}$  (National Board of Forestry, 2004).

EFI's modelling study, reported by Nabuurs et al. (2003) estimate that a maximum sustainable production of 97 million  $m^3 yr^{-1}$  may be achieved, which is a large increase from the present level. Furthermore, the projections in that stud show a rather inert forest resource with no large fluctuations and without any large discrepancies with international statistics: the gross annual increment remains stable at around 4.6  $m^3 ha^{-1} yr^{-1}$  by 2050.

Most private land owners are members of Forest owners' associations: the 7 existing associations together have 90.000 members with a total forest area of some 6 million ha. Some 10% of Sweden's land is protected by some kind of nature conservation legislation; nature reserves accounting for three-quarters of the protected land. The major threats to Swedish forests are storms, game damage and root fungi. (National Board of Forestry, 2004)

## **Turkey**

As Turkey has not submitted any National Communications yet, information for this section has been taken from Nabuurs (2003) only.

The total forest and other wooded land areas amount to 20.7 million ha, with the forest area being 9.9 million ha. All forest area is publicly owned (FAO, 2000). The species composition is very diverse. Due to water limitation, the growth of the forest is limited and the threat of wildfires is significant. Turkey has major afforestation schemes. The main functions are protection and conservation.

Although the modelling exercise of EFI reported by Nabuurs et al. (2003) is considered to provide underestimates by the authors, as not all forestland has been included and increment data seemed to be quite uncertain, the results indicate that the present felling are at their biological maximum or slightly above. This leads to the projection that under the present felling level, the average growing stock may decline from 153  $m^3 ha^{-1}$  to 140  $m^3 ha^{-1}$  in 2050. A maximum sustainable production of 13.6 million  $m^3 yr^{-1}$  may be achieved, which is a moderate decrease from the present level of around 14.2 million  $m^3 yr^{-1}$ . By 2050 however, the growing stock may amount to 162  $m^3 ha^{-1}$ .

## **United Kingdom**

With 10% of the land covered by forest, the UK is one of the less densely forested countries in Europe. Of the 2.4 million ha of forest, 1.3 million ha is privately owned. There has been a 30% increase in forest area in the UK since 1950, mainly as a result of forestation with fast growing spruce species. Large-scale forestation has led to a relatively young forest estate. Fast growing conifer plantations account for 87% of the total national fellings but currently the UK has a forest management policy that aims for more natural forests: 82% of new planting in 2004 consists of broadleaves. Forestry contributes 0.5% to the GDP. (Nabuurs et al. 2003)

Some 2.1 million ha of the forest area is available for wood supply according to FAO (2000) generating 9.5 million m<sup>3</sup> of roundwood per year (8.3 million m<sup>3</sup> being coniferous).

Modelling by EFI reported by Nabuurs et al. (2003) projects strong fluctuations in felling due to the age-class distribution of the forests. The maximum felling level is likely to be reached in the period 2020-2025 at 19 million m<sup>3</sup> yr<sup>-1</sup>. The long-term average however, will be around 12.5 m<sup>3</sup> yr<sup>-1</sup>.

Growing stock will continue to increase; projections range from 314 to 362 m<sup>3</sup> ha<sup>-1</sup>. Ageing of forest stands will lead to a peak in gross annual increment around 2025 at about 8.5 m<sup>3</sup> ha<sup>-1</sup> yr<sup>-1</sup> after which it will decline again to some 7.7 m<sup>3</sup> ha<sup>-1</sup> yr<sup>-1</sup>, whilst currently it amounts approximately 6.4 m<sup>3</sup> ha<sup>-1</sup> yr<sup>-1</sup>. This ageing process will show strongly towards 2050 as utilisation rates are low: 45-50%. (Nabuurs et al. 2003)

## **6.3 European scale results**

The European Forestry Institute (EFI) has conducted a number of studies, one of them being a simulation study for 30 European countries looking at the development of the European forest resource until 2050 under varying assumptions for demand and management by Nabuurs (2003). It has used four 'what-if' scenarios, trying to predict the consequences of different management policies in combination with different demand for harvested wood.

The business as usual (BAU) scenario assumes that the 1990 total national felling levels stay the same throughout the simulation period and that management regimes are applied as today. In the EFISCEN-ETTS scenarios the felling levels as projected by the UN-ECE/FAO European Timber Trend Studies V for the period (1990-2040) are used and management regimes are applied as they are today. The maximum sustainable production (MAX) scenario tries to achieve the maximum felling level under which the ratio between increment and fellings is close to one, and average standing volumes are thus maintained at present levels. In the multi-functional (MTF) scenario it is assumed that the current trend in forest management towards nature-oriented management is continued throughout the entire simulation period.

Running these scenarios up to 2050 provides projections for European forests in terms of:

- ❖ Growing stock per hectare for all scenarios (see figure 1) and for the MTF scenario only (see figure 2);
- ❖ Expansion of the forest area: see figure 3; and,

- ❖ Gross annual increment development for each country in the MTF scenario over time (see figure 4).

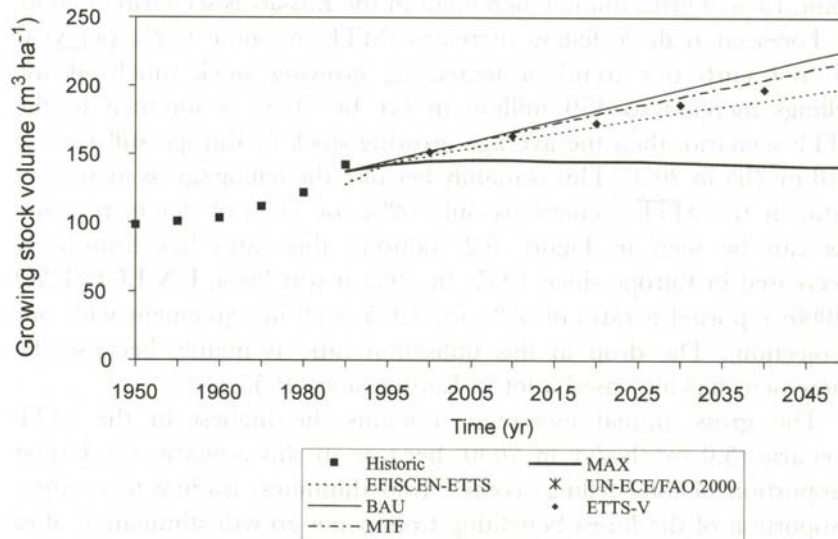


Figure 1: Growing stock per hectare (Nabuurs, 2003)

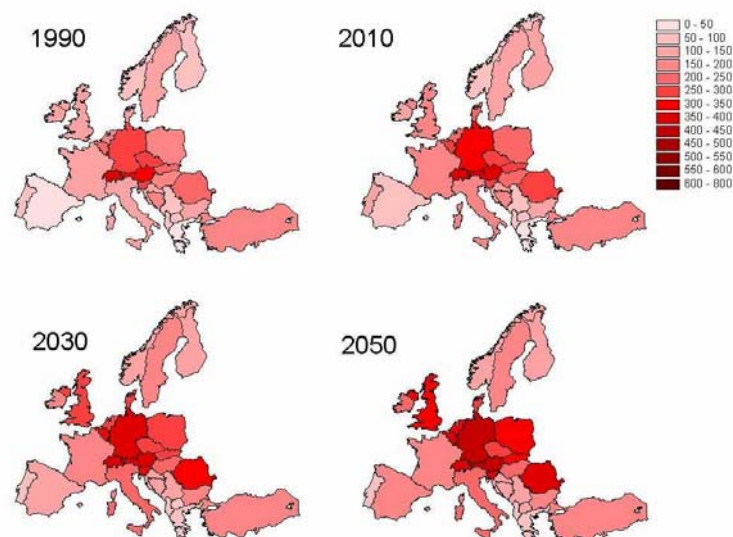


Figure 2: Growing stock in m<sup>3</sup> ha<sup>-1</sup> in 1990, 2010, 2030 and 2050 (Nabuurs, 2003)

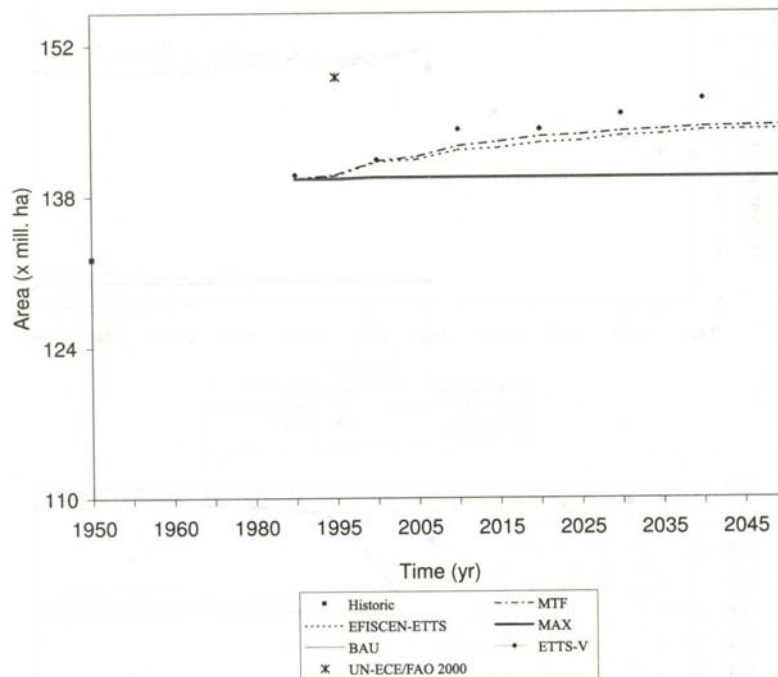


Figure 3: Expansion of the forest area (Nabuurs, 2003)

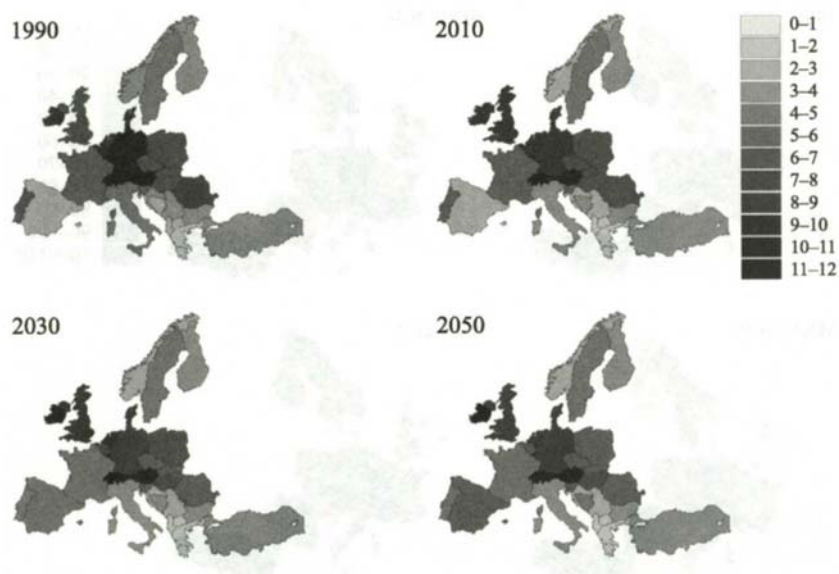


Figure 4: Gross annual increment development for each country in the MTF scenario over time (Nabuurs, 2003)

The figures together illustrate that over time forest management under Article 3.4 could contribute to achieving targets to mitigate climate change. The study (Nabuurs, 2003) reports



that projections in most scenarios show a continuous build-up of growing stock, with a gross annual increment reaching a level of around  $4.8 \text{ m}^3 \text{ ha}^{-1} \text{ yr}^{-1}$  in 2050 providing a total increment varying between 637 million  $\text{m}^3 \text{ yr}^{-1}$  in the maximum sustainable production scenario and 729 million  $\text{m}^3 \text{ yr}^{-1}$  in the multi-functional scenario. This confirms the future continuation of the difference between increments and fellings. If fellings remain at the current total level of just under 400 million  $\text{m}^3 \text{ yr}^{-1}$ , which is the business as usual scenario, the average growing stock in Europe will rise from 137 in 1990 to  $226 \text{ m}^3 \text{ ha}^{-1}$  in 2050. If the fellings rise to 450 million  $\text{m}^3 \text{ yr}^{-1}$  by 2030, as foreseen in one of the scenarios, then the average growing stock in Europe for all forests (managed and set-aside) still rises to  $218 \text{ m}^3 \text{ ha}^{-1}$  in 2050, with total dead wood in this scenario amounting up to 83 million  $\text{m}^3 \text{ yr}^{-1}$  in 2050. (Nabuurs, 2003)

The projections show a maximum sustainable felling level of 606 million  $\text{m}^3 \text{ yr}^{-1}$ , which is 95% of the gross increments and 100% of the net increments. Within the limits of sustainable forest management there are opportunities, in most of the countries, for increased economic utilisation of harvesting possibilities while at the same time ensuring the nature conservation objectives. (Nabuurs, 2003)

Hence, depending to some extent on the developments regarding future CCM regimes and methodologies to account for harvested wood products the contribution of article 3.4 in future could be moderate to significant.





## 7 FORESTRY AND THE INTERNATIONAL CONTEXT POST-2012

### 7.1 Forest conservation and climate change post-2012

As mentioned before, the inclusion of sinks in a future CCM regime is important because article 2 of the UNFCCC cannot be achieved if sinks are not included; currently, tropical deforestation still accounts for a significant amount of the global carbon emissions. Therefore, the best chance for success is a future CCM regime that is inviting or tempting Parties to increase their level of participation in the regime by offering opportunities in the LULUCF sector.

If the role for LULUCF is to increase in future there are two possible avenues that are not mutually exclusive but should rather be used in parallel. One is to extend the list of participating countries that can use LULUCF (non-Annex I countries). The other option is to broaden the list of eligible activities beyond afforestation and reforestation. This implicitly means that accounting for improved forest management or reducing emissions from forest degradation or deforestation in non-Annex I countries should be considered again.

In the past the term "avoiding deforestation" has been used to capture the activities that would lead to reducing such emissions. Nowadays, the subject is better understood and it has become common knowledge that forest degradation causes at least as many losses as deforestation. Not just in terms of biomass, but also in terms of all functions that forests provide, such as: watershed protection, harbouring bio-diversity, livelihood for forest-dwelling people, protection against erosion and soil degradation, maintenance of amenity values and landscape aesthetics, providing non-timber forest products, providing recreational values and possibly other goods and services.

Hence, forest conservation is important and the best way to conserve forest is to appreciate all its values. Those are best conserved if the forest is used in a sustainable manner and actively managed. This is also illustrated when looking at drivers of deforestation or forest degradation: chances of deterioration or loss are greatest if the forest cannot be used, when it doesn't have a monetary value. Hence, the best guarantee for the qualitative and quantitative maintenance of forest cover is the sustainable use.

Promoting the sustainable use of forests can be assisted by including credits generated by forest management in the EU ETS - not just from its own Member States but also from outside the EU - but the mechanism for countries with or without a target differ.

### 7.1.1 Countries with a target

In countries that have taken on commitments, parts of the LULUCF sector can be used to get into compliance during the 1<sup>st</sup> commitment period. If forest management under Art.3.4 is elected by a Party improved forest management can lead to a higher level of carbon sequestration and thus credits (RMUs). This promotes forest conservation and the wise use of natural resources.

But there are also other factors that influence the degree, to which sinks are interesting, for instance the high oil prices in relation to the use of bio-energy. Until recently most estimates of the cost-effectiveness of bio-energy were based on studies applying an oil price of 20-30 USD per barrel whilst currently prices of 70 USD per barrel are more realistic. Such prices may tilt the balance in favour of bio-energy where it wouldn't before. "Carbon plantation", as fields of bio-energy crops are sometimes referred to, may not always be of high natural value, but they surely contribute to a number of other assets mentioned before.

### 7.1.2 Countries without a target

In countries without an emission reduction target - non-Annex I countries - only forestation can be used to generate credits. Existing forests cannot qualify for project activities under the CDM even though most emissions come from such forest. Both from the perspective of forest conservation as well as climate change mitigation this is not an appropriate strategy. By allowing forest management and combating forest degradation and deforestation under a future climate regime, positive incentives are created towards forest conservation. If the traditional non-paid for forest functions such as climate change mitigation are not recognised and (financially) rewarded forest may then become a physical barrier to development. This will cause a continuation of current trends in non-Annex I countries which is not desirable for the reasons mentioned before.

### 7.1.3 Possible regime options for the future

Obviously the rules, modalities and guidelines (RMG) for LULUCF can be improved and currently experts are working on options for future CCM regimes that include LULUCF more comprehensively.

Suggestions that are being made in literature include:

1. A 2<sup>nd</sup> commitment period under the KP with an extended list of eligible LULUCF activities, in particular for the CDM;
2. A separate sink target (sectoral target): one target for non-LULUCF sectors and one target for LULUCF with various options for "fungibility"<sup>7</sup> between sectors and between countries; and,
3. A "Multi-Stage Regime" (MSR).

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<sup>7</sup> Fungibility means the inter-exchangeability of different types of credits. For instance, if all types of credits can be traded and used to get into compliance by all Parties, fungibility is 100%. t/ICERs are examples of credits that are not 100% fungible.



But, even for the optimists, the possibility that no future CCM regime emerges after CP1 should be kept considered as an option as well.

The 1<sup>st</sup> option would build on the regime as we have it now with possibly some modifications in terms of RMGs or the list of eligible LULUCF activities. An advantage would be that the system that is in place now can be continued and the flaw of the LULUCF sector being an option to offset emissions from other sectors, can be remedied by taking on tougher targets. A further possibility would be to extend the list of Annex I countries with emerging economies that are ready to participate in the regime at that level.

The separate sink target negates the disadvantages of having LULUCF credits offsetting other emissions and it has the advantage that countries can take on firm commitments in the LULUCF sector without being squeezed in other sectors. This may be of particular interest to non-Annex I countries that want to participate in the market-based mechanisms but do not want to take on commitments in non-LULUCF sectors that may inhibit economic growth of their economies.

The basic ideas - here not specific to LULUCF activities - behind the MSR approach<sup>8</sup>, as discussed in literature to date, are that:

1. It is a systematic approach to extend commitments beyond Annex I providing predictability about participation;
2. The MSR can account for different equity principles of capability, responsibility and need (for development);
3. The stringency of commitments can increase by each stage over time;
4. Criteria and thresholds for participation in various stages can be pre-defined: countries "graduate" to a next stage, if a threshold is passed (possible triggers are: per capita income (capability); emissions levels (responsibility); or a combination; and,
5. There are different types of commitments per stage.

This option's particular strength is that it can take full account of country-specific situations: if a country is not ready yet, it doesn't need to move on to a next stage. The challenge here of course is to find the right "carrots" to make the graduation from one level of commitment to another appealing for the country. Rewards for graduating could include access to technology, participation in trade, protection of the natural resources, etc. Obviously a sectoral CDM or separate sinks target can be just one stage in the MSR. Stages are not necessarily mutually exclusive. For instance, sustainable Policies and Measures can be introduced simultaneously with undertaking capacity building activities or technology research and development.

## 7.2 Future commitments, the EU burden sharing system and European forestry

As sideways stated before, overall targets for Parties in a future CCM regime can be tougher if LULUCF is included. The level of fungibility determines how difficult it will be to reach the emission reduction target. For instance, if the use of LULUCF credits is capped, the market is distorted to some degree and the value of LULUCF credits may be less. But if RMG allow flexibility

<sup>8</sup> Source: presentation by Marcel M. Berk (MNP) during the Groeneveld workshop (2004).

in the ways and means to reach the targets, it is beneficial to have as much choice as possible in the type of activities undertaken to reach compliance. The market can find the most cost-effective manner of achieving this. In that respect it would be useful if all Parties mobilise all options to reduce emissions or enhance sinks and reservoirs, as also defined by Article 4.1(d) of the Convention: "All Parties ....shall: promote sustainable management, and promote and cooperate in the conservation and enhancement, as appropriate, of sinks and reservoirs of all GHG not controlled by the Montreal Protocol, including biomass, forests and oceans as well as other terrestrial, coastal and marine ecosystems."

Although Parties are starting to look ahead towards possible future commitment periods and adequacy of commitments, it is too early to tell which way the discussions will be going. But there seems to be a strong realisation amongst all Parties to the Convention that the LULUCF sector needs to be included under a possible future climate change regime if the ultimate goal of the Convention is ever to be reached; Article 2: "stabilization of GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system". One of the major weaknesses with regards to LULUCF when the Kyoto Protocol was negotiated was the fact that emission reduction targets were set before an agreement was reached if, and if so, how LULUCF could assist Annex I Parties to achieve its emission reduction targets. This has led to - sometimes strong - opposition of Parties to include LULUCF at all. Ultimately agreement was reached on a limited role for LULUCF.

This complicating situation could be avoided if LULUCF was to be included as one of the sectors with a 'regular' target together with the non-LULUCF sectors. In that way, LULUCF net removals would no longer offset emissions from other sectors but rather be an integral part of climate policy. If the process was to achieve that point, an estimate would need to be made what targets in LULUCF are realistic and those should be added to the estimates for other sectors.

In summary, the effectiveness of the EU ETS is strengthened most if LULUCF is included in the EU ETS in a comprehensive and flexible manner. Creating an overall target for Annex I (type) Parties that includes LULUCF can be higher than a target that excludes LULUCF. In addition, including LULUCF in the EU ETS will promote good forest management.

### 7.3 LULUCF, the EU ETS and the post-2012 era

Depending on the choice of future CCM regime, accounting rules may need to change as well. Besides the existing RMGs the following options may need to be reviewed in the light of such choices.

#### 7.3.1 Full carbon accounting

One option would be to move towards a more comprehensive form of accounting. The Kyoto Protocol currently mandates that accounting be restricted to certain "human-induced" activities. This restriction impinges on the use of "full carbon accounting" (FCA), which implies complete accounting for changes in carbon stocks across all carbon pools, landscape units, and time periods. In the Special Report on Land Use, Land-Use Change and Forestry (IPCC, 2000), "full carbon accounting"



means complete accounting of stock changes in all carbon pools related to a given set of landscape units in a given time period, noting that a carbon pool (e.g. forest products) can be related to a landscape unit without being physically located on the site (IPCC, 2000). This is because under the current set-up accounting is not taking place for the complete territory of a country but is only conducted for the areas that result under Articles 3.3 and 3.4; areas subject to specified human-induced activities. So, although a land-based accounting rule (see table 5 below) can capture full carbon accounting over pools, landscape units, and time (in the special case of the Kyoto Protocol covering the summation of all carbon pools and all landscape units in contiguous commitment periods extending into the indefinite future), under the Kyoto Protocol it is only applied to areas subject to certain "human-induced" activities: an activity-based rule. In that way full carbon accounting over pools and time is applied to landscape units that constitute Kyoto land by virtue of being subjected to that specified human-induced activities. (amended after IPCC, 2000)

Table 5: Land-Based and Activity-Based Accounting Equations (IPCC, 2000)

Land-Based Rule		Activity-Based Rule	
$Q = \sum_{i=1}^M \sum_{j=1}^N [S_{ij}(TE) - S_{ij}(TB)] - \sum_{k=1}^R A_k$		$Q = \sum_{i=1}^M a_i L_i - \sum_{k=1}^R A_k$	
Symbol	Definition	Symbol	Definition
Q	Quantity of carbon emissions debited or removals credited	Q	Quantity of carbon emissions debited or removals credited
i	Indexes a landscape unit whose LUCF activity places it in Kyoto accounting system	i	Indexes activity
j	Indexes carbon pools (e.g., aboveground biomass, below-ground biomass, etc.)	k	Indexes adjustments
k	Indexes adjustments	M	Total number of activities in Kyoto accounting system
M	Total number of landscape units in Kyoto accounting system	L <sub>i</sub>	Land area subject to activity <i>i</i>
N	Total number of carbon pools included in Kyoto accounting system	a <sub>i</sub>	Carbon emissions or removals per unit land area from activity <i>i</i>
R	Total number of adjustments adopted for use in Kyoto accounting system	R	Total number of adjustments adopted for use in Kyoto accounting system
TE	Year at end of commitment period	A <sub>k</sub>	Adjustment <i>k</i> , if adopted, to reflect, e.g., baselines, leakage, uncertainty, etc.
TB	Year at beginning of commitment period		
S <sub>ij</sub> (t)	Stock of carbon on landscape unit <i>i</i> , in carbon pool <i>j</i> , in year <i>t</i>		
A <sub>k</sub>	Adjustment <i>k</i> , if adopted, to reflect, e.g., baselines, leakage, uncertainty, etc.		

Measuring, monitoring, accounting and verification is easiest when all activities, carbon pools and landholdings are included in the system, or when a very small subset of the total is included. Any intermediate stage will be more complex and difficult, with many system boundaries to cover, certainly when specific accounting rules need to be applied to specific activities and/or areas. In that sense, the agreement reflected in the Marrakech Accords is probably the worst case scenario. It has to be expected that it is the wish of all Parties to simplify the approach under any circumstances in any future CCM regime.

If entire countries are covered by the national system and GHG inventories on a permanent basis, the type of units would be RMUs or even AAUs if Parties would not worry any more about the origin of an emission reduction. Those units are fully compatible with units of the EU ETS.

### 7.3.2 Reducing emissions from forest degradation and deforestation

It can also be expected that it is the wish of most, if not all Parties to increase the amount of emissions in the LULUCF sector that will be covered by a future regime considering that since the industrial revolution approximately 270 Gt C has been emitted as CO<sub>2</sub> into the atmosphere through fossil fuel burning and cement production, and about 136 Gt C as a result of land-use change, predominantly from forest ecosystems (IPCC, 2000). Currently about one-fifth of all global CO<sub>2</sub> emissions are still resulting from forest degradation and deforestation; emissions that are currently not covered by the Kyoto Protocol.

Forest degradation and deforestation will also continue to be a major driver of climate change in the next foreseeable future. For instance, it is estimated that by 2050, current trends in agricultural expansion will eliminate a total of 40% of Amazon forests, including at least two-thirds of the forest cover of six major watersheds and 12 eco-regions, releasing 32 ±8 Pg of carbon to the atmosphere (Silveira et al., 2005). In addition, current annual deforestation in Brazil and Indonesia alone is estimated to release four-fifths of the total reduction targets in comparison to 1990 emission levels of the Annex I countries (Skutsch et al., 2006). Therefore, it is extremely important to include this part of the LULUCF sector under a future CCM regime.

Several proposals have been made recently to address this issue and to account for emissions from forest degradation and deforestation, all based on the principle that past deforestation rates in non-Annex I countries could be used as the baseline against which future rates are compared, such that reductions in the rate of deforestation could be rewarded. Obviously this brings about a number of practical challenges that need to be faced, but the principle is not very different from current arrangements for Annex I Parties: a base year with a particular amount of base year emissions and reduced emissions over a fixed period of time in the future: the budget period or commitment period. In principle, if the same was to be applied to emissions from forest degradation and deforestation this would result in a sectoral target.

Without going into too much detail regarding all the challenges, if policy makers were able to agree on rules, modalities and guidelines to facilitate the operationalisation of this option, the type of credits in which this would result are similar to the RMU on the basic premises that this is a national approach.



If countries were to favour this approach for particular regions, provinces or states, instead of for the entire country, a sub-national target would be the result, which would be more similar to a CDM-type of approach. Credits resulting from such an initiative would then resemble the CER credits normally being generated under the CDM.

The main differences between a national approach - by taking on a sectoral target - and a CDM-type of approach are two. First of all a national sectoral target implies that a country commits itself to quantify, monitor and report on all emissions and removals of that sector from the moment the target is taken on forth. Secondly, if a project activity is undertaken, the risk occurs that the achieved net removals may be reversed somewhere in future, without being accounted for. While a national more permanent approach has a broader scope, e.g. landscape level as a minimum, and continues to report on all changes in that sector. Hence, non-permanence is an issue in the case of a CDM-type approach - although the tCER/ICER accounting is solving that - but not in the case of national accounting. In the possible scenario whereby reducing emissions from degradation and deforestation (REDD) may be credited in future, non-permanence is also not an issue, because the proposals put forward to date all relate to national initiatives.

Already some Parties have expressed a concern with this type of activity - crediting for REDD: the argument is that it may well deflect attention away from reducing emissions from the combustion of fossil fuels. Hence, an initial reluctance has been noted amongst some Parties but it is recognised that incentivising REDD without emissions trading, e.g. through the implementation of sustainable Policies and Measures (PAM), may yield less resistance, but is unlikely to generate the financial resources that are required to really curb deforestation. Of course, consideration could be given to political solutions such as a cap, or accounting fixes such as the temporary nature of the credits (resulting in tCERs or ICERs) aside from incentivising REDD through PAMs. This may well address some of the concerns even though it is accounting-wise not correct.

As concluded before, the RMU and tCER are fully compatible with the current units allowed under the EU ETS. LCERs are not.

## 7.4 No future CCM regime: what if...?

But let's imagine briefly that the international community decides not to follow up CP1 with any of the above, nor possible other options or that it is incapable of reaching consensus. In this context it is worth remembering that the EU ETS is a separate and voluntary process of the EU: it is the EU's internal commitment to reduce GHG emissions and to do that in the most cost-efficient manner.

In the case no other commitments would come into effect, emitters/installations or projects generating LULUCF credits - RMUs or credits from JI or CDM - will look at the EU ETS as the sole market for the credits. The pressure to develop appropriate NAPs would in this case be of even greater importance as weak allocation plans destroy the market for credits resulting in a lack of demand. This would lead to low prices as nobody would need to buy and allowances. This would also limit the market for outsiders to sell offsets into the EU ETS.

To continue to provide incentives to good forest management in such a scenario it would be beneficial to create tough targets under the NAPs, to simplify RMGs and to broaden the list of eligible activities.



## 8 OTHER TRADING SCHEMES / INITIATIVES

### 8.1 The different initiatives

The Kyoto Protocol defines a context for international emissions trading between Parties, which sets a common backdrop against which domestic emissions trading schemes involving private entities are constructed. Nevertheless, entities' participation in international emissions trading and the actual design of any domestic emissions trading schemes is to be decided by each relevant Party. The extent to which domestic schemes are integrated with international emissions trading is therefore, a matter of domestic policy. Linking different domestic GHG trading schemes is also a matter to be decided by relevant national authorities.

The EU ETS Directive recognises the potential cost effectiveness of linking the EU ETS to other GHG trading schemes in its Article 25. The directive paves the way for agreements to be made for mutual recognition of allowances with third countries listed in Annex B to the Kyoto Protocol that have ratified the Protocol.

Potential economic benefits arise from the creation of a larger emissions trading market. Giving access to a greater range of emission abatement opportunities should allow GHG targets to be met at lower overall cost. A larger market should also be more liquid and therefore, more efficient in allocating resources in the most cost-effective way.

This chapter reviews a number of other emissions trading initiatives around the world.

#### 8.1.1 United States

Even though, the federal government has officially rejected the Kyoto process, a lot of initiatives have been launched in the US in relation to climate change policy. These initiatives are mainly driven by processes taking place in the Senate and at the state level. However, there is some concern about the lack of vision in many of the proposals, e.g some of them don't consider emission trading at all; some want a price cap of 7US\$ per tonne; and in some linking with other schemes is almost not discussed (personal comment Manik Roy, Pew Center, at the JET-SET workshop, May 2006). Moreover, there is a general sense that many of the bills and programmes have been passed because of political reasons.



**a. Region Greenhouse Gas Initiative<sup>9</sup>**

The Regional Greenhouse Gas Initiative (RGGI) is a cooperative effort by several Northeast and Mid-Atlantic states to design a regional cap-and-trade programme initially covering CO<sub>2</sub> emissions from power plants in the region. Currently, seven states (Connecticut, Delaware, Maine, New Hampshire, New Jersey, New York, and Vermont) are participating in the RGGI effort. And legislation was signed in April, 2006, that will allow Maryland to become a full participant in the process by June 30, 2007 (daily news story on Planetark.com). In addition, the Districts of Columbia, Massachusetts, Pennsylvania, Rhode Island, the Eastern Canadian Provinces, and New Brunswick are observers in the process.

The programme will apply to fossil fuel-fired electric generators of 25 megawatts (MW) and larger. The first compliance period would begin on January 1, 2009. Demonstration of compliance will be required every three years.

Regional emissions would be capped at 121.3 million short tons<sup>10</sup> of CO<sub>2</sub> through 2014, and reduced to 10% below this level in 2018. The initial cap is approximately equivalent to 1990 emissions according to the RGGI process itself

([http://www.rggi.org/docs/mou\\_rggi\\_overview\\_12\\_20\\_05.pdf](http://www.rggi.org/docs/mou_rggi_overview_12_20_05.pdf)). According to another source (<http://aetf.emcc.net.au/ContentStore/pdf/ReviewAugSep2005.pdf>) the initial regional cap is approximately equivalent to the average emissions of the highest three years between 2000 and 2004.

Each state will receive an emissions budget (each state's share of the regional budget, or cap). Similar to the EU ETS, each state may allocate allowances from its CO<sub>2</sub> emissions budget as it deems appropriate, except that all states agree that 25% of their allowances will be allocated for consumer benefit or strategic energy purposes. These allowances will be sold in the market and the revenue will be used to support consumer benefits, such as increased support for end-use energy efficiency programmes. Banking of allowances, offset allowances and early reduction credits will be allowed without limitation. In order to facilitate compliance, the scheme allows for project-based emissions reductions or carbon sequestration achieved outside the capped electric power sector, ie. emissions offsets.

Eligible offset activities include projects involving landfill gas, sulphur-hexa-fluoride (SF<sub>6</sub>), afforestation and natural gas/home heating oil/propane end-use energy efficiency projects. Additional offset types will be added to the programme over time. Offset projects/activities will be required to occur within the seven-state RGGI region, or the rest of the US States, with certain restrictions. Offsets from the seven-state RGGI region will be awarded offsets allowances for certified reductions on a one ton-to one ton basis. Offsets from the rest of the U.S. will only be awarded one offset allowance for every two tons of certified emissions reduction.

In addition to the emission offsets, the programme has also built in multiple mechanisms to help ensure that programme costs will not rise excessively. These so-called Price Mitigation Triggers

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9 Sources used for this section are: RGGI Memorandum of Understanding; RGGI Memorandum of Understanding; RGGI Overview (all from [www.rggi.org](http://www.rggi.org)), and the website from the Australasian Emissions Trading Forum ([aetf.emcc.net.au](http://aetf.emcc.net.au), content store, review August/September 2005)

10 1 short ton = 1.1023 metric tonne (<http://www.epa.gov/cmop/resources/converter.html>)



will provide additional flexibility during potential episodes of high allowance prices while maintaining the compliance obligation of regulated sources and the overall environmental integrity of the programme.

The offsets limit and the geographic scope of eligible offsets will be expanded if the RGGI allowance price equals or exceeds 7 US\$ per ton for twelve months (following an initial 14-month "market settling" period at the beginning of each compliance period). During the compliance period in which the trigger is hit, offset allowances may come from projects located in North America on a one allowance - to one ton certified reduction basis (1:1). Electric generators subject to RGGI may use offsets for compliance in this period up to a limit equivalent to 5% of their reported emissions. Beginning in the next compliance period, offsets eligibility will revert to the original offsets limits and eligibility prior to the trigger event.

If the RGGI allowance price equals or exceeds 10 USD per ton for twelve months (following an initial 14-month "market settling" period at the beginning of each compliance period), the compliance period will be extended for one year, up to a total three-year extension. The trigger price will escalate at 2% per year, beginning in 2006. This means that regulated sources will have additional time to "true-up" their emissions and allowances, but their compliance obligation will not change. If after two years of the compliance period extension allowance prices are still above the 10 USD trigger price, regulated sources will be able to cover up to 20% of their reported emissions with offsets in the 4th, 5th, and 6th years of the extended compliance period. The geographic scope will also be expanded to offsets from international trading programmes. In the subsequent compliance period offsets limits and eligibility will revert to the original programme requirements.

Although a detailed initiative, there is still a lot of confusion about the exact rules of the RGGI. One participant at the JET-SET workshop in May 2006 commented: "All ideas thrown into the stew pot and it is hard to predict what will come out".

#### **b. The Chicago Climate Exchange (CCX)<sup>11</sup>**

The Chicago Climate Exchange (CCX) is a voluntary GHG cap-and-trade programme running from 2003 to 2006. The 24 Members of the CCX have made a voluntary, legally-binding commitment to reduce their emissions of GHGs (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, PFCs, HFCs, SF<sub>6</sub>) by 4% below the average of their 1998-2001 emissions baseline by 2006. New targets have already been set for the 2<sup>nd</sup> period (2007-2010).

CCX Members were issued Exchange Allowances at the inception of the programme for the four-year period (2003-2006). Each Member can meet their commitment through internal reductions, by purchasing allowances from other Members, or by purchasing credits from emission reductions projects. Eligible offset project categories are: landfill and agricultural methane capture, carbon sequestration in soils, and carbon sequestration in forest biomass.

Talks have already taken place to link the CCX with the EU ETS.

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<sup>11</sup> Sources are: The Ecosystem marketplace ([ecosystemmarketplace.com](http://ecosystemmarketplace.com)), [www.chicagoclimatex.com](http://www.chicagoclimatex.com); and [www.ieta.org/ieta](http://www.ieta.org/ieta)

## 8.1.2 AUSTRALIA

Until now, the Federal Government of Australia has ruled out a national ETS. State governments on the other hand are continuing to respond to the issue of climate change with a wide variety of regulatory, voluntary and incentive-based programmes. All state and territory governments are currently investigating the development of a national emissions trading scheme through the Inter-jurisdictional Working Group on Emissions Trading. Initiatives that already exist are:

1. Mandatory Renewable Energy Target (MRET)
2. Generator Efficiency Standards (GES)
3. Queensland 13% Gas Scheme
4. Australian Building Greenhouse Rating Scheme (ABGR)
5. Green Power
6. New South Wales Greenhouse Gas Abatement Scheme (GASS)

Not all of them will be discussed here.

### a. The New South Wales Greenhouse Gas Abatement Scheme (GASS)<sup>12</sup>

The New South Wales (NSW) Greenhouse Gas Abatement Scheme, commenced on January 1<sup>st</sup> 2003 and remains in force until 2012, unless extended. The Scheme sets and regulates mandatory targets for abating the emission of GHG from electricity production and use (including carbon dioxide, methane, nitrous oxide, perfluorocarbon, sulphur hexafluoride) in New South Wales. The Scheme requires NSW electricity retailers and certain other parties (benchmark participants) to meet mandatory targets by reducing their GHG emissions to identified benchmark levels.

The scheme seeks to reduce GHG emissions from the NSW electricity sector by 5% per capita between 2003 and 2007, and then maintain the reduced level until at least 2012. GHG emissions in excess of a benchmark participant's benchmark can be off-set by surrendering abatement certificates purchased from accredited Abatement Certificate Providers (ACP). Abatement certificates may be created from certain emissions reduction activities: low-emission generation of electricity (Generation); activities that result in reduced consumption of electricity (Demand Side Abatement); and, capture of carbon from the atmosphere in forests (Carbon Sequestration).

Abatement certificates resulting from these activities are called New South Wales Greenhouse Abatement Certificates (NGAC), which represents the abatement of one tonne of CO<sub>2</sub> equivalent associated with the consumption of electricity in NSW. NGACs are transferable and can be traded between different participants.

In addition to the NGACs, participants can also obtain Large User Abatement Certificates (LAUC) from so-called large user abatement activities, in order to comply with their benchmarks. However, these LAUCs cannot be traded. A failure to comply with the benchmarks will result in a penalty calculated per tonne of emissions generated above the participant's benchmark.

Initially, the penalty is set at AU\$10.50 per tonne of excess CO<sub>2</sub> emissions over the benchmarks.

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<sup>12</sup> Sources: [www.greenhousegas.nsw.gov.au](http://www.greenhousegas.nsw.gov.au), and [ecosystemmarketplace.com](http://ecosystemmarketplace.com)



However, since the penalties are not tax deductible, but offset purchases are, the effective price could be as high as AU\$15/tCO<sub>2</sub>e. The penalty rate will subsequently be adjusted by the Consumer Price Index.

The Independent Pricing and Regulatory Tribunal (IPART) of New South Wales is responsible for administering the scheme. IPART has two separate functions. On the one hand, it manages the accreditation and monitors the performance of Abatement Certificate Providers (ACPs). On the other hand, it also serves as the compliance regulator for monitoring the performance of the different Benchmark Participants.

In order to ensure the integrity of the Scheme, IPART draws heavily on the services of specialist auditors appointed to the Audit and Technical Services Panel. Audits may be commissioned by IPART as the Scheme Administrator prior to accreditation, prior to allowing an ACP to create certificates or where a specific issue has arisen and independent assurance is sought. Audits are also commissioned annually by IPART as the compliance regulator to ensure that Benchmark Participants have correctly calculated their certificate surrender requirement.

Credits from carbon sequestration are allowed in the system, whether coming from permanent forests, commercial timber forestry operations, or sustainable forest management. The forest must be located in New South Wales, or another Australian state with a similar scheme, and meet the sinks regulations in the Kyoto Protocol as well as meeting the conditions set out in the NSW Greenhouse Gas Benchmark Rule on Carbon Sequestration.

To be eligible to apply for accreditation as a NGAC provider, a forest manager must: own or control the carbon sequestration rights associated with the land; be able to demonstrate that the carbon sequestration achieved by the forest project will be maintained for 100 years; have appropriate procedures in place to manage risks such as fire, disease or climate variability; and, maintain adequate records. NGACs can only be generated by sequestration that occurs from 2003 onwards. The carbon stock can be estimated using a variety of methodologies. However, the forest manager must be able to demonstrate, based on an uncertainty analysis, that it is 70% probable that the net increase in its carbon stocks is greater than the number of NGACs being claimed. Liability for calculations, ongoing compliance and maintenance of carbon stocks lies with the forest manager (i.e., the seller) and not the buyer.

### 8.1.3 CANADA: Large Final Emitters (LFE) System<sup>13</sup>

Steps to implement a GHG emissions trading programme for large industrial sources are underway in Canada. In July 2005 the government published a "Notice of intent to regulate greenhouse gas emissions by Large Final Emitters" under the Canadian Environmental Protection Act. The final regulations were expected to come into force in 2007 for the programme to begin on January 1, 2008. However, due to a change of government, there is a great deal of uncertainty around the final implementation of the scheme and at the moment there is nothing concrete. Even the name of the system is likely to change (JET-SET workshop).

<sup>13</sup> Sources: [iea.org](http://iea.org); [aetf.emcc.net.au](http://aetf.emcc.net.au) and [climatechange.gc.ca](http://climatechange.gc.ca).



Firms (an issue yet to be resolved is whether the participants are firms or facilities ([aetf.emcc.net.au/ContentStore/pdf/ReviewOctNov2005.pdf](http://aetf.emcc.net.au/ContentStore/pdf/ReviewOctNov2005.pdf))) covered by LFEs are electricity generators that use natural gas, oil or coal; firms engaged in oil and gas production, processing, transmission and distribution; chemicals; fertilizers; pulp and paper; mining; smelting and refining; aluminium; steel; cement; lime; and glass. Other manufacturing industries, such as assembly operations, are excluded. The LFE programme will cover about 700 firms. They are responsible for almost half of Canada's GHG emissions: a minority of the firms (80 to 90) are responsible for 85% of the total emissions covered by the scheme.

The projected average annual emission reduction by these sources for 2008-2012 is 45 tCO<sub>2e</sub>. LFEs will have mandatory emission intensity targets (tCO<sub>2e</sub> per unit of physical output). Fixed process emissions will have a 0% reduction target for 2008-2012. All other emissions will have a 15% intensity reduction target relative to a 2010 business-as-usual forecast, not to exceed a reduction of 12% of total emissions. Emission intensity targets for large new facilities and existing facilities undergoing major transformations or expansions would be based on Best Available Technology Economically Achievable. Companies that do better than their target will receive tradable domestic credits. As these credits will be issued on a net basis, the LFE system is more like a baseline-and-credit system than a cap-and-trade system.

LFEs will be able to comply by reducing their own emissions, buying credits from other LFEs, CERs, ERUs, "greened" AAUs, domestic offset credits, or Technology Investment Units. While LFEs will be able to use Kyoto units for compliance, they will not be able to exchange LFE credits for Kyoto units for sale internationally.

LFEs may buy Technology Investment Units at a cost of C\$15/tCO<sub>2e</sub> to a maximum overall contribution of 9 MtCO<sub>2e</sub> per year for compliance. Money from the sale of Technology Investment Units will go into a fund that will help finance research into, or the development or demonstration of, technologies or processes to reduce GHG emissions from industrial sources or to remove GHG from the atmosphere in the course of an industrial operation. Since LFEs should benefit from the technology development in the long run, they may prefer this compliance option over the purchase of credits even if the price of credits is lower.

In addition, the federal government has launched public consultations on a proposed Offset System for GHGs. It is designed to encourage cost-effective incremental reductions or removals (carbon storage) of GHG in activities not covered by federal GHG regulations. Projects are expected to include increased sequestration by forest and agricultural soils, storage in geological reservoirs, reduction of landfill gas emissions, and emission reductions resulting from clean energy, demand-side management, and co-generation.

Some of the fore-mentioned reductions/removals eligible to earn offset credits will not contribute to meeting Canada's Kyoto commitment: it will not be possible to exchange offset credits for Kyoto units. Emission reductions in other countries by Canadian firms engaged in cross-border trucking may be eligible. Geological storage of CO<sub>2</sub> imported from the United States may be eligible. Forest management projects may be eligible even if Canada does not include forest management in its Kyoto accounting (provisions to address non-permanence also may differ from those for the Kyoto Protocol). Emission reductions from January 1, 2006 may be eligible.



Offset credits can be sold to LFEs or the federal government's Climate Fund. The Climate Fund is likely to be the larger market; it plans to buy 75 to 115 MtCO<sub>2</sub>e of domestic and international units annually while the reduction target for LFEs is 45 MtCO<sub>2</sub>e per year.

The process proposed for the Offset System is similar to that of the Clean Development Mechanism (CDM). A project will need to use an approved "quantification protocol" or "quantification methodology". The protocol/methodology will specify the project boundary, baseline, leakage, and monitoring requirements. The participants must demonstrate they have clear legal ownership of the reductions/removals. The offset programme authority will validate the proposed project. The emission reductions/removals must be verified *ex post* by an accredited independent expert at intervals selected by the project participants. The offset programme authority issues credits based on the report by the accredited expert. All projects have a fixed registration period of eight years that can be renewed if the project is re-validated possibly with a revised baseline. Registration periods must be contiguous.

Instead of a penalty system, the Government has committed to implement a "price assurance mechanism" to ensure that LFEs will be able to meet their regulatory obligations at a cost of no more than C\$15/tCO<sub>2</sub>e (estimated to be about US\$10/tCO<sub>2</sub>e) for the period 2008-2012. Details of this mechanism are not yet available. Natural Resources Canada had proposed that a participant that wished to use this mechanism would enter into an agreement for a maximum quantity prior to the start of the year. It would pay a premium (unspecified), like an insurance premium, for the price guarantee. To receive price guarantee units, the participant would pay the government \$15 per credit for the lesser of the quantity needed to achieve compliance (after using all allocated units) and the maximum quantity agreed at the start of the year. Price guarantee units would not be tradable.

Credit for early action and industrial competitiveness are considered to be addressed by the emission intensity targets. No additional provisions are being considered. While not explicitly mentioned, it is expected that credit banking, but not borrowing, will be allowed. Accounting and tax treatment of credit purchases and sales have not yet been proposed. A penalty of no more than C\$200 per tonne of excess emissions is proposed.

#### 8.1.4 JAPAN: The Japanese Voluntary Emission Trading Scheme (JVETS)<sup>14</sup>

In May 2005, the Japanese government has launched the Japanese Voluntary Emission Trading Scheme to reach its target for cutting GHG emissions under the Kyoto Protocol. The scheme is part of the Kyoto Target Achievement Plan (2005).

For the initial period, which ends in 2007, The Japanese Ministry of the Environment has selected 34 companies and corporate groups as participants. They were chosen from among applicants who responded to an open invitation and screened based on their cost-effectiveness for this programme. Among them are INAX Corp., Nippon Electric Glass Co., Mitsubishi Gas Chemical Co.,

<sup>14</sup> Sources: [ieta.org](http://ieta.org), [greenbiz.com](http://greenbiz.com) and [iges.or.jp](http://iges.or.jp).

and Yamazaki Baking Co. Under the scheme, the ministry subsidizes the installation cost of CO<sub>2</sub> emissions reduction equipment to help businesses that are actively attempting to reduce GHG emissions. In fact, one-third of the costs of GHG reduction activities will be subsidized by the government as incentive. In exchange for the subsidy the participants are required to commit to a certain reduction in their CO<sub>2</sub> emissions. The total of emissions reductions promised by the individual companies for fiscal year 2006 is 276,380 tons, or 21% of their average annual CO<sub>2</sub> emissions in the base years (fiscal 2002 to 2004).

Participants can utilize the Emission Trading Scheme as flexibility mechanism to achieve pledged emission reduction. To this end, the government issues the tradable allowances (JPA) to each facility (not company). The amount of tradable allowances is equal to the total base year emissions minus the estimated reduction amount. In addition, target facilities can use the credits under the Kyoto Mechanisms (CERs/ERUs, etc.) in complying with their obligations.

Compliance takes place on a yearly basis. After the final trading period, if participants cannot retire allowances corresponding to the actual amount of their emissions, the subsidies paid to them should be returned. Participants are allowed to transfer their excess emission allowances to the next term (i.e. banking).

Compared to the other ETS, the coverage of the scheme is very small. The scheme is mostly considered to be a learning process. At this moment, mandatory emissions trading is NOT an option. There is still considerable opposition from the industrial sector. Many large industries are not participating in the voluntary system because they fear a mandatory system. However, interest in ETS is growing and the Ministry of Environment is doing a lot of research on the topic. Careful design of the scheme may in the end solve some of the industry's concerns (comments made at the JET-SET workshop).

## 8.2 Possible links between the EU ETS and other schemes

According to the OECD (2004) key design features that are relevant for possible linking of different ETSs include:

- ❖ Coverage of the scheme: which gases and sectors are included: e.g. sinks are not accepted within the EU ETS but they are accepted in all the other schemes. In addition, countries have to bear in mind that linking schemes will affect the total level of supply (supply of linked schemes will be added up);<sup>15</sup>
- ❖ Mutual recognition of trading units: e.g. the metric tonnes of most ETSs versus the short tons of RGGI; this requires harmonisation or setting an exchange rate. But also the type of unit is relevant: which units are included and which ones are excluded from the linked the linked schemes must be agreed jointly. But the recognition of allowances is ultimately a political issue: there are no clear technical fixes available to link schemes with different

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<sup>15</sup> Care has to be taken also with accounting procedures when linking upstream with downstream schemes, and direct with indirect schemes in order to avoid double-counting of emissions.



- types of units. ;
- ❖ Absolute vs. relative targets: e.g. the intensity target used in the Canadian Scheme may lead to higher emissions and as such it can impair the environmental integrity of the EU ETS if linking would take place;
  - ❖ Stringency of the scheme: as long as targets are stringent enough to be beyond business as usual, there should not be any technical problem with linking schemes with different stringencies. If stringency is so low that more allowances are allocated than required under business as usual, then linking could undermine environmental action in the combined scheme depending whether or not these allowances were backed up with Kyoto units. In addition, voluntary opt-in and opt-out provisions can create opportunities for surplus allowances to enter the scheme if the conditions for these provisions are not sufficiently stringent;
  - ❖ Initial allocation method and update: differences in methodology between two schemes for the initial allocation should not cause a difficulty in linking. There could be additional gaming opportunities created by linking two schemes that have different rules on updating allocations in subsequent periods. Harmonising rules on this may help to reduce any distortions introduced by linking;
  - ❖ Banking: companies in countries that do not allow banking will effectively be able to bank via swaps with companies in countries that do allow banking. Harmonisation of rules on banking, or some limitations on banking would therefore be advisable;
  - ❖ Monitoring, Reporting and Verification (MRV): MRV is fundamentally important to ensuring confidence and underpinning value in the traded units. Differences in the MRV process or even to some extent accuracy may not matter as long as these differences do not undermine market confidence. However, as to date, only the EU ETS has a clear and detailed MRV system available; and,
  - ❖ The penalty regime: linking to a scheme with a similar penalty regime should not be a problem even if the level of the penalty is different. However, it is not straight-forward to combine the fixed penalty type compliance regime of the EU ETS with a scheme that has a price cap type regime (e.g. Canadian Scheme): the market will tend to split if the market price rises above the price cap, reducing the expected benefits of linking.

Altogether, there is considerable flexibility to link the EU ETS to other domestic or regional trading schemes, even if they are of different design. Only in the case units are transferred out of the EU ETS into a country that has not ratified the Kyoto Protocol problems may arise from 2008 onwards because EUAs are linked to AAUs. Transfer would then imply that AAUs have to be cancelled. So, although in principle linking would still be possible, it is not beneficial to the EU unless the financial returns on such a transfer are so high that it will easily facilitate an equal amount of domestic emission reductions, where abatements on average are more costly.

A number of conclusions can be drawn based on the fore-mentioned (and some were also drawn at the JET-SET workshop):

1. Design does matter, there is a need for a standardized approach and a baseline-credit system is generally considered to be more complicated and less interesting than the cap-and-trade system;



2. The 'weakest system' will determine the overall (environmental) integrity;
3. Linking with non-Kyoto country is possible in principle but not beneficial in most cases;
4. Linking with Norway and Switzerland could be straightforward;
5. Linking with RGGI is feasible, although it has to be noted that linking is certainly not a top priority in the US;
6. Linking with Canada and Australia will endanger the EU ETS' environmental integrity; and,
7. The Japanese scheme should be considered too small in its current set-up.

A number of additional points have to be made. First of all it has to be recognised that if schemes are linked this may actually strengthen initiatives at the national and sub-national level as linking does reduce overall abatement costs, in particular when CDM credits are allowed. This may in itself then assist the international negotiations: if all Parties benefit, the willingness to act will go up. Linking schemes may also have that added bonus that the overall quality of the schemes will go up as some schemes will need to be improved to be able to meet a particular standard before they are allowed to join in.

On the down-side, all systems now work with a selection of emitters and sectors and as the current allocations induce very low reductions in the covered sectors, an additional burden is put on the non-covered sectors.



## 9 CONCLUSIONS AND RECOMMENDATIONS

### 9.1 Conclusions

**Concerns expressed in the past by Parties regarding the inclusion of LULUCF under the EU ETS in the 1<sup>st</sup> commitment period have proven not to be valid (anymore).** From the previous chapters it is clear that for instance the scale that is to be expected from JI and CDM project activities in the forestry sector, as far as they are eligible, can be neglected. Domestic action is also minimal as the number of EU Member States that have chosen to elect forest management under Art.3.4 for compliance purposes is limited. Furthermore, the temporary nature of CDM units is no obstacle either as clear rules have been agreed how to handle such units.

**All types of LULUCF units are compatible with EU allowances except for ICERs.** Although both tCERs and ICERs are not permanent emission reductions - the most significant difference with all the other units - the ICER needs to be replaced by the Annex I Party that has acquired the unit, if the project fails to maintain the level of carbon sequestration on the basis of which the credits has been issued. This causes various complications, e.g.: the Annex I Party needs to replace its ICERs when it is confronted with non-valid units, even when the market may be unfavourable for buyers; and, trade in ICERs is complicated within the EU ETS as a notification system needs to be in place to keep track of the project performance that is associated with the ICERs in the system.

**The review of the Directive for the 2<sup>nd</sup> phase (2008-2012) is a good moment to introduce amendments to include LULUCF credits into the system, text for which has been provided in section 4.3.** The Commission should have prepared proposals in this regard already fulfilling the mandate provided by Art. 30.2 of the Directive and 1.8 of the Linking Directive. If proposals are still to come forward, which is unclear at this stage, a delay has already been caused for the possible inclusion of LULUCF units into the system. This gives negative investment incentives in the forestry sector because the market for JI and CDM LULUCF credits, and probably for RMU units as well, is therefore, limited for the 1<sup>st</sup> commitment period.

**Even if a positive decision is made with respect to an amendment of the Directive facilitating the inclusion of LULUCF under the EU ETS, virtually no such credits can be generated anymore for use in the 1<sup>st</sup> commitment period.** Realistically, if amendments were agreed in the shortest possible timeframe, already no LULUCF credits can be expected anymore through JI or



CDM; at the most a very small influx of forest management RMUs through the limited number of countries that have elected Art.3.4 forest management. This is due to the time it will take to formalise any such decision - two to three years - by which time we are midway through CP1.

**To strengthen the EU ETS' effectiveness LULUCF should be included in the EU ETS in a comprehensive and flexible manner.** Therefore, besides amending the Directive full carbon accounting and reducing emissions from forest degradation and deforestation (REDD) must be reconsidered as eligible LULUCF activities. An additional advantage of including LULUCF is that the overall target for Annex I (type) Parties can be higher than a target that excludes LULUCF. Besides that, including LULUCF in the EU ETS will promote good forest management which is important not just for forest conservation but also for the protection of biodiversity, bio-energy crops substituting fossil fuels, investments directed towards rural areas, etc. Lastly, undertaking activities in the LULUCF sector is for some non-Annex I countries the only way to increase its level of participation in the UNFCCC and the Kyoto Protocol.

**The contribution of article 3.4 forest management in future (commitment periods) can be moderate to significant, depending on the developments regarding future CCM regimes and methodologies to account for harvested wood products.** Studies show a continuous build-up of growing stock in various scenarios of forest management and demand for wood products, with a gross annual increment reaching a level of around  $4.8 \text{ m}^3 \text{ ha}^{-1} \text{ yr}^{-1}$  in 2050 providing a total increment varying between 637 million  $\text{m}^3 \text{ yr}^{-1}$  in the maximum sustainable production scenario and 729 million  $\text{m}^3 \text{ yr}^{-1}$  in the multi-functional scenario. The proportion of sequestration that is additional to the BAU depends on accounting methods and base year selection. Other findings show that within the limits of sustainable forest management there are opportunities, in most of the EU countries, for increased economic utilisation of harvesting possibilities while at the same time ensuring the nature conservation objectives.

**There are good options to link the EU ETS to other schemes which will have a positive impact on both the environmental as well as cost effectiveness.** Some issues to harmonise and standardise GHG emission trading schemes must obviously be resolved but that can be done relatively easily. Linking with schemes such as those of Switzerland and Norway in particular is straight-forward and can be accomplished relatively quickly. It has to be noted though that the risk exists that a burden is placed on sectors and emitters outside the schemes because not all sectors and emitters are included under the schemes and the current allocations are not very tight.

**In the case no agreement can be reached in the next couple of years regarding a follow-up for the 1<sup>st</sup> commitment period, the EU ETS will be the sole market for credits.** Excluding LULUCF will then mean no action whatsoever for those countries that have no emission in non-LULUCF sectors; pre-dominantly the least developed countries. In this context it may also be worth remembering that LULUCF, besides contributing to the economic development of non-Annex I countries, can assist EU Member States in the search for the most cost-efficient manner to meet its emissions reduction target. The pressure to develop appropriate NAPs would in this case be of even greater importance as weak allocation plans destroy the market for credits resulting in a lack



of demand, low prices, etc. To still continue to provide incentives to good forest management in such a scenario, within the EU and outside, tough targets under the NAPs would need to be set and the list of eligible activities would need to be broadened.

## 9.2 Recommendations

1. EU Member States should seek clarification from the Commission what the status is of the review of the 1<sup>st</sup> phase of the EU ETS;
2. EU Member States should request the inclusion of LULUCF in the 2<sup>nd</sup> phase of the EU ETS;
3. National Allocation Plans for the 2<sup>nd</sup> phase should take on tougher targets to stimulate action and to avoid the extra burden on emitters and installations not included under the NAP;
4. EU Member States should investigate how it can benefit optimally from the LULUCF sector in future without jeopardizing the achievement of non-climate change related objectives in its forestry sector, such as landscape aesthetics, bio-diversity, energy crop production, etc.;
5. Extending the list of eligible LULUCF project activities, predominantly under the CDM, and predominantly in the area of REDD, should be explored seriously; and,
6. Links with other emission trading schemes, such as those of Switzerland and Norway, should be explored and pursued.







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# Annex 1

Full text Directive 2003/87/EC





## Annex 2

Full text Linking Directive 2004/101/EC