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The Kyoto Protocol and the Effect of Existing and Planned Measures in the Agricultural and Forestry Sector in the EU25.

Authors: Francesco Bosello, Barbara Buchner, Jacopo Crimi, Carlo Giupponi and Andrea Povellato

Author's Organisation : FEEM

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Table of Contents

1 Introduction

Agricultural and forestry activities occupy the majority of the EU territory. Although their decreasing importance in the general economy, in terms of Gross Domestic Product, farming and forestry still play a key role in determining the health of the rural economy as well as the quality of the rural landscape and of the environment in general. According to the estimation of land use made by LUCAS survey, agriculture accounts for more than 41% of the territory, making it the leading type of land use in the EU15, while forestry comes second, with a percentage of 30% (Eurostat, 2003). The situation is extremely diversified, ranging from several countries where more than two third of the territory is used for farming to few countries where forestry accounts for over half the territory. However in all the countries there is an increasing awareness of the strong linkage exiting between agro-forestry systems and environment, both for the pressure on environment coming from the rural activities and for the environmental and recreational values entrusted to rural areas. So far land management has became an important priority in the Common Agricultural Policy (CAP), even in the new member countries where rural economy is still quite essential in the context of general economic development (IAMO, 2004).

The role of farming both as a source of and as a sink of GHG varies significantly because of the different agricultural practice adopted by farmers and of the diversified environmental condition of the agricultural areas in Europe. As stated by several studies the contribution of agriculture to GHG emissions is not negligible and, according to official estimates (Duchateau, Vidal, 2003), agricultural activities are responsible for 10% of the total GHG emissions in EU15, mainly represented by nitrous oxide (56%) and methane (43%). Agriculture is a small emitter of carbon dioxide, if the use of fossil fuels for agricultural machinery, heating and drying is not considered (1.3% of total emissions). CO_2 emissions may arise from the conversion of existing forest and natural grassland to agricultural land use, but the trends in Europe about land use make very unlikely this hypothesis.

On the other hand agricultural and forest land can be a sink for carbon dioxide. Land use change from agriculture to forestry and conversion of arable land to permanent grassland are the main sources of carbon sequestration. Land abandoned process is relevant in Europe, although the natural transition from agriculture to forests/shrubs is very complex to be monitored. Other methods to increase the sink function are associated with specific farming and forestry management practices. Considering the complexity to monitor carbon storage, there is still considerable discussion about the feasibility of estimating the amount of CO_2 absorbed by farming and forestry. The presentation of a Good Practice Guidance for Land Use, Land-Use Change and Forestry (LULUCF) have made more clear the procedure to estimate the carbon sinks (IPCC, 2003), but the effectiveness and security of such sequestration may be only temporary (EEA, 2003b).

An important feature of the climate change policy related to agriculture and forestry concerns the positive side-effects of policy measures aimed to promote the adoption of low-impact practices and the conversion of intensive production systems to more sustainable systems. In particular, carbon sequestration is not independent from the other environmental effects of a change in land-use practice. Potential co-benefits can include wildlife habitat, water quality, soil conservation, energy savings and landscape aesthetics. Policy implications of co-benefit are relevant in terms of cost effectiveness of mitigation strategies.

In what follows, section 2 introduces the normative framework at the EU level that regulates and/or sets incentives for the adoption of these measures; section 3 focuses on the Member State level to describe country strategies; section 4 offers a quantitative evaluation of the effects of existing and

planned measures, providing also a perspective picture analysing past and future trends in GHG emissions; finally section 5 provides some conclusive remarks.

2 The EU policy framework

This section provides an overview on the framework that regulates the relationships between agriculture, forestry and GHG emissions at the EU level.

2.1. Climate change policy, agriculture and forestry.

Since the beginning of the EU climate change policy - that can be dated back to 1991 when the first Community strategy to limit CO_2 emissions and improve energy efficiency was issued - reduction policies, limits and strategies were targeted not to agriculture and forestry, but to different sectors, mainly energy, industry and transportation. In 1999 the report "Key developments in the implementation of the 5th Environmental Action Program (EAP)", was released. It assessed strengths, weaknesses and accomplishment of that Program that devised priorities and strategies for the EU environmental policy from 1993 to 2001. The 5th EAP is of particular relevance for EU mitigation policies, as it was the first to devote a particular area of intervention to climate change. The report highlighted that agriculture and forestry had only a marginal direct influence on the phenomenon, and that regulation in those sectors focused more on the issues of acidification, inland water quality, coastal zones and biodiversity.

The 1998 signature of the Kyoto Protocol by the EU, did not substantially change this situation. By signing, the EU as a whole agreed a total emission reduction target of –8% compared to the 1990 emission level, to be accomplished within the 2008-2012 period (the Kyoto "First Commitment Period"). Country-specific targets were also set for each member state as part of the 'burden-sharing agreement' included in the EC's ratification instrument for Kyoto that was deposited with the UNFCCC in 2002. Finally, sector-specific emission targets at the country level were set in National Allocation Plans (NAP) under the framework of the European Emission Trading Scheme becoming operational in January 2005 (for a detailed description of NAP see Bosello and Buchner, 2004). In all this process, agriculture and forestry still remained marginally involved: interestingly, NAPs in their current "warm-up phase" (2005-2007) neither involve agricultural sectors nor cover GHGs different from CO_2, accordingly no specific emission reduction targets are presently imposed to agriculture or to its major emissions: N_2O and CH_4. Moreover very few member states presently have specific emissions reduction plans targeted to agriculture (see below). The marginal role attributed to agriculture and forestry in the area of climate-change mitigation is also demonstrated by the recent European Environmental Agency Third Assessment Report (2003), whose conclusions on the role of agriculture and forestry in relation to the problem of GHG emissions are not too far from the above-mentioned 1999 report to the 5th EAP .

Nevertheless, there are good possibilities and signals that this situation will change. This is due to a very practical fact: agriculture is one of the economic sectors to which EU and country commitment to reduce GHGs emissions applies. Due to the high "global warming potential" of N_2O and CH_4 (310 and 21 times that of CO_2 over a 100-year horizon, respectively) and the differences in sectoral abatement costs, it can be conceivable that emissions of non-CO_2 GHGs should be reduced by more than the overall country targets and CO_2 emissions by less than the overall country targets to gain cost-efficiency. In the scientific community there is a wide consensus on the cost-saving opportunities offered by a multi-gas approach to GHG reduction strategies. For instance Manne and Richels (2004) show that a target imposing the stabilisation of total global warming potential to 3.5 watts per square meter will imply a loss of nearly 1% of world discounted consumption over the next century if only CO_2 is affected, whereas the loss would be reduced to 0.25% in the case non CO_2 gases and sinks were also involved. Similarly Klaassen et al. 2004, show that a 15% GHG

emission reduction to be accomplished within 2020 will cost to the EU nearly 0.18% of 2020 GDP if mitigation tackled only CO_2, while the cost would drop to 0.038% of 2020 GDP if mitigation options for N_2O and CH_4 performed also by the agricultural sector (namely reduced enteric fermentation, improved efficiency in rice and soil cultivation) were considered. Similar conclusions were also drawn by Manne and Richels (2000), Jansen and Telle (2001) and Vielle et al. (2004).

These scientific findings are somewhat reflected by the EU initiative. Indeed, the recognised need to reinforce EU climate change strategies after the Kyoto signature, led the Commission to launch the European Climate Change Programme (ECCP) in June 2000. The goal of the ECCP was to identify and develop all the necessary elements of an EU strategy, in the form of proposal and recommendations, to implement the Kyoto Protocol. ECCP represents now the main framework for policy action in this field.

The "second phase" of the ECCP (2002-2003) was of particular relevance for agriculture and forestry. Firstly the 2001 "Proposal for a Directive on the Promotion and the Use of Biofuels for Transport" was translated into the Directive 2003/30/EC on the promotion of the use of biofuels or other renewable fuels for transport (see below). Secondly, different Working Groups (WG) studied and suggested a set of specific interventions in agriculture and forestry. WG7 on agriculture proposed a wide range of interventions with GHG reduction potential: in the case of N_2O the different measures focused basically on a more efficient use of the different kinds of N-fertilisers (e.g. the institution of fertiliser-free zones, optimisation of distribution geometry, improved fertiliser efficiency through precision farming etc.). These were estimated to provide a cost-effective reduction of the equivalent of 10 Mt of CO_2 during the first Kyoto commitment period. According to WG7 these results could be achieved with the proper implementation of the nitrate directive, water legislation and a constructive implementation of measures within the rural development policy. The conclusions on CH_4 were less optimistic: measures devised to reduce emissions from enteric fermentation were estimated either to have a very small reduction potential (like e.g. the improvement in livestock lifetime efficiency), or a high potential, but low-cost efficiency (like anaerobic digestion).

The "Working Group on Sinks related to Agricultural Soils" identified a set of "most promising measures" to reduce CO_2 emissions from or enhance CO_2 storage in agricultural soils. These were: promoting the use of organic input on arable land, permanent revegetation of arable set-aside land (e.g. afforestation) or extensivation of arable production by introduction of perennial components, biofuel production with short-rotation coppice plantations and perennial grasses, promoting organic farming, promoting permanently shallow water table in farmed peat land and zero or reduced tillage. Carbon sequestration potential was estimated to be relevant - up to 60-70 Mt CO_2/year for the EU15 ranging from the 19%-20% of the EU15 commitment during the first commitment period - nevertheless a possible major limitation to the practical application of the measures was devised in regional differences imposing country or even site-specific ad-hoc strategies.

Finally, the "Working Group on Forest Sink", pointed out that afforestation, reforestation and deforestation activities in the EU could provide some contribution in terms of C-sinks to the GHG accounts for the first Kyoto Protocol commitment period. Still, during this first commitment period, their expected contribution is quite limited (19Mt CO_2 eq. representing 5.5% of the reduction required or 8% of 1990 emissions), even though potential improvements especially in the longer term were devised. The most promising measure in this case was identified in the short rotation tree plantations with possible substantial impact already in the first commitment period through direct substitution of fossil fuel for energy production. However, this would need to be supported by additional measures on the demand side (promotion of biomass for renewable energy, electricity and heat).

All the working groups highlighted two crucial aspects: first, the still high level of uncertainty surrounding all the quantitative analyses provided, calling for great caution in the interpretation of results; second, the necessity to consider all the measures proposed as interlinked and necessarily part of a broader and coherent strategy for GHG reduction.

The above-mentioned indications of the ECCP are now at the basis of legislative interventions at the EU level and also offer guidance to the design and implementation of policies at the Member State level. Accordingly, further future medium greenhouse gas emission savings could occur through either implemented and existing policies or additional regulatory, economic and fiscal measures inspired by the ECCP.

Before the release of the ECCP, emission reductions in agriculture often were not the response to a legislation expressly linked to climate-change priorities or to the Kyoto process itself, but to other pieces of legislation, aiming more generally to the improvement of air and water quality standards or to the implementation of "good agricultural practices".

Thus summarising, two situations may be devised: in a first case a range of interventions exists that regulates directly some kind of GHG emissions, irrespective of the source; thus agriculture is naturally involved when it is an emitter of those gases. Alternatively, directives and regulations act directly on agriculture and forestry management and practises, but to provide incentives to the implementation of environmental-friendly activities which can bring GHG reductions only as an indirect side benefit. It is worth emphasising that under the pressure of this "indirect" legislation GHG emissions reduction in agriculture has already been accomplished.

For instance between 1990 and 2001, EU nitrous oxide emissions from agricultural soils were estimated to fall by 8 % and EU methane emissions from enteric fermentation (by cattle) by 9 % (EEA 2003a). In the first case the result is mainly due to the 1991 Nitrate Directive aimed at reducing water pollution (see below), but also the consequence of the Common Agricultural Policy (CAP) reform (see below), in the second case the observed reduction depends on the reduction of the number of cattle which is also partly a consequence of "good agricultural practices" embedded in the CAP.

In the following section a brief overview of the directives that had relevance in promoting the adoption of mitigation strategies in the agro-forestry sector since the 90's is reported.

Directives directly targeted to climate-change mitigation with relevance for agriculture and forestry.

Directive 2003/30/EC on the promotion of the use of biofuels or other renewable fuels for transport.

Description: This Directive aims at promoting the use of biofuels (liquid or gaseous fuels produced from biomass) or other renewable fuels to replace diesel or petrol for transport purposes in each Member State in order to contributing to meeting climate change commitments, environmental friendly security of supply and promoting renewable energy sources. Member States have to set national indicative targets to ensure that a minimum proportion of biofuels and other renewable fuels is placed on their markets.
Comments: the Directive gives concrete realisation to one of the proposal contained in the 2000 European Climate Change Programme. It is directly relevant for climate change as it should reduce the consumption of fossil fuels. Indirectly it regards agriculture as it promotes the cultivation of some kind of crops and the use of biomass.

Directives targeted to improved environmental quality with indirect effect on GHG emission reduction from agriculture and forestry.

Council Directive 85/203/EEC of 7 March 1985 on air quality standards for nitrogen dioxide.
Description: To monitor and limit the quantity of nitrogen dioxide in the atmosphere.

The Directive specifies, for the concentration of nitrogen dioxide in the atmosphere:

- a limit value which may not be exceeded throughout the Member States during specified periods;
- guide values, designed to improve the protection of human health and of the environment.

On 19 July 2001, the Directive was partly repealed by Directive 199/30 (see below).
Comments: The Directive is directly relevant to air quality standards. It is indirectly relevant for agriculture as in some cases limits for NOx can foster specific control measures. Indirectly this is also beneficial to climate as N_2O is a greenhouse gas.

Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources (the Nitrate Directive).

Description: It consists in the following points:
- identification of vulnerable zones to nitrate;
- establishment of code of "good agricultural practices";
- establishment and implementation of actions programs including training;
- limitation to the land application of fertilisers and setting of specific limits to the application of manure;
- Monitoring of water to assess that the measures are effective.

Comments: the Directive is directly relevant to water quality standards. It tackles directly agriculture emissions of nitrates. Indirectly this is relevant for climate-change mitigation strategies as emissions of N_2O which is a greenhouse gas will be reduced.

Council Directive 96/62/EC of 27 September 1996 on ambient air quality assessment and management

Description: Establishes the basic principles of a common strategy to define and set objectives for ambient air quality in order to avoid, prevent or reduce harmful effects on human health and the environment. To assess ambient air quality in the Member States and inform the public, notably by means of alert thresholds.
Tackles the definition of limit values and alert thresholds for the following pollutants:

- sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead;
- benzene and carbon monoxide;
- ozone;
- polycyclic aromatic hydrocarbons, cadmium, arsenic, nickel and mercury.

Comments: the Directive is directly relevant to air quality standards. It is indirectly relevant for agriculture as in some cases alert thresholds and limitation specially for NOx can impose specific control measures. This indirectly is also beneficial to climate as N_2O is a greenhouse gas.

Council Directive 1999/30/EC of 22 April 1999 laying down limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulates and lead in the ambient air.

Description: To maintain or improve the quality of the ambient air by establishing limit values for the concentrations of sulphur dioxide, nitrogen dioxide and nitrogen oxides, particulates and lead, together with alert thresholds for concentrations of sulphur dioxide and nitrogen dioxide in the ambient air by evaluating those concentrations on the basis of common methods and criteria, and by bringing together suitable information on such concentrations in order to keep the public informed.
Includes setting limits, monitoring and diffusion of information.

Comments: the Directive is directly relevant to air quality standards. It is indirectly relevant for agriculture as in some cases limit values specially for the concentration of NOx can stimulate the adoption of specific control measures. Limit to the concentration of NOx is also beneficial to climate as N_2O is a greenhouse gas.

Directive 2000/25/EC of the European Parliament and of the Council of 22 May 2000 on action to be taken against the emission of gaseous and particulate pollutants by engines intended to power agricultural or forestry.

Description: To reduce the atmospheric pollution caused by agricultural or forestry tractor engines by laying down, at Community level, standards for acceptable emissions that apply to those engines.
Comments: the Directive is directly relevant to air quality standards. It tackles directly the agricultural and forestry sectors. Indirectly it can be relevant for climate-change mitigation as reduction in some kind of emissions from engines used in agriculture and forestry can reduce also their greenhouse potential.

Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants.

Description: The aim of this Directive is to limit emissions of acidifying and eutrophying pollutants and ozone precursors in order to improve the protection in the Community of the environment and human health against risks of adverse effects from acidification, soil eutrophication and ground-level ozone. In addition the Directive aims at moving towards the long-term objectives of not exceeding critical levels and loads and of effective protection of all people against recognised health risks from air pollution by establishing national emission ceilings, taking the years 2010 and 2020 as benchmarks.

Comments: This Directive is directly relevant for air quality, nevertheless it is indirectly relevant for climate change as it provides for the introduction, by the end of 2010 at the latest, of national emission ceilings among others for sulphur dioxide (SO2), and nitrogen oxides (NOx), which are partly responsible of global warming. It is also relevant for agriculture as nitrogen is emitted by agriculture.

2.2 CAP Reform and mitigation strategies

After three decades of public intervention in agriculture completely devoted to support farmers' income and increase factor productivity, CAP was subject to a key reform in 1992 and for the first time environmental protection was acknowledge as an objective of agricultural policy. Although MacSharry reform was largely aimed at restoring market balance and improving the competitiveness of EU agriculture, the promotion of less intensive production methods through price reduction was expected to reduce the pressure on the environment as well as to cut farm surpluses. For the first time on a large scale financial incentives were available through specific agri-environment schemes (reg. 2078/92) and afforestation schemes (reg. 2080/92). These measures represented the core of the emerging agri-environmental policy (Lowe, Baldock, 2000). GHG reduction was not an explicit objective of these first agri-environmental schemes and potential positive effects on the carbon balance could be seen as a by-product of strategies aimed to reduce pollution and to support farming in high nature value areas.

The implementation of the agri-environmental policy was not free from criticisms, due to the poor targeting of many schemes from an environmental perspective and even to the substantial lack of environmental benefits (European Commission, 1998). From the institutional point of view another objection raise from the marked different strategies formulated by the ministries of agriculture, responsible for the integration of environmental objectives in the CAP, and the ministries of environment responsible for the implementation of environmental directives. These last mandatory policy instruments, mainly justified under the polluter-pays principle, have generally found the opposition of agriculture ministries and of farming groups due to possible restrictions on farming practices (Lowe, Baldock, 2000). The case of Nitrate Directive, one of the less implemented directive among member states, is exemplary in this context. Although only indirectly affected by Nitrate Directive, GHG emission reduction has not been so substantial as in the case of a prompt implementation process.

Another round of the CAP reform process came into force with the approval of Agenda 2000 in 1999. In general the new reform followed the directions of the Mac Sharry reform, adding few additional resources directly to environmental supports and linking more clearly the agri-environment and afforestation measures to the rural development policy, the so-called "second pillar" of the CAP, where the "first pillar" is represented by the market policies (Lowe, Brouwer, 2000; Baldock, *et al.*, 2002). From an environmental perspective, the most important change is the introduction of cross-compliance and environmental standards. Following the polluter-pays principle, farmers receive direct payments only if they respect basic standards in the production methods and can be compensated for agri-environment efforts beyond the so-called "good agricultural practices". Member States were left with considerable discretion over how to proceed, due to different relations between agriculture and environment by farming systems ad regions. The achievement of effective environmental benefits was not significant but the introduction of the cross-compliance concepts suggested a new course for the reform process.

In June 2003 a further fundamental reform was agreed following an undertaking to carry out a mid-term review of the application of Agenda 2000 CAP. This reform, which is expected to enter into force in 2005, represents a radical change in the way the EU supports its farm sector. Regulations 1782/03 and 1783/03 setting the normative framework for the mid-term CAP review define its key elements: de-coupling, modulation and cross compliance. These principles continue to back the Agenda 2000 priorities, but their scope has clearly widened.

Decoupling means the conversion of direct payments under the different schemes into a unique farm payment which is kept constant in time and is not depending on the land allocation among

different crops. In practice this means that there is no direct linkage between a specific agricultural production and direct payments such that income support will depend less on price distortion and EU markets will be more open to foreign competition. The changes in market and price support could also have effects on the use of inputs and therefore encourage less intensive production methods with likely positive effects on environment.

Modulation, shifting from the present voluntary system to a compulsory one in 2005, is intended to partly correct the uneven distribution of direct payments and, at the same time to induce reallocation of funds from the direct payment in the first pillar of the CAP into the second pillar (rural development). More financial resources for rural development measures means more chances to expand the land management schemes, now joined in one of the three axis (general objectives) of the new regulation for rural development that will come into force in 2006.

More relevant under the environmental viewpoint is the strengthening of cross-compliance which emphasises the linkage between direct payments in the first pillar of the CAP and standards at the farm level, based on specified EU regulations (Regulation (EC) 1782/2003, Annex III), as well as the notion to maintain eligible agricultural land in good agricultural and environmental conditions (Annex IV of the Regulation). The new mechanism of cross-compliance seems to have a double objectives: on one hand to enforce the implementation of environmental directives at Member States level, on the other to cover neglected environmental aspects, such as soil conservation. It is worth to mention the recent document concerning a EU strategy for soil protection, where the Climate Change Convention is explicitly cited and specific carbon sequestration measures are signalled through the increase of soil organic matter (European Commission, 2002).

Because of its particular relevance for GHG emissions, a particular mention deserves here the content of articles 88 and 89 consisting in an aid of 45 Euro per hectare per year granted for areas sown under energy crops (biofuels and biomass for electric and thermal energy production).
In summary, after the current reforms will have been implemented, the new CAP will respond better to the consumers' priorities and help both rural economies, the environment as well as farmers. The regulations covered by the CAP can contribute to the reduction of GHG emissions through a general improvement of the environmental conditions in agriculture and forestry.

This overview on the general normative framework in the EU has painted the broad picture of directive and regulations affecting the GHG emissions from agriculture and forestry. In order to highlight their implications, the next section will go into more detail by analysing the specific measures and policies implemented and/or planned in the EU Member States.

3 A qualitative assessment of measures applied to the agricultural and forestry sector.

3.1 A country description

The sources used for the country descriptions are the 3rd National Communications to the UNFCC. As can be seen some of them are very detailed with a clear distinction between aims of the overall mitigation strategy, a description of the related policy measures and often a specification of the technical measures supported by those policies. Some others are lacking under one or the other aspect. Another important remark is that, being released between 1999 and 2003, the 3rd National Communications (an exception is Ireland) do not take into account possible effects of the last Mid-Term Review of the CAP. Nevertheless they still remain a valuable (and often the only) source of information to draw a comprehensive picture of what is happening at the country level.

In presenting country pictures, we try to emphasise (when possible) the difference between strategies, interpreted as major goals pursued; policy framework, which is the direct recall to the

relevant legislation, program or regulation that implement the strategy; type of policy, which highlights the mean by which the policy operates and finally - in the "comment" – the technical measures i.e. the kind of activities or practices affected. In our opinion this can help to distinguish those measures directly aimed to the reduction of GHG emissions and accordingly more "Kyoto-driven", from those measures more closely related to CAP requirements.

3.1.1 Austria

Strategy. Extension of ecological farming
Policy Measure/Framework: Austrian Programme for Environmentally Compatible Agriculture (APECA) I and II. The main drivers of Austrian policy are the process of complying with Kyoto targets and the guidelines provided by CAP.
Description **Implementing entity/ies: *Federation, Länder, EU.*** **Type of policy: *Promotive-subsidies.*** **GHG affected: CH4, N2O.** **Target/s: *n. r.*** **Comments:** Programme co-financed by the EU. The Federation, *Länder* and the EU gave compensation payments to organic farmers at a value of 64 millions Euro in 2000. Set of activities promoted through direct subsidies (not exaustive)**:** improved manure management, limitation of livestock density, reduced use of mineral fertilisers.

Strategy: Increase bio-fuel production
Policy Measure/Framework: n. r.
Description. **Implementing entity: *Federation, Länder.*** **Type of Policy: *Promotive-tax exemption.*** **GHG affected: CO2** **Target/s: *n. r.*** **Comments:** Liquid bio fuels have been entirely exempted from mineral oils taxes.

Strategy: Accompanying measures to N2O and CH4 reduction
Policy Measure/Framework: n. r.
Description. **Implementing entity: *Federation, Länder.*** **Type of Policy: *Promotive-information-training.*** **GHG affected: CO2, N2O, CH4** **Target/s: *n. r.*** **Comments:** mainly awareness-raising voluntary programmes. Set of activities promoted**:** training programmes for farmers on ecologically sound production methods, recommendation to offer biological meals in restaurants, schools, hospitals.

Strategy: Carbon sink Improvement
Policy Measure: n. r.
Description.

Implementing entity: ***Federation, Länder.***   **Type of Policy:** ***Regulatory, research, information.***   **GHG affected: CO2**   **Target/s:** ***No specific target stated, but intend to maintain the present level of forest area of the country (nearly 47%)***   **Comments:**   Set of activities promoted**:** sustainable management and improved protection of forests from air pollutants,   reduction of damage from deer and cattle, preservation and increase of biological diversity.

3.1.2 Belgium

Flemish Region.

Strategy. Direct reduction of GHG
Policy Measure/Framework: Manure Action Plan (in force since 2000)
Description   **Implementing entity/ies: Flemish Region, VLM Manure Bank**   **Type of policy:** ***Regulatory.***   **GHG affected: CH4, N2O.**   **Target/s:** ***Specific standards on nitrogen spreading and limit on livestock number.***   **Comments:** techniques of manure transformation are developed, in order to convert animal waste into exportable products, without additional emission of greenhouse gases; different systems of assessing the nutrient balance are provided as management instruments to assist farmers; these systems must enable quantities of nutrients entering and leaving a given system (farm, plot of land, animal) to be calculated.
Policy Measure/Framework: Plan to reduce pig breeding
Description   **Implementing entity/ies:** ***Flemish Region, Agricultural and Horticultural administration***   **Type of policy:** ***Promotive: financial support.***   **GHG affected: CH4, N2O.**   **Target/s:** ***n.r.***   **Comments:**
Policy Measure/Framework: Plan to Reducing Ammonia (in force since the end of 2000)
Description   **Implementing entity/ies: Flemish Region**   **Type of policy:** ***Promotive***   **GHG affected: Ammonia, indirectly CH4 and N2O.**   **Target/s:** ***n.r.***   **Comments:** The principal measures target changes of practice in storing, handling and spreading liquid manure. The plan relies on a phased approach in which the most effective measures (from the cost point of view) will be applied first.

Strategy: Extension to organic farming
Policy Measure/Framework: Organic Farming Action Plan..

Description. **Implementing entity:** ***Flemish Region, Agricultural and Horticultural administration*** **Type of Policy:** ***Promotive.*** **GHG affected: CO2, CH4, N2O** **Target/s:** ***To cultivate 10% of farmland organically by 2010*****..** **Comments:** Includes support for investment, permanent training, supervision of reorientation, promotion and sale of farm produce, and education
Policy Measure/Framework: Flanders Rural Development Programme.
Description. **Implementing entity:** ***Flemish Region*** **Type of Policy:** ***Promotive.*** **GHG affected: CO2, CH4, N2O** **Target/s:** ***n.r.*** **Comments:** Includes: promotion of methods of production that favour quality and animal welfare; accelerated development of activities extending organic farming and the marketing of organic produce; involvement of farmers and horticulturists in the management of the natural environment, within the farm structure, plus in predefined zones; conversion towards sustainable water management..

Walloon Region

Strategy. Promoting Sustainable Agriculture in Wallonia
Policy Measure/Framework: The **"**Wallon Rural Development Plan" and the "Decree for the Sustainable Management of Nitrogen in Agriculture" provide the policy framework to sustainable agriculture in Wallonia, promoting the adoption of specific measures with direct relevance for GHG reduction. These measures are:
Agri-environmental measures: the introduction of extensive strips of meadow or grassed strips at the side of cropfields along waterways to avoid losses of nitrogen and pesticides onto the surface water;- the introduction of seeded crops in between other cultivated crops in order to reduce the loss of nitrates by leaching or run-off by 50%. **Comments:** These measures are supported financially to the tune of 50% by the Walloon Region and 50% by the EU.
Storage, handling and spreading of farmyard manure.
Reduction in the application of mineral nitrogen.
Description **Implementing entity/ies: Walloon Region** **Type of policy:** ***Promotive, financial support.*** **GHG affected: CH4 and N2O.** **Target/s:** ***n.r.*** **Comments:**

Strategy. Carbon Sink Improvement
Policy Measure/Framework: Supervising reforestation
Description **Implementing entity/ies:** ***Federal State, Ministry of Agriculture*** **Type of policy:** ***Promotive-financial support*** **GHG affected: CO2.** **Target/s:** ***n.r.*****.**

Comments: Phased out in 2000
Policy Measure/Framework: Reforestation
Description **Implementing entity/ies:** ***Flemish Region, Dept of Wood and Countryside*** **Type of policy:** ***Promotive: financial support.*** **GHG affected: CO2.** **Target/s:** ***n.r.*** **Comments:** the authorities are pursuing a purchasing policy aiming to create new areas of woodland; secondly they are pursuing a policy of financial support aiming to initiate reforestation initiatives by local authorities or individuals.
Policy Measure/Framework: Prohibition of deforestation
Description **Implementing entity/ies:** ***Flemish Region Dept of Wood and Countryside*** **Type of policy:** ***Regulatory*** **GHG affected: CO2.** **Target/s:** ***n.r.*** **Comments:** the deforestation of ground outside residential and industrial areas is no longer allowed unless special exemption is obtained from the general prohibition of deforestation. Furthermore, if any trees are felled from a plot of land compensation is required; this may be made in kind (by planting trees elsewhere), or by a payment.
Policy Measure/Framework: Rural Development Plan
Description **Implementing entity/ies:** ***Walloon Region*** **Type of policy:** ***Promotive-financial support*** **GHG affected: CO2.** **Target/s:** ***n.r.*** **Comments:** compensation for the lack of income for proprietors who practice forest conservation, by a policy of awarding allowances to private proprietors for setting up, managing and conservation of private forest reserves.
Policy Measure/Framework: Wood Energy Plan
Description **Implementing entity/ies:** ***Walloon Region*** **Type of policy:** ***Pilot projects*** **GHG affected: CO2.** **Target/s:** ***n.r.*** **Comments:** targeted at initiating and conducting a dozen projects for automatic wood heating, gas generation or other technologies using wood designed to recover energy from wood in Wallonia.

3.1.3 Czech Republic

Strategy: GHG reduction through increased bio-fuel production
Policy Measure/Framework: Strategy of Protection of the Climate System of the Earth in C.R.. Since 2002 replaced by the Clean Air Act as a direct response to the C.R. Kyoto Protocol commitment and to harmonisation purposes with EU legislation in view of acceding to the EU.

Description. **Implementing entity: *State (Ministry of Agriculture).*** **Type of Policy: *Promotive – subsidies.*** **GHG affected: CO2** **Target: n. r.** **Comments:** It is a support programme for bio-fuel production targeted to bio fuel from methyl ester of rape-seed oil (bio-diesel fuel) and bioethanol taking the form in the form of non returnable subsidies provided by the Ministry of Agriculture.

Strategy: Carbon sink Improvement
Policy Measure/Framework: Strategy of Protection of the Climate System of the Earth in C.R.. Since 2002 replaced by the Clean Air Act as a direct response to the Kyoto Protocol commitment and to harmonisation purposes with EC legislation in view of accession.
Description. **Implementing entity: *State (Ministry of Agriculture).*** **Type of Policy: *Promotive – subsidies.*** **GHG affected: CO2** **Target: n. r.** **Comments:** It is a support programme for afforestation of uncultivated agricultural areas including protection of established forest cultures, in the form of non returnable financial assistance provided by the Ministry of Agriculture.

3.1.4 Denmark

Strategy. Direct GHG Reduction
Policy Measure/Framework: Action plans for aquatic environment I and II
Description **Implementing entity/ies: *Central and County authorities.*** **Type of policy: *Regulatory and Economic information.*** **GHG affected: N2O.** **Target/s: *n. r.*** **Comments:** Include: Improved use of fodder, reduced animal density, use of catch crops, reduced fertilisation and use of nitrogen in manure.
Policy Measure/Framework: Ban on burning of straw on fields
Description. **Implementing entity: *Central and Country authorities.*** **Type of Policy: *Order.*** **GHG affected: N2O, CO2** **Target/s: *n. r.*** **Comments:**
Policy Measure/Framework: S-Plan for Ammonia Treatment
Description. **Implementing entity: *Central and Country authorities.*** **Type of Policy: *Order*** **GHG affected: N2O** **Target/s: *n. r.***

Comments: Include optimisation of manure handling, ban on broad spreading manure, ban on top dressing and reduction of time from field application of manure to incorporation, ban on ammonia treatment of straw.
Policy Measure: Biomass Agreement on the use of biofuel
Description. **Implementing entity:** ***State and electricity producers.*** **Type of Policy:** ***Voluntary.*** **GHG affected: CO2, N2O** **Target/s:** **Comments:** include biomass agreement on use of straw as fuel, increased use of biogas plants, biomass agreement on the use of wood chips as fuel.

Strategy. Carbon Sink Improvement
Policy Measure/Framework: Subsidy scheme for private afforestation
Description **Implementing entity/ies:** ***National Forest and Nature agency.*** **Type of policy:** ***Promotive, subsisdies.*** **GHG affected: CO2.** **Target/s:** ***Increase in forest area from 450000 to 500000 ha in 100 ys time*** **Comments:**

3.1.5 Estonia

Strategy. Extension of Organic farming
Policy Measure/Framework: Organic Agriculture Act
Description **Implementing entity/ies:** ***n.r.*** **Type of policy:** ***Regulatory*** **GHG affected: CO2, N2O, CH4** **Target/s:** ***n. r.*** **Comments:** Includes restrictions in the use of pesticides and ecolabelling

Strategy. GHG reduction
Policy Measure/Framework: Ambient Air Protection Act
Description **Implementing entity/ies:** ***Ministry of the Environment.*** **Type of policy:** ***Regulatory.*** **GHG affected: CO2, N2O, CH4** **Target/s:** ***n. r.*** **Comments:**

Strategy. Carbon Sink Improvement
Policy Measure/Framework: Estonian National Environmental Strategy
Description **Implementing entity/ies:** ***Ministry of the Environment.*** **Type of policy:** ***Regulatory.*** **GHG affected: CO2** **Target/s:** ***n. r.*** **Comments:**

Policy Measure/Framework: Estonian Forestry Strategy
Description. **Implementing entity:** ***Ministry of the Environment.*** **Type of Policy:** ***Regulatory.*** **GHG affected: CO2** **Target/s:** ***Afforest nearly 100000 ha of abandoned land*** **Comments:**
Policy Measure/Framework: Forest Act
Description. **Implementing entity:** ***Ministry of the Environment.*** **Type of Policy:** ***Regulatory*** **GHG affected: CO2** **Target/s:** ***n. r.*** **Comments:** three goals: renewal of forests, production of wood by logging, and direction of the growth of a new forest generation.
Policy Measure: Reforestation of Mining Areas
Description. **Implementing entity:** ***Ministry of the Environment.*** **Type of Policy:** ***Regulatory.*** **GHG affected: CO2** **Target/s:** ***300 ha of closed opencast oil shale mines afforested per year*** **Comments:**

3.1.6 Finland

Strategy. Development of environmental sustainable agriculture
Policy Measure/Framework: Horizontal Rural Development Programme.
Description **Implementing entity/ies:** ***n.r.*** **Type of policy:** ***Regulatory, Promotive – taxes and subsidies.*** **GHG affected: CO2, CH4, N2O.** **Target/s:** ***n. r.*** **Comments:**.

Strategy. Carbon Sink Improvement
Policy Measure/Framework: Finland National Forest Program
Description **Implementing entity/ies:** ***n.r.*** **Type of policy:** ***Promotive, Voluntary.*** **GHG affected: CO2** **Target/s:** ***Objectives for 2010 Include:*** ***– to increase the forest industry's annual use of domestic roundwood by 5–10 million cubic metres.*** ***– to double the value of the wood industry's exports to EUR 4.2 billion per year.*** – ***to increase the annual use of wood for energy production by 5 million cubic metres***. **Comments:** includes, forest certification, increase wood use, extend the area of forest management, increase investment in forestry protection and improvement, and in research and training in the field of forestry and silviculture.

3.1.7 France

Strategy: GHG reduction
Policy Measure/Framework: ***Programme de Maitrise des Pollutions Agricoles (PMPOA-1994)***
Description. **Implementing entity:** ***Ministry of Agriculture and Fishery (Map)*** **Type of Policy:** ***n.r.*** **GHG affected:** ***CH4, N2O*** **Target/s:** **Comments.** Includes: decrease in cattle density, limitation on use of fertilisers, increase efficiency and environmental sustainability of manure management, increase manure stockage in sensible periods

Strategy: Support to bio-fuel production and use
Policy Measure/Framework: n.r.
Description. **Implementing entity:** ***n.r.*** **Type of Policy:** ***Promotive*** **GHG affected:** ***CO2*** **Target/s:** ***n.r.*** **Comments:** 400.000 hect. presently devoted to this activity with reduced emissions equal to 1 MtCO2/y Biofuel in this case refers to ethanol and methilester from vegetal oil.

Strategy: Carbon Sink Improvement
Policy Measure/Framework: Plan National pour la foret francaise – 1999
Description. **Implementing entity:** ***n.r.*** **Type of Policy:** ***Promotive*** **GHG affected:** ***CO2*** **Target/s:** ***30.000 hect. per year of new forestry before 2006*** **Comments:**

3.1.8 Germany

Strategy. Expansion of Organic Farming
Policy Measure/Framework: n.r.
Description **Implementing entity/ies: Federal Government, Agriculture** **Type of policy:** ***Economic, Voluntary.*** **GHG affected: CO2, CH4, N2O.** **Target/s:** ***n. r.*** **Comments:**.

Strategy. GHG Reduction
Policy Measure/Framework: Fertiliser Ordinance
Description **Implementing entity/ies: Federal Government,** **Type of policy:** ***Regulatory.*** **GHG affected:CH4, N2O.**

Target/s: *n. r.*
Comments:. Provides for biogas use in liquid-manure-treatment systems built primarily for manufacturing fertiliser products for precision nitrogen fertilisation and for fertiliser use in keeping with proper practice; this is expected to reduce nitrogen input into the soil from 174 kg/ha in 1990 to 160 kg/ha in 2005

Strategy: Carbon Sink Improvement

Policy Measure/Framework:

Description
Implementing entity/ies: Federal Government, Federal Lander, Forestry Sector
Type of policy: *Economic, Regulatory, Voluntary.*
GHG affected: CO2.
Target/s: *n. r.*
Comments:. Management and protection of existing forests, initial afforestation. Expansion of use of wood products.

Strategy. Increase the use of renewables

Policy Measure/Framework:
- Renewable raw materials programme.
– Renewable energy sources act.
– Biomass ordinance.
– Biogenic fuels and lubricants programme.

Description
Implementing entity/ies: Federal Government, Agriculture
Type of policy: *Economic, Voluntary.*
GHG affected: CO2.
Target/s: *n. r.*
Comments:.

3.1.9 Greece

Strategy. Expansion of organic farming

Policy Measure/Framework: Second National Climate Change Program

Description
Implementing entity/ies:
Type of policy:
GHG affected: CO2, N2O, CH4
Target/s: *A target of 200,000 ha cultivated according to the practices of organic farming is set.*

Comments: accompanying measure is the improved manure management

Strategy. Carbon Sink Improvement

Policy Measure/Framework: Second National Climate Change Program

Description **Implementing entity/ies:** **Type of policy:** **GHG affected: CO2.** **Target/s: *n.r.*** **Comments:** includes reforestation, construction, maintenance and improvements in the forests' road network, economic development on mountainous communities, private forestry, control of forest fires, national forest parks, inventory of forests, studies, afforestation of agricultural land, settlement of the various streams in mountainous areas.

3.1.10 Hungary

Strategy. Extension of Ecological Farming
Policy Measure/Framework: National Climate Change Strategy (Government Decision 2206/2000) –setting priorities 2000-2012.
Description **Implementing entity/ies: *n.r.*** **Type of policy: *Regulatory, Promotive. Taxes, subsidies.*** **GHG affected: CH4, N2O.** **Target/s: *n.r.*** **Comments:** Dissemination of sustainable agricultural and animal husbandry methods together with the utilisation of resulting methane as biogas.

Strategy. Carbon Sink Improvement
Policy Measure/Framework: National Climate Change Strategy (Government Decision 2206/2000) –setting priorities 2000-2012.
Description **Implementing entity/ies: *n.r.*** **Type of policy: *Regulatory*** **GHG affected: CO2.** **Target/s: *In addition to standard afforestation policies, 700000 ha of agricultural land under current cultivation will be taken out of cultivation subsequent to the accession to the EU.*** **Comments:**

3.1.11 Ireland

Strategy. Direct reduction of GHG emissions
Policy Measure/Framework: National Climate Change Strategy – setting priorities 2000-2010 -
Description **Implementing entity/ies: *n.r.*** **Type of policy: *Promotive - subsidies, premia.*** **GHG affected: CH4** **Target/s: *n.r.*** **Comments:** Incentives include: Extensification premia - Special Beef Premium - Disadvantaged Areas Compensatory Allowances - Suckler Cow Premium, all inducing a

decrease in livestock density. Moreover a Lower Age at Slaughter Premium.
Policy Measure/Framework: Rural Environmental Protection Scheme
Description **Implementing entity/ies: *n.r.*** **Type of policy: *Voluntary*** **GHG affected: N2O** **Target/s: *n.r.*** **Comments:** Environmental standards for manure management and fertiliser use higher than those of "good agricultural practices".
Policy Measure/Framework: Application of 2001 "Good Farming Practice Rules"
Description **Implementing entity/ies: *n.r.*** **Type of policy: *Order – Compulsory – Penalties*** **GHG affected: CH4, N2O** **Target/s: *n.r.*** **Comments:** Environmental standards for manure management and fertiliser use higher than those of "good agricultural practices".

Strategy. Carbon Sink Improvement
Policy Measure/Framework: National Climate Change Strategy – Government Forestry Program: "Growing for the Future"
Description **Implementing entity/ies: *n.r.*** **Type of policy: *Promotive – incentives*** **GHG affected: CO2.** **Target/s: *An afforestation rate of 20,000 ha/year is current policy, to reach a national forest cover of 17% by 2030.*** **Comments:**

3.1.12 Italy

Strategy: Extension of Organic Farming
Policy Measure/Framework: Incentives provided under EU Regulations no. 2078/92.
Description **Implementing entity/ies: *n.r.*** **Type of policy: *Promotive*** **GHG affected: *CO2, NH3*** **Target/s: *n.r.*** **Comments:** Emissions avoided could total 0.337 Mt CO2 in 2010.

Strategy: Enhance Use of biogas
Policy Measure/Framework: n.r.

Description **Implementing entity/ies: *n.r.*** **Type of policy: *Regulative, Promotive*** **GHG affected: *CH4*** **Target/s: *n.r.*** **Comments:** Use of biogas to combustion or cogeneration plants: Technical regulations (IPPC) for new plants, regional financing for existing plants

Strategy: Direct GHG Reduction
Policy Measure/Framework: National law implementing EU Directive no. 676/91
Description **Implementing entity/ies: *n.r.*** **Type of policy: *Programme agreements and regulations*** **GHG affected: *N2O*** **Target/s: *n.r*** **Comments:** Rationalisation of fertiliser use through implementation of Good Agricultural – Practice, Improved manure management.

Strategy: Increase Sink Potential
Policy Measure/Framework: National law implementing EEC Regulation 2080/92
Description **Implementing entity/ies: *n.r.*** **Type of policy: *n.r.*** **GHG affected: *CO2*** **Target/s: n.r.** **Comments:** Afforestation plantings performed total 117,428 hectares;
Policy Measure/Framework: *n.r.*
Description **Implementing entity/ies: *n.r.*** **Type of policy: *n.r.*** **GHG affected: *CO2*** **Target/s: n.r.** **Comments:** Natural reforestation which includes the natural expansion of the forested area as a result of policies for the reduction of farming-pasture surface area and for the protection of the environment; Certification of carbon removal; Creation of National Forestry Inventory of Carbon (2005).

3.1.13 Latvia

Strategy: Development of environmentally sustainable Agriculture
Policy Measure/Framework: Rural Development program**.**
Description. **Implementing entity: *Public institutions, local governement, agricultural producers*** **Type of Policy: *Promotive*** **GHG affected: *CH4, N2O*** **Target/s: *n.r.*** **Comments:**
Policy Measure/Framework: SAPARD rural development program.

Description. **Implementing entity:** ***Rural Support Service (SSS) and agricultural producers*** **Type of Policy:** ***Promotive*** **GHG affected:** ***CH4, N2O, CO2*** **Target/s:** ***n.r.*** **Comments:**
Policy Measure/Framework: Adoption of Good Agricultural Practices
Description. **Implementing entity:** ***Agricultural producers*** **Type of Policy:** ***Voluntary*** **GHG affected: N2O** **Target/s:** ***n.r.*** **Comments:**
Strategy: Use of renewable energy
Policy Measure/Framework: n.r.
Description. **Implementing entity:** ***n.r.*** **Type of Policy:** ***Promotive and Regulative*** **GHG affected: CO2** **Target/s:** **Comments:** Processing of animal-origin waste.

Strategy: Increase Sink Potential
Policy Measure/Framework: Forest Policy - 1998
Description. **Implementing entity:** ***Ministry of Agriculture*** **Type of Policy:** ***n.r.*** **GHG affected: CO2** **Target/s:** **Comments:** Targeted afforestation of abandoned agricultural land (voluntary), Increase forest productivity,

3.1.14 Lithuania

Strategy: Development of environmentally sustainable agriculture
Policy Measure/Framework: Code for Good Practice in Agriculture (CGPA).
Description. **Implementing entity:** ***n.r.*** **Type of Policy:** ***Promotive, Regulatory*** **GHG affected:** ***CO2, CH4, N2O*** **Target/s:** ***n.r.*** **Comments:** Measures in the field of tilling and growing of agricultural crops, of animal husbandry. Measures in biodiversity and landscape management.
Policy Measure/Framework: Rural Development Fund (1997).

Description. **Implementing entity:** ***n.r.*** **Type of Policy:** ***Research information*** **GHG affected:** ***CO2, CH4, N2O*** **Target/s:** ***n.r.*** **Comments:** Investment programmes of high priority, research and analysis system of agricultural resources and product quality, financing agricultural research works, consultation and training.
Policy Measure/Framework: Programme for the restructuring of the traditional agriculture.
Description. **Implementing entity:** ***n.r.*** **Type of Policy:** ***n.r.*** **GHG affected:** ***n.r.*** **Target/s:** **Comments:** Implementation in the Karst Region in northern Lithuania (1993).
Policy Measure/Framework: Programme for the protection of underground waters.
Description. **Implementing entity:** ***n.r.*** **Type of Policy:** ***n.r.*** **GHG affected:** ***n.r.*** **Target/s:** **Comments:** Implementation in the most vulnerable areas of the Karst Region (1993).
Policy Measure/Framework: ***n.r.***
Description. **Implementing entity:** ***n.r.*** **Type of Policy:** ***Promotive*** **GHG affected:** ***n.r.*** **Target/s:** ***n.r.*** **Comments:** Funds for investment projects, Subsidies to farmers who engage in ecological and sustainable farming, Establishment of an organic farming community “Gaja”. Organic farms are inspected and supervised in accordance with the requirements and standards set up by the European Union and International Federation of Organic Farming.

Strategy: Carbon sink improvement
Policy Measure/Framework: ***The Forest Fund***
Description. **Implementing entity:** ***n.r.*** **Type of Policy:** ***Regulative*** **GHG affected:** ***n.r.*** **Target/s:** ***n.r.*** **Comments:** prepare the national inventory of the Lithuanian forest, to assess timber resources, its quality, and to evaluate the usage norms of these resources, a strategy and a new draft law on the preserved territories; prepare the Forest Development Strategy; a programme for the enlargement of the Lithuanian forest area

3.1.15 The Netherlands

Strategy: Development of environmentally sustainable agriculture
Policy Measure/Framework: Energy savings in greenhouse horti-culture**.**

Description. **Implementing entity:** **Type of Policy:** ***Voluntary agreement, regulations , CO2 buffer project, fiscal incentives, subsidies*** **GHG affected:** ***CO2*** **Target/s:** ***Improve energy efficiency by 65% between 1980 and 2010*** **Comments:**

Strategy: Carbon sink improvement
Policy Measure/Framework: CO2 sequestration
Description. **Implementing entity:** ***National Government*** **Type of Policy:** ***Promotive, Certification*** **GHG affected:** ***CO2*** **Target/s:** ***n.r.*** **Comments:** To accelerate afforestation in the Netherlands by certification of CO2, reduction from forests fiscal incentives

3.1.16 Poland

Strategy: Development of environmentally sustainable agriculture
Policy Measure/Framework: Programme for Development of Environmental Agriculture (1997).
Description. **Implementing entity:** ***n.r.*** **Type of Policy:** ***Regulative*** **GHG affected: CO2, CH4, N2O** **Target/s:** ***n.r.*** **Comments:** To improve and modernise the area structure of farms and establish the conditions for sustainable development, includes: Programmes for soil protection; Programme for improvement of agricultural economy on the hydrogenic soil areas; Programme for adaptation of mineral and organic fertilisation techniques and technologies to meet environmental protection requirements; Programme for adaptation of plant protection to meet environmental protection requirements and needs of agricultural production; Production technologies on grassland, and a programme of adapting them to meet environmental protection requirements; Programme for adjustment of animal production techniques and technologies to improve environmental quality of foodstuffs; Programme for promoting good practice in farming; Programme for enhancement of environmental education in rural communities.

Strategy: GHG reduction
Policy Measure/Framework: n.r.

Description. **Implementing entity: *n.r.*** **Type of Policy: *n.r.*** **GHG affected: CH4** **Target/s:** **Comments:** Includes litter rearing of ruminants and adjustment of livestock volume to the market needs.
Policy Measure/Framework: n.r.
Description. **Implementing entity: *n.r.*** **Type of Policy: *n.r.*** **GHG affected: *N2O*** **Target/s: *n.r.*** **Comments:** Optimisation of fertilising combined with crops production efficiency: improved efficiency of nitrogen fertilisers use; improved techniques of feeding animals; improved systems of breeding livestock.

Strategy: Carbon sink improvement
Policy Measure/Framework: National Programme of Increasing Forest Cover, State Forestry Policy
Description. **Implementing entity: *n.r.*** **Type of Policy: *n.r.*** **GHG affected: CO2** **Target/s: *To enhance 45 forest cover in Poland up to 30% by 2020 and up to 33% by 2050.*** **Comments:** This means that 700 thousand hectares have to be afforested by 2020 and further 1.5 million hectares within next 30 years.

3.1.17 Portugal

Strategy: Carbon sink improvement
Policy Measure/Framework: Framework Law on Forestry Policy (Law number 33/96 of August 17) and Plan for the Sustainable Development of Portuguese Forests (Council of Ministers Resolution number 27/99 of April 8)
Description. **Implementing entity: *Various*** **Type of Policy: *Promotive and Regulative*** **GHG affected: *CO2*** **Target/s: *n.r.*** **Comments:** Include the followings measures
Policy Measure/Framework: Regional Strategies for Forest Planning
Description. **Implementing entity: *DGF - General Directorate for Forestry*** **Type of Policy: *Regulative*** **GHG affected: *CO2*** **Target/s: *n.r.*** **Comments:** Aims to establish appropriate sustainable forest management strategies for each region
Policy Measure/Framework: Sustainable Development of Forests (AGRO Programme)

Description. **Implementing entity:** ***DGF - General Directorate for Forestry*** **Type of Policy:** ***Promotive*** **GHG affected: CO2** **Target/s:** ***n.r.*** **Comments:** Productivity support to tree planting of forest spaces, to the productivity rehabilitation of damaged forests and to the promotion of multi-use of forest spaces.
Policy Measure/Framework: RURIS Programme Afforestation of agricultural land
Description. **Implementing entity:** ***IFADAP*** **Type of Policy:** ***Promotive*** **GHG affected: CO2** **Target/s:** ***n.r.*** **Comments:** Aims to promote quality forest extension to agricultural lands with species adapted to the environment.
Policy Measure/Framework: AGRIS Programme / Measure- Sustainable Management and ecological stability of forests
Description. **Implementing entity:** ***IFADAP - Institute for Agriculture and Fisheries Funding and Development Support*** **Type of Policy:** ***Promotive*** **GHG affected:** ***CO2*** **Target/s:** ***n.r.*** **Comments:** Aims to promote quality forest extension to agricultural lands with species adapted to the environment.

3.1.18 Slovakia

Strategy: Rationalisation of the energy system in agriculture
Policy Measure/Framework: Regulation of the Ministry of Agriculture of the Slovak Republic No. 928/1992 – 100 on the support of enterprise in agriculture
Description. **Implementing entity:** ***Ministry of Agriculture*** **Type of Policy:** ***Regulative and Promotive*** **GHG affected: CO2** **Target/s: n.r.** **Comments:**

Strategy: GHG Reduction
Policy Measure/Framework: Act No. 307/1992 on Agricultural Soil Protection ammended by Act No. 83/2000 Coll.; Act No. 136/2000 Coll. on Fertilisers
Description. **Implementing entity:** ***Ministry of Agriculture*** **Type of Policy:** ***Regulative*** **GHG affected: CH4** **Target/s: n.r.** **Comments:**

Policy Measure/Framework: Act No. 307/1992 on Agricultural Soil Protection ammended by Act No. 83/2000 Coll.; Directive of the Ministry of Agriculture of the SR No. 5000/1982 on the Water Protection against Agricultural Contamination; Directive of the Ministry of Agriculture of the SR No. 5001/1982 on Manipulation with and Utilisation of Liquid Manure and Liquidation of Ensilage Juices
Description. **Implementing entity:** ***Ministry of Agriculture*** **Type of Policy:** ***Regulative*** **GHG affected: N2O** **Target/s: n.r.** **Comments:**

Strategy: Carbon sink improvement
Policy Measure/Framework: Soil Stock Protection
Description. **Implementing entity:** ***Ministry of Agriculture*** **Type of Policy:** ***Regulative*** **GHG affected: CO2** **Target/s: n.r.** **Comments:**
Policy Measure/Framework: Regulation of timber extraction
Description. **Implementing entity:** ***Ministry of Agriculture*** **Type of Policy:** ***Regulative*** **GHG affected: CO2** **Target/s: n.r.** **Comments:**
Policy Measure/Framework: Afforestation of Non-forest area
Description. **Implementing entity:** ***Ministry of Agriculture*** **Type of Policy:** ***Regulative*** **GHG affected: CO2** **Target/s: n.r.** **Comments:**

3.1.19 Slovenia

Strategy: Promote sustainable agriculture
Policy Measure/Framework: Subsidies per area of arable land
Description. **Implementing entity:** ***n.r.*** **Type of Policy:** ***Promotive*** **GHG affected: CH4, N2O** **Target/s:** ***n.r.*** **Comments:** Transition from subsidies per unit of food produced to subsidies per area of arable land. Includes: organic agriculture, greater share of grazing, production of higher-quality fodder, reduced use of mineral fertilisers.

Strategy: Reduce GHG emission
Policy Measure/Framework: n.r.

Description. **Implementing entity:** ***n.r.*** **Type of Policy:** ***n.r.*** **GHG affected:** ***CH4*** **Target/s:** ***n.r.*** **Comments:** Planned measure will be focused particularly on ensuring the production of higher-quality voluminous fodder and on selectively improving the genetic potential of cattle for the purpose of reducing emissions resulting from enteric fermentation in the production of milk and beef. In addition, the state will promote the preservation of traditional systems of separate collection of solid and liquid manure, and increase the share of grazing.
Policy Measure/Framework: Decree on the Input of Plant Nutrients and Protective Agents into the Soil
Description. **Implementing entity:** ***n.r.*** **Type of Policy:** ***n.r.*** **GHG affected:** ***N2O*** **Target/s:** ***n.r.*** **Comments:** The 2001 updated version of the Decree limited the annual input of nitrogen via animal fertilisers to 170 kg/ha.
Policy Measure/Framework: n.r.
Description. **Implementing entity:** ***n.r.*** **Type of Policy:** ***n.r.*** **GHG affected:** ***N2O*** **Target/s:** ***n.r.*** **Comments:** Planned measure aims to reduce the input of nitrogen into soil by: enhancing the quality of fertilisation, taking into account the needs of plants and agro-meteorological conditions, tackling the input of nitrogen via rainfall.

Strategy: Carbon sink improvement
Policy Measure/Framework: Implementation of National Forest Development Programme.
Description. **Implementing entity:** ***n.r.*** **Type of Policy:** ***n.r.*** **GHG affected:** ***CO2*** **Target/s:** ***n.r.*** **Comments:** Planned measure aims to implement a comprehensive approach to forest management, taking into account the environmental, production and social functions of forests.

3.1.20 Spain

Strategy. GHG reduction
Policy Measure/Framework: Action Programmes targeted to Nitrates vulnerable areas Implementation of "good agricultural practices" for rational fertilization
Description **Implementing entity/ies:** ***Ministry of the environment, General secretariat of***

agriculture, Local communities, . **Type of policy: *Educational, voluntary*** **GHG affected: N2O, CO2.** **Target/s:** **Comments:**
Policy Measure/Framework: Implementation of PAC requirements Spanish rural development program for accompanying measures
Description **Implementing entity/ies: *Ministry of agriculture, food and fishery, Local communities, .*** **Type of policy: Regulatory, *Economic – quotas, taxes*** **GHG affected: N2O, CH4, CO2.** **Target/s:** **Comments:**
Policy Measure/Framework: Inter-ministry co-ordination program
Description **Implementing entity/ies: *Interminstry departments and ministry of agriculture, food and fishery*** **Type of policy: *Regulatory, Economic*** **GHG affected: CO2.** **Target/s:** **Comments:** Increasing areas dedicated to biomass production.
Policy Measure/Framework: Plan for Renewable Energy
Description **Implementing entity/ies: *Ministry of the environment, General secretariat of agriculture, sub-directorat general of cultivation .*** **Type of policy: *Information*** **GHG affected: CO2, CH4, N2O.** **Target/s:** **Comments:** Includes GHG emission inventory for agriculture, nitrogen balances, crop mapping, agroclimatic zones mapping, erosion and run-off zones mapping.
Policy Measure/Framework: *n.r.*
Description **Implementing entity/ies: *Ministry of the environment, General secretariat of agriculture, sub-directorat general of cultivation .*** **Type of policy: *Information*** **GHG affected: CO2, CH4, N2O.** **Target/s:** **Comments:** Includes GHG emission inventory for agriculture, nitrogen balances, crop mapping, agroclimatic zones mapping, erosion and run-off zones mapping.

Strategy. Carbon Sink Improvement
Policy Measure/Framework: Spanish Forestry Plan, Priority Action Plan Against Forest Fires National Program of Action Against desertification

Description **Implementing entity/ies:** ***Ministry of agriculture food and fishery, Ministry of the environment, Local communities.*** **Type of policy:** ***n.r.*** **GHG affected: CO2.** **Target/s:** **Comments:** Includes afforestation, reforestation, improved forest management and fire protection.
Policy Measure/Framework:
Description **Implementing entity/ies:** ***Ministry of the environment, research centres.*** **Type of policy:** ***Information*** **GHG affected: CO2.** **Target/s:** **Comments:** Includes national forests inventory, National forest mapping, environmental database, investigation on biomass potential, carbon sink inventory

3.1.21 Sweden

Strategy: General support to agriculutural sector
Policy Measure/Framework: Includes about 50 sets of regulations
Description **Implementing entity/ies:** ***n.r.*** **Type of policy:** ***Various*** **GHG affected:** ***n.r*** **Target/s:** ***n.r.*** **Comments:**. Even though most instruments exist on the supply side of the agricultural market, it is on the demand side that there is the greatest potential for reducing the sector's impact on climate.

Strategy: Cultivation of energy forest, production of energy forest fuel
Policy Measure/Framework: n.r.
Description **Implementing entity/ies:** ***n.r.*** **Type of policy:** ***n.r.*** **GHG affected:** ***CO2*** **Target/s:** ***n. r.*** **Comments:** Cultivation of energy forest is about 15,000 hectares; may produce a yield corresponding to 0.5 TWh fuel per year.

Strategy: Production of biomass fuels
Policy Measure/Framework: n.r.
Description **Implementing entity/ies:** ***n.r.*** **Type of policy:** ***n.r.*** **GHG affected:** ***CO2*** **Target/s:** ***n.r.*** **Comments:** Other biomass fuels based on agricultural products, mainly straw, amounted to about 0.4 TWh per year. Small quantities of biogas, energy grass and RME are also produced

Strategy: Maintain an open cultivated landscape, conserve biodiversity and reduce nutrient
Policy Measure/Framework: n.r.
Description **Implementing entity/ies: *n.r.*** **Type of policy: Promotive** **GHG affected: *n.r.*** **Target/s: *n.r.*** **Comments:** Different forms of specific, targeted environmental support, largely adapted to national conditions.Indirect influence on GHG; no evaluation is at now available

Strategy: GHG reduction
Policy Measure/Framework: n.r.
Description **Implementing entity/ies: *n.r.*** **Type of policy: *n.r.*** **GHG affected: *CO2*** **Target/s: *n.r.*** **Comments:** General policies to reduce CO2 emissions from direct and indirect use of fossil fuels: reduce use of mechanical soil cultivation to reduce diesel consumption
Policy Measure/Framework: n.r.
Description **Implementing entity/ies: *n.r.*** **Type of policy: *n.r.*** **GHG affected: *CH4, N2O*** **Target/s: *n.r.*** **Comments:** Manure management and Livestock reduction: the changeover from solid manure to slurry management tends to increase methane emissions but reduce those of nitrous oxide

3.1.22 United Kingdom

Strategy: Encouragement in the growth of renewable energy crops on intensively managed
Policy Measure/Framework: Rural Development Plan
Description **Implementing entity/ies: *n.r.*** **Type of policy:** **GHG affected: *n.r*** **Target/s: *n.r.*** **Comments:** a new energy crops scheme will provide support for the growth of short rotation coppice and miscanthus.

Strategy: Improve energy efficiency
Policy Measure/Framework: n.r.

Description **Implementing entity/ies: *n.r.*** **Type of policy: Promotive, Subsidies** **GHG affected: *n.r*** **Target/s: *n.r.*** **Comments:** The Government has given a temporary 50% discount for up to five years for horticultural businesses, recognising that this sector includes a large number of small businesses, is energy intensive, and special treatment is given to horticultural firms in some other countries. Businesses in the intensive pig and poultry rearing sectors can also join climate change agreements and obtain an 80% discount from the levy;

Strategy: Use of poultry litter for power generation
Policy Measure/Framework: n.r.
Description **Implementing entity/ies: *n.r.*** **Type of policy: *n.r*** **GHG affected: CH4** **Target/s: *n.r.*** **Comments:** The stations have, in the past, consumed 42% of total poultry litter produced, but this figure had decreased to 16% in 2000 when one of the power plants began to use alternative biomass materials.

Strategy: Increase Carbon Sink
Policy Measure/Framework: The UK Forestry standard (1998)
Description **Implementing entity/ies: *Local Governement*** **Type of policy: *n.r*** **GHG affected: CO2** **Target/s: *n.r.*** **Comments:** Forestry policies implemented by the Government and devolved administrations mean that sequestration of carbon by woodlands could save up to 3.4 MtC in 2010, of which 0.6 MtC will be from afforestation since 1990.

3.2 Comparative Analysis

The data presented in the previous section allowed for the preliminary characterisation of the policies of 22 Member States (MS's). Given all the limitations deriving from the sources of information (poor technical contents, little details, etc.), to some extent compensated by the fact that National Communications (NC's) are official and rather homogeneous documents, a general picture of the situation in Europe can be derived and a preliminary comparative analysis attempted, with reference to the information available before autumn 2004. The updated versions of this document planned for autumn 2005 and 2006 may provide a more concrete basis for evaluation. In particular the second update, the 2006 one may substantially benefit from the fourth NC's, theoretically due by January 2006.

The structure of agricultural and forestry policy relevant for the scope of the present analysis at the EU level, as reported at the MS level, can be categorised into four main groups of measures:

1 – Measures concerned with the introduction of sustainable agricultural systems, directly or indirectly related to the agri-environmental measures of the Rural Development Plans, with expected positive side effects on GHG reduction;

2 – Measures concerned with the reduction of GHG emissions, by introducing/supporting specific livestock and crop production systems with expected positive effects on GHG reduction;

3 – Measures concerned with the reduction of GHG emissions, by introducing/supporting the production and use of biofuels, including biogas;

4 – Measures targeted to carbon sink improvement.

The classification of the measures is not always perfectly clear, as sometimes their description is not sufficiently detailed, or they include complex mechanisms targeting more than one objective.
Nevertheless, some general trends and distinctive features can be derived by analysing the contents of Table 1.

Measures belonging to the first group are typically voluntary and based upon the financial resources of the CAP for providing incentives or subsidies to the farmers. The vast majority of MS's have included a much diversified set of measures in the National Communications. The link of such measures with the expected benefit in terms of combating global change is in general very vague. Expected positive effects are related to a plethora of different, usually indirect, effects, such as the sequestration of CO_2 in soils as a consequence of reduced tillage, which is expected to limit the mineralisation of soil organic matter. In many cases enhanced management techniques in the livestock production sector are listed as a means for limiting CH_4 emissions from livestock rearing plants and/or from the utilisation of manures as fertilisers for crop production. Benefits in the emissions of N_2O are expected from the improvement of fertilisation in general and the management of livestock wastes, which is a crucial aspect concerning the role of agricultural activities and GHG emissions also, and in particular, for what concerns methane, the main contribution to global change from the primary sector.

Measures of the second and third category are more directly related to GHG emission reduction, since they target more specifically the emissions from agricultural sources and the potential benefits from the substitution of fossil fuel with biofuel and biogas.

In the case of measures targeted to increase biofuel and biogas production, present in half of the NC's, mainly from central and northern Europe, CO_2 emissions are usually targeted through incentives or tax exemption mechanisms aimed at the increased use of renewable energy sources. Biodiesel produced by energy crops such as rape seed, or short rotation coppice as a direct source of energy are typical solutions, which may provide tangible and measurable effects on GHG budgets at the national scale. More complex would be the assessment of the expected benefit of the second category of measures, which includes a broad set of options targeting in particular CH_4 and N_2O emissions, with promotive/voluntary approaches aimed in general at providing increased energy efficiency in the primary sector. The approaches adopted usually focus on manures and their treatment. Synergic positive effects are expected in the case of biogas production, since the utilisation of biogas substitutes the use of fossil fuels and, at the same time, limits the emissions of CH_4 and N_2O from agricultural sources.

Those measures attempt to introduce multi-objective optimised approaches capable to cope with both problems, but whose effects are very difficult to estimate. At this regard, it must be remembered that quite often in the past strategies for combating water pollution from nutrients

released from manures and chemical fertilisers have produced detrimental effects on air pollution and GHG emissions.

The fourth category includes those measures targeted to increase carbon sequestration by forest, to be planted, improved or differently managed. CO_2 is the GHG targeted, through measures to be implemented both through regulative and voluntary measures supported by incentives. The assessment of those measures is relatively easy and consolidated whenever they produce a measurable surface area of new forest. More debatable is the quantification of the changes in forest management. This category seems to be the most consolidated approach for combating GHG emissions from the primary production side and all MS's, apart from Ireland, have adopted policies of this type.

In general the categories of measures and instruments are coherent with the policy framework outlined in section 2 of this document. Diversified strategies are implemented by the various MS's, but the overall criterion seems to be the reassessment of existing CAP measures for benefiting from their side effects in terms of contributions to the obligations of the Kioto Protocol.

Table 1: Summary matrix of measures per category and Member States.

	Promotion of ecological/organic/sustainable farming					GHG reduction though various measures					GHG reduction though increased biofuel or biogas production					Carbon sink Improvement				
	No. of measures	Sector	GHG affected	Regulative/Promotive/Voluntary	Subsidies_Incentives/Taxations/Research_Inform	No. of measures	Sector	GHG affected	Regulative/Promotive/Voluntary	Subsidies_Incentives/Taxations/Research_Inform	No. of measures	Sector	GHG affected	Regulative/Promotive/Voluntary	Subsidies_Incentives/Taxations/Research_Inform	No. of measures	Sector	GHG affected	Regulative/Promotive/Voluntary	Subsidies_Incentives/Taxations/Research_Inform
Austria	1	livestock & fertilisers	CH4 N2O	P	S	1	food	CO2 N2O CH4	P	R	1	biofuel	CO2	P	T	1	forest	CO2	R	R
Belgium	2	livestock & crop	NH3 CO2 N2O CH4	P P	S S	3	livestock & manure	CH4 N2O	P R R	S						4	forest	CO2	P P R O	S S S
Czech Republic											1	biofuel	CO2	P	S		forest	CO2	P	S
Denmark						3	livestock crop manure & biogas	CO2 N2O	R R R V							1	forest	CO2	P	S
Estonia	1	crop	CO2 N2O	R							1	?	CO2 N2O	?	?	4	forest	CO2	R R	

			CH4										CH4						R R	
Finland	?	?	CO2 N2O CH4	R P	S											1	forest	CO2	P V	
France						1	livestock crop & manure	CH4 N2O	P		1	biofuel	CO2	P		1	forest	CO2	P	
Germany	?	livestock & crop	CO2 N2O CH4	V							2	fertilisers & biogas	CO2 N2O CH4	R V		1	forest	CO2	R V	
Greece	1	manure	CO2 N2O CH4	?												1	forest	CO2	P	
Hungary	1	livestock crop & biogas	CH4 N2O	R P	S T											1	forest	CO2	R	
Ireland	2	livestock & crop & manure	CH4 N2O	R V	S						1	livestock	CH4	P	S					
Italy	1	crop	CO2 NH3	P	S						2	biogas manure & fertilisers	CH4 N2O	P R		2	forest	CO2	P	
Latvia	3	livestock & crop	CO2 N2O CH4	P V							1	biogas	CO2	R P		1	forest	CO2	V	

Lithuania	5	livestock & crop	CO2 N2O CH4	R P	(R)											1	forest	CO2	R	
The Netherlands	1	crop horticulture	CO2	R V	S T											1	forest	CO2	P	
Poland	1	livestock & crop	CO2 N2O CH4	R		2	livestock crop & manure	CH4 N2O	P							1	forest	CO2	P	
Portugal																4	forest	CO2	R P	
Slovakia						3	energy livestock crop & manure	CO2 N2O CH4	R P							3	forest & soil	CO2	R	
Slovenia	4	livestock & crop	CO2 N2O CH4	P	S											1	forest	CO2		
Spain	5	energy livestock crop & manure	CO2 N2O CH4	R P V	S R											2	forest	CO2		R
Sweden	50 (?)	livestock & crop	?			2	energy & crop	CO2 N2O CH4			1	biofuel	CO2			1	forest & energy	CO2		

United Kingdom						3	energy livestock crop & manure	?	P	S						1	forest	CO2		

4 A quantitative assessment of measures applied to the agricultural and forestry sector

In what follows, we will report quantitative information about the expected effect of the existing and additional GHG reduction measures that the EU 25 member countries are adopting or are going to adopt in the next future. After presenting a general picture for the whole EU 25 economy, we will focus on the agricultural and forestry sector.
The bulk of information is based on Third National Communications of the EU25 member countries to the UNFCCC (released from 2001 to 2003). It is important to clarify that these data do not allow a fully consistent and homogeneous inter-country comparison. In fact, in particular when reporting projections, National Communications are often based on different underlying assumptions about the evolution of the key variables that drive the socio-economic scenario.
Accordingly, to offer a comparison and a consistency check to our calculations, we are also reporting, whenever appropriate, information from the EU Wide Projections (EEA, 2003a; 2003b) in which problems of internal consistency and comparability should be less severe.
Nevertheless, we still believe that it might be useful to present the highly disaggregated information provided by the National Communications..

4.1. The General picture

Table 2 offers a first global comparison between data reported by the Third National Communications and the EU Wide Projections (EEA, 2003).
Columns 3 and 4 summarise the values reported by the Third National Communications while column 5 shows those reported by the European Environmental Agency (2003a).
The comparison of the 4^{th} and 5^{th} columns, both showing the gap between projected emissions and the Kyoto target in percentage, highlights big discrepancies (greater than 5% versus the target) for Belgium, Denmark, Germany, The Netherlands, Spain and Hungary. As a consequence, by effect of existing mitigation measures, in 2010 total GHG emissions in the EU are estimated to be only 0.27% higher than the total reduction target according to the summary of National Communications, while the difference is 4.31% according to EU-wide projections. Germany is mainly responsible for this difference: according to its National Communications, by exploiting the GHG reduction policies already in place, in 2010 it should be able to present a GHG reduction over delivery of 15% compared to its Kyoto commitment, while according to EU Wide estimates it will present a shortfall, albeit small, of 1.3%.

Table 2: GHG emissions in the EU 25 in 2010 and their relation to the Kyoto target

		Third National Communications to the UNFCCC		**EEA 2003 "Europe's Environment, the Third Assessment"**
	Kyoto Target in Absolute Terms (Mt. CO_2 eq.) [a]	**2010 GHG Emission Projections With Existing Measures (Mt. CO_2 eq.)**	**2010 Required Additional Reduction in % of Target (**)**	**2010 Required Additional Reduction in % of Target [d]**

		[b]	[c]	
Austria	67.3	86.05	27.86	24
Belgium	133.7	171.18	28.03	23
Denmark	54.7	80.42	47.02	38
Finland	77.1	89.9	16.62	16
France	549.3	582.5	6.04	10
Germany	965.9	812.08	-15.93	1
Greece	131.1	147.21	12.28	11
Ireland	60.2	74	23.01	27
Italy	486.7	540.1	10.96	10
Luxembourg	7.9	na	na	6
The Netherlands	203.9	256	25.50	12
Portugal	82.5	95.2	15.41	14
Spain	240.3	307.4	27.94	33
Sweden	73.4	70.88	-3.41	-3
United Kingdom	649.7	630.67	-2.93	-3
Cyprus	na	na	na	na
Czech Republic	176.7	128.29	-27.40	-23
Estonia	40.0	18.86	-52.87	-49
Hungary	79.4	65.91	-16.99	0
Latvia	25.6	12.81	-49.92	-50
Lithuania	na	na	na	na
Malta	na	na	na	na
Poland	435.3	394	-9.48	-9
Slovakia	67.1	53.19	-20.73	-19
Slovenia	18.6	22.15	19.28	18
EU 25 TOTAL	4626.3	4638.8	0.27	4.31

Source: As reported in table
(**) Computed as: (([b]-[a])/[a])*100

Bearing this in mind, the following results are consistently highlighted by both sources:

1) Existing measures are not sufficient to bring the EU 25 to full compliance with Kyoto commitments. Additional reductions are required (in the range of 0.27%-4%).
2) The gaps between projected emissions and Kyoto targets are unevenly distributed. Notwithstanding existing measures, former EU 15 countries are projected to emit more than their Kyoto target (notable exceptions are the UK and Germany). On the contrary, Acceding Countries are projected to decrease their GHG emissions below their respective Kyoto commitments as an effect of current and planned mitigation measures coupled with the economic restructuring that started during the first half of the 1990s (the exception here is Slovenia).

3) In 2001, GHG emissions in the EU 15 were 2.3 % below the base-year level, taking the EU 15 little more than a quarter of the way towards its greenhouse gas emission target (-8%). This result was due to France, Germany, Luxembourg, Sweden and the United Kingdom being on track to reach their burden-sharing targets with domestic policies and measures. The remaining ten Member States were not on course, whereby in particular Ireland, Portugal and Spain headed towards exceeding their targets by more than 20 index points.
4) In 2001, GHG emissions in the 10 Accession Countries (now new member countries) were below the base-year level (- 36% according to EEA (2003a)).

4.2. Agriculture and Forestry

The following tables, 3 to 6, focus on the agriculture and forestry sectors in the EU25. They summarize the data reported extensively in the statistical appendix to this report built on information provided by Third National Communications. Readers should refer to the Statistical Appendix to this document to find indication on the major assumptions driving projection results. It is worth noting here that excepting Ireland, none of the National Communications examine the possible implication of the CAP mid-term review for GHG emissions.

According to national communications, in 2010 GHG emissions from the agriculture and forestry sectors will amount to nearly 2.5% of total EU GHG emissions (see Table 3). The difference between the "with measures" and the "with additional measures" cases is negligible. If these data are cleared from the sink effect provided by the forestry sector, agriculture emissions are estimated to represent nearly 7%-8% of total GHG emissions. The forestry sector in turn is estimated to supply a carbon storage service quantifiable in the range of 5.5% of total GHG emissions.

A comparison of the projected 2010 emissions with the 2001 data shows a decreasing contribution of the joint agricultural and forestry sectors to GHG emissions in the EU25. In particular, emissions decline from the historical 3.69% to the projected 2.5%.

As shown, this reduction is entirely due to lower emissions from agriculture and not to an increased sink potential provided by the forestry sector (LUCF sinks in fact slightly decline from nearly 6% in 2001 to 5.1%-5,6% in 2010). This means that the decline can basically be imputed to a reduced production of CH_4 and N_2O.

Three important remarks should be remembered: firstly here sink potential is considered with respect to total GHG emissions. Accordingly if both emissions and sink increase, but the first increases more than the second, sink capacity decreases. Secondly what is being shown is the EU 25 data, in some countries sink potential does increase (see statistical appendix). Thirdly and most importantly, all the consulted sources agree on the fact that the estimation of sink potential is particularly uncertain, and large inconsistencies have been found for example comparing historical data with projections. Thus information about sinks should be regarded just as an indication.

Table 3: GHG emissions in the EU 25: a focus on agriculture and forestry

	2001		**2010 With Measures**		**2010 With Additional Measures**	
	Mt CO_2 eq.	% of total GHG emissions(**)	Mt CO_2 eq.	% of total GHG emissions (**)	Mt CO_2 eq.	% of total GHG emissions (**)
***All Sectors** GHG Emissions*	4842.13	100	4638.80	100	4256.15	100
***Agriculture** GHG Emissions (Without Sinks)*	456.98	9.44	347.71	7.49	344.73	8.09
***Agriculture and Forestry** GHG emissions (With Sinks)*	178.22	3.69	110.15	2.37	105.72	2.48
***Sink Potential** (*)*	(-) 278.76	(-) 5.75	(-) 237.56	(-) 5.12	(-) 239.01	(-) 5.61

Source: Our computation based on Third National Communications to the UNFCCC.
(*) The minus sign as reported quantities are removals.
(**) Reported figures are percentages of total GHG emissions in the reference years – 2001 and 2010 (with measures and with additional measures) - which are set equal to 100.

Tables 4, 5 and 6 analyse the effect of existing and planned measures in a longer-term perspective, comparing the estimated figures for 2010 with the historical observation in 1990. The data confirm the general finding of Table 3: both emissions from agriculture and sink potential of the forestry sector are projected to decline. The former are estimated to be reduced by nearly 17% in the 1990-2010 period (Table 3) while the latter by 25% (Table 4).

Considering agriculture and forestry together, the net effect is a slight increase of GHG emissions in the 1990-2010 period that is estimated to range between 1%-5% (Table 6).

Table 4: GHG emissions from agriculture in the EU 25 (Excluding Sinks)

	1990 GHG Emissions From Agriculture	2010 GHG Emissions Projections From Agriculture With Existing Measures	2010 GHG Emissions Projections From Agriculture With Additional Measures
Mt CO_2 eq.	**418.94**	**347.71**	**344.73**
Index (**)	**100**	**82.99**	**82.28**

Source: Our computation based on Third National Communications to the UNFCCC.
(**) Reported figures are percentages of GHG emissions in 1990 which are set equal to 100.

Table 5: Sinks potential in the EU 25

	1990 LUCF Sink Potential	2010 LUCF Sink Potential With Existing Measures	2010 LUCF Sink Potential With Additional Measures
Mt CO_2 eq. (*)	**(-) 314.65**	**(-) 237.56**	**(-) 239.01**
Index (**)	**100**	**75.5**	**75.96**

Source: Our computation based on Third National Communications to the UNFCCC.
(*) The minus sign in table as reported quantities are removals.
(**) Reported figures are percentages of GHG sinks in 1990 which are set equal to 100.

Table 6: GHG emissions from agriculture and forestry in the EU 25 (Including Sinks)

	1990 GHG Emissions From Agriculture and Forestry	2010 GHG Emission Projections From Agriculture and Forestry With Existing Measures	2010 GHG Emission Projections From Agriculture and Forestry With Additional Measures
Mt CO_2 eq.	**104.29**	**110.15**	**105.72**
Index (**)	**100**	**105.72**	**101.37**

Source: Our computation based on Third National Communications to the UNFCCC.

(**) Reported figures are percentages of GHG emissions in 1990 which are set equal to 100.

As previously mentioned, the decreased emissions of N_2O within the 1990-2001 period are mainly imputable to the reduced and more efficient use of fertilisers fostered by the Nitrate Directive. CH_4 emissions follow a drop in the number of cattle also in response to CAP reform. These seem to remain the main causes of GHG emissions reductions also in the 2001-2010 period, even though CAP reform provisions (we recall that sources here report the effect of measures linked to the process of CAP reform starting from the 1992 Mac-Sharry reform to the "Agenda 2000" CAP reform and not to the last "Mid Term Review") will probably be increasingly important in inducing GHG reduction.

More insights in the comparison of these results with those reported by EEA (2003) may support some preliminary conclusions, as follows.

Historical information (data for 1990, 2001 and trends) is in line: both sources highlight that between 1990 and 2001, N_2O and CH_4 emissions in the EU15 agriculture sector fell roughly by 8%. As expected, a sharp difference can be observed when comparing projections. In particular, our finding that CH_4 and N_2O emissions from agriculture in the 1990-2010 period dropped by 17% is based on National Communications, and is remarkably higher than the 11% figure reported by EEA.
Differences between the National Communications and the EEA (2003) report can also be found in estimating the sink potential. At page 28, the EEA summary states: "The same eight Member States [Austria, Belgium, Finland, Netherlands, Portugal, Spain, Sweden] that have provided information on their plans to use the Kyoto mechanisms have also done it for their intended use of carbon sinks to achieve their targets. [...] there are plans to remove, by 2008–12, around 10 million tonnes CO_2 per year through forestry activities and an additional 3 million tonnes CO_2 per year through agricultural activities. These removal estimates represent almost 4 % of the total EU reduction required. The European climate change programme estimates that potentially 93–103 million tonnes CO_2 could be sequestered through the enhancement of sink activities in the agricultural and forestry sectors" (EEA, 2003a).

In fact, according to official GHG emissions inventories in 2001, the total sink potential provided by the forestry sector in the same 7 Member States (Spain excluded) was roughly equal to 60 million tonnes of CO_2 equivalent. According to National Communications, in 2010 this figure is projected to decrease to 41 million tonnes that in any case is much higher than the sink estimates provided by the EEA (13 million tonnes).

5 Concluding remarks to the 2004 release of D5

Since the 1992 Mac Sharry reform, the relevance of environmental issues in the development of a Common Agricultural Policy raised in importance and nowadays the protection of the environment in the form of an improved environmental quality and of the adoption/development of environment-sustainable agriculture and forestry is a recognised key target in the European CAP. The majority of measures promoting "green" agriculture and forestry work indirectly to decrease the negative impact of

these sectors on climate change as they usually rely on lower emission technologies or induce an increase in the sink potential.

As a completion of this policy, some EU Directives have been specifically targeted to the direct reduction of GHG from different agricultural practices to respond both to the need of improving the general environmental quality of the production and of contributing to the EU policy towards the implementation of the Kyoto Protocol on GHG reductions. Given this framework, the member states are allowed to set targets and define strategies.

Apart from country-specific bans and quotas on GHG emissions, common to all countries is the support to environmentally-sustainable farming activities. In addition, a number of very diverse policies are applied: forest protection and afforestation, incentives of the use of wood products, increased development and use of biofuels, monitoring and/or inventorying activities, research and development of "green" production methods, information and educational programmes.

It is important to highlight that even though measures at the country level still respond mainly to CAP requirements or to the improvement of air and water quality standards, especially after year 2000 the issue of climate change has become increasingly prominent in the design of agro-forestry development strategies.

The overall effect of these policies can be summarised in the following points:

1) Considering the general effect of EU strategies to curb GHG emissions, the EU as a whole is still projected to emit more than its Kyoto commitment in 2010. This general data hides strong differences at the member state level: in general EU Acceding Countries (except Slovenia) are expected to emit below their binding targets, while the opposite applies to the EU 15. Regarding the EU15, France, Germany, Luxembourg, Sweden and the United Kingdom are on track to reach their burden-sharing targets whereas the remaining ten Member States are not in line with particularly large shortfalls of Ireland, Portugal and Spain.
2) Within this picture, agriculture and forestry, on the basis of existing and planned sector-specific measures, are estimated to contribute only the 2.5% to total GHG emissions in 2010, showing thus a neat decline respect to the 3.7% of 2001. This positive effect is the compound of two trends: a strong decline in non-CO_2 emissions (-17% in 1990-2010) that is partially offset by a similar decline (even if this data is surrounded by a high uncertainty) in the sink potential (-25% in the same period).

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7 STATISTICAL APPENDIX

Austria: Agriculture & LUCF GHG Emissions With Measures						
	1990 (Historical Gg. CO2 eq.)	2001 (Historical Gg. CO2 eq.)	2005 (Gg. CO2 eq. projected)	2010 (Gg. CO2 eq. projected)	2015 (Gg. CO2 eq. projected)	2020 (Gg. CO2 eq. projected)
	CO2					
Agriculture	**0**	**0**	**0**	**0**	**0**	**0**
Land Use Change and Forestry (*)	**-92210**	**-7633,36**		**-7633,36**		
	CH4					
Agriculture	**4566,03**	**4060,94**	**3887,10**	**3771,60**	**3664,50**	**3560,76**
	N2O					
Agriculture	**3718,00**	**3540,97**	**1001,30**	**988,90**	**982,70**	**973,40**
TOTAL Gg. CO2 eq.	**-83925,97**	**-31,45**	**4888,40**	**-2872,86**	**4647,20**	**4534,16**

Austria: Agriculture & LUCF GHG Emissions With Additional Measures						
	1990 (Historical Gg. CO2 eq.)	2001 (Historical Gg. CO2 eq.)	2005 (Gg. CO2 eq. projected)	2010 (Gg. CO2 eq. projected)	2015 (Gg. CO2 eq. projected)	2020 (Gg. CO2 eq. projected)
	CO2					
Agriculture	**0**	**0**	**0**	**0**	**0**	**0**
Land Use Change and Forestry (*)	**-92210**	**-7633,36**		**-7633,36**		
	CH4					
Agriculture	**4566,03**	**4060,94**	**3813,39**	**3643,50**	**3482,85**	**3330,39**
	N2O					
Agriculture	**3718**	**3540,97**	**992,00**	**976,50**	**961,00**	**945,50**
TOTAL Gg. CO2 eq.	**-83925,97**	**-31,45**	**4805,39**	**-3013,36**	**4443,85**	**4275,89**

Source: Our Calculations Based on Third National Communications to the UNFCCC

Explanatory Notes:

(a) "With Measures" scenario refers to measures adopted until year 2000. "With Additional Measures" scenario refers to planned policies in the years 2000, 2001.

(b) Emissions from agriculture are based on the Austrian Carbon Balance Model (ACBM) that reflects the dynamic behavior of the carbon cycle in Austria. The model uses carbon fluxes and carbon pools taking into account interdependencies between and within individual subsystems. For the current projections the results of the ACBM scenarios have been partially adapted according to results of the energy projections.

(c) Emissions figures are based on emissions factors from the Austrian Greenhouse Gas Inventory. Accordingly reduced fertilizer use in agriculture cannot be properly taken into account as the development of new emission factors would be necessary.

(d) LUCF sink potential is not explicitly described. In the tables it has been kept constant in line with Austrian objective to keep forestry area more or less constant at the current level.
(e) Selected major macroeconomic indicators driving scenario building:

	2005	2010	2015
GDP growth (%)	2,1	2	1,9
Oil price Brent	16,5	16,5	19,7
Population (million)	8,17	8,21	8,25
Energy Efficiency	10%		
Cattle (1,000 head)	2,092	2,01	1,941

Belgium: Agriculture & LUCF GHG Emissions With Measures				
	1990 (Historical Gg. CO2 eq.)	2001 (Historical Gg. CO2 eq.)	2005 (Gg. CO2 eq. projected)	2010 (Gg. CO2 eq. projected)
	CO2			
Agriculture		**0**	**0**	**0**
Land Use Change and Forestry (*)		**-1814,38**	**na**	**na**
	CH4			
Agriculture	**8252**	**6932,961**	**7838**	**7700**
Land Use Change and Forestry (*)		**105,16**	**na**	**na**
	N2O			
Agriculture	**7093**	**5213,27**	**6687**	**6552**
Land Use Change and Forestry (*)	**729**	**242,36**	**729**	**729**
TOTAL Gg. CO2 eq.	**16074**	**12388,59**	**15254**	**14981**

Source: Our Calculations Based on Third National Communications to the UNFCCC

Explanatory Notes:
(a) "With Measures" refers to existing and implemented policies in Belgium in the period 1990-2000.
(b) Belgium sink potential which is negative in projections (positive emissions of 729 Gg. CO2 eq.) is probably
underestimated as the historical value for 2001 is -1466.86 Gg. of CO2 equivalent. Nevertheless positive sink potential is NOT reported in Belgium IIIrd National Communication. Our choice is to stick to the value of IIIrd National Communication.
(c) Emissions from agriculture are based on the HERMES and EPM models;
(d) Selected major macroeconomic indicators driving scenario building

	1999/2005	2005/2010	2010/2030
GDP growth	2,2	2,1	1,8
Technical progress			
Labour	0,8	0,8	0,8
Material	1	1	1
Agric. Production	1,8	1,9	1,7
	2001/2006	2007/2012	2001/2012
Oil Prices (Brent)	26,6	30,6	28,6

All values as annual average growth rates except Brent prices which are average US$ per barrel

Czech Republic: Agriculture & LUCF GHG Emission with Measures					
	1990 (Historical Gg. CO2 eq.)	2001 (Historical Gg. CO2 eq.)	2005 (Gg. CO2 eq. projected)	2010 (Gg. CO2 eq. projected)	2015 (Gg. CO2 eq. projected)
	CO2				
Agriculture	**0**	**0**	**0**	**0**	**0**
Land-Use Change and Forestry (*)	**-2281**	**-4363**	**-3444,00**	**-3487,00**	**-3531,00**
	CH4				
Agriculture	**4284**	**2371,41954**	**2410,72**	**2646,57**	**2694,15**
Enteric Fermentation	*3276*	*1698,6438*	*1659,63*	*1870,45*	*1904,07*
Manure Management	*1008*	*672,77574*	*751,09*	*776,12*	*790,08*
	N2O				
Agriculture	**620**	**5220,36877**	**5315,57**	**5314,33**	**5313,09**
Manure Management	*0*	*418*	*0*	*0*	*0*
Agricultural Soils	*620*	*4802,39656*	*5315,57*	*5314,33*	*5313,09*
TOTAL Gg. CO2 eq.	**2623**	**3228,74827**	**4282,286**	**4473,90**	**4476,243**

Source: Our Calculations Based on Third National Communications to the UNFCCC

Explanatory Notes:
(a)"With Measures" scenario refers to "Reference Scenario" in Czech IIIrd National Communication: Czech economic trends are projected following what has been observed for the last about 80 years. "With measures" refers to measures implemented until year 2000 included.

(b) Estimates of GHG emissions from agriculture take also into account the climate change impacts on agriculture production and productivity. This has been done applying CERES-family crop growth models.

(c) According to Czech IIIrd National Communication sink potential is projected to increase from 2000 onward. As usual there is a discrepancy from the historical data and projections.

(d) Selected major macroeconomic indicators driving scenario building:

	2005	2010	2015
GDP (% growth)	3	3	3
Population (thousands)	Roughly stagnant at 10300		
GDP Energy Intensity (% ave. interannual decrease)	-2,7	-2,6	-3,1
Oil Prices (US $/barrel)	20,83	21,37	21,89

Denmark: Agriculture & LUCF GHG Emission with Measures					
	1990 (Historical Gg. CO2 eq.)	2001 (Historical Gg. CO2 eq.)	2005 (Gg. CO2 eq. projected)	2010 (Gg. CO2 eq. projected)	2015 (Gg. CO2 eq. projected)
	CO2				
Agriculture	**0**	**0**	**0**	**0**	**0**
Land-Use Change and Forestry (*)	**-3118**	**-3531**	**-1063**	**-1202**	**-1357**
	CH4				
Agriculture	**4095**	**3633**	**3348**	**3199**	**3133**
Enteric Fermentation	*3192*	*2751*	*2641*	*2509*	*2459*
Manure Management	*903*	*882*	*707*	*690*	*674*
	N2O				
Agriculture	**10230**	**8060**	**7501**	**7553**	**7553**
Manure Management	*310*	*620*	*723*	*750*	*750*
Agricultural Soils	*9920*	*7440*	*6779*	*6803*	*6803*
TOTAL Gg. CO2 eq.	**11207**	**8162**	**9786**	**9550**	**9329**

Source: Our Calculations Based on Third National Communications to the UNFCCC

Explanatory Notes:
(a) CH4: productivity of individual cows is estimated to increase, inducing an increase in the emission coefficient from dairy cows from 1990s 102 Kg CH4/cow/year to 2010s 117 Kg CH4/cow/year. This is more than compensated by the fall in the population of dairy cows

(b) N2O: its decreasing trend is due mainly to the effect of the Action Plans for the Aquatic Environment I and II, fully implemented in 2003.

(c) LUCF: forecasts of sink potential are based upon the assumption that the 2001 structure of afforestation subsidy and financing is maintained until 2012

Estonia: Agriculture & LUCF GHG Emissions With Measures					
	1990 (Historical Gg. CO2 eq.)	2001 (Historical Gg. CO2 eq.)	2005 (Gg. CO2 eq. projected)	2010 (Gg. CO2 eq. projected)	2015 (Gg. CO2 eq. projected)
	CO2				
Agriculture	**0**	**0**	**0**	**0**	**0**
Land Use Change and Forestry (*)	**-6320**	**-739**	**-7400**	**-7200**	**-7000**
	CH4				
Agriculture	**1470**	**446,90**	**819**	**924**	**945**
	N2O				
Agriculture	**961**	**322,04**	**465,00**	**465,00**	**496,00**
TOTAL Gg. CO2 eq.	**-3889**	**29,47**	**-6116**	**-5811**	**-5559**

Estonia: Agriculture & LUCF GHG Emissions With Additional Measures					
	1990 (Historical Gg. CO2 eq.)	2001 (Historical Gg. CO2 eq.)	2005 (Gg. CO2 eq. projected)	2010 (Gg. CO2 eq. projected)	2015 (Gg. CO2 eq. projected)
	CO2				
Agriculture	**0**	**0**	**0**	**0**	**0**
Land Use Change and Forestry (*)	**-6320**	**-739**	**-8060**	**-8290**	**-8490**
	CH4				
Agriculture	**1470**	**446,90**	**504,00**	**609,00**	**651,00**
	N2O				
Agriculture	**961**	**322,04**	**372,00**	**372,00**	**372,00**
TOTAL Gg. CO2 eq.	**-3889**	**29,47**	**-7184,00**	**-7309,00**	**-7467,00**

Source: Our Calculations Based on Third National Communications to the UNFCCC

Explanatory Notes
(a) "With measures" refers to measures implemented until year 2000 included.
"With additional measures" refers to measures that are likely to be taken in the future.

(b) Note the discrepancy between historical sinks in 2001 and projections from Estonia's IIIrd National Communication. The projected sink potential provided by LUCF is probably overestimated as it is nearly 10 times bigger than what effectively recorded in 2001. In the WM scenario, sink potential decline is due to increased harvesting. Sink improvement in WAM scenario is due to reduced harvesting and additional reforestation and afforestation policies.

(c) Projections are derived using the Bottom-up Model MARKAL coupled with the economic model MACRO

(d) Selected major macroeconomic indicators driving scenario building:

	2005	2010	2015
GDP (% growth)	4	3	2,5
Population (millions)	1,35	1,33	1,31
Oil Prices (US $/barrel)	20,83	21,37	21,89

Finland: Agriculture & LUCF GHG Emissions With Measures					
	1990 (Historical Gg. CO2 eq.)	2001 (Historical Gg. CO2 eq.)	2005 (Gg. CO2 eq. projected)	2010 (Gg. CO2 eq. projected)	2020 (Gg. CO2 eq. projected)
	CO2				
Agriculture	**3200**	**1945,79**	**2200**	**1900**	**1900**
Land Use Change and Forestry (*)	**-22000**	**-16851**	**-3000**	**-7000**	**-20000**
	CH4				
Agriculture	**2000**	**1769,21**	**1600**	**1600**	**1600**
	N2O				
Agriculture	**5000**	**3736,09**	**3600**	**3300**	**3300**
TOTAL Gg. CO2 eq.	**-11800**	**-9399,61**	**4400**	**-200**	**-13200**

Finland: Agriculture & LUCF GHG Emissions With Additional Measures				
	1990 (Historical Gg. CO2 eq.)	2001 (Historical Gg. CO2 eq.)	2005 (Gg. CO2 eq. projected)	2010 (Gg. CO2 eq. projected)
	CO2			
Agriculture	**3200**	**1945,79**	**2200**	**1900**
Land Use Change and Forestry (*)	**-22000**	**-16851**	**-3000**	**-7000**
	CH4			
Agriculture	**2000**	**1769**	**1600**	**1500**
	N2O			
Agriculture	**5000**	**3736,09**	**3600**	**3300**
TOTAL Gg. CO2 eq.	**-11800**	**-9399,61**	**4400**	**-300**

Source: Our Calculations Based on Third National Communications to the UNFCCC

Explanatory Notes

(a) "With Measures" scenario refers to policies implemented within the Agenda 2000 reform. The main feature of the WM scenario is that of unchanged energy and climate policy. "With Additional Measures" scenario tries to estimate some developments linked to possible reforms to the CAP. Particular emphasis is put on social, cultural and environmental aspects.

France: Agriculture & LUCF GHG Emissions With Measures				
	1990 (Historical Gg. CO2 eq.)	2001 (Historical Gg. CO2 eq.)	2010 (Gg. CO2 eq. projected)	2020 (Gg. CO2 eq. projected)
	CO2			
Agriculture	**0**	**0**	**0**	**0**
Land Use Change and Forestry (*)	**-52019,8**	**-58968,01**	**-58968,01**	**na**
	CH4			
Agriculture	**34256**	**43838,53**	**32000**	**32000**
	N2O			
Agriculture	**56147**	**54547,88**	**53200**	**53000**
TOTAL Gg. CO2 eq.	**38383,20**	**39418,41**	**26231,99**	**85000**

France: Agriculture & LUCF GHG Emissions With Additional Measures				
	1990 (Historical Gg. CO2 eq.)	2001 (Historical Gg. CO2 eq.)	2010 (Gg. CO2 eq. projected)	2020 (Gg. CO2 eq. projected)
	CO2			
Agriculture	**0**	**0**	**0**	**0**
Land Use Change and Forestry (*)	**-52019,8**	**-58968,01**	**-58968,01**	**na**
	CH4			
Agriculture	**34256**	**43838,53**	**31000**	**31000**
	N2O			
Agriculture	**56147**	**54547,88**	**53200**	**51200**
TOTAL Gg. CO2 eq.	**38383,20**	**39418,41**	**25231,99**	**82200,00**

Source: Our Calculations Based on Third National Communications to the UNFCCC

Explanatory Notes:
(a) "With Measures" scenario refers to policies adopted until the 31st December 1999.
(b) "With Additional Measures" scenario considers planned policies until year 2000.
(c) Selected major macroeconomic indicators driving scenario building:

	Average 1997-2010	Average 2010-2020
GDP Growth	2,30%	2,30%
Oil Prices (1999 US$/barrel)	17	25
Population (millions)	61,7	63,5

Germany: Agriculture & LUCF GHG Emissions With Measures				
	1990 (Historical Gg. CO2 eq.)	2001 (Historical Gg. CO2 eq.)	2005 (Gg. CO2 eq. projected)	2010 (Gg. CO2 eq. projected)
	CO2			
Agriculture	**0**	**0**	**0**	**0**
Land Use Change and Forestry (*)	**-33719**	**-23694,82**	**-30000**	**-30000**
	CH4			
Agriculture	**39949**	**25393,2**	**25930**	**21850**
	N2O			
Agriculture	**26350**	**39840,11**	**23362**	**22090**
TOTAL Gg. CO2 eq.	**32580**	**41538,49**	**19292**	**13940**

Source: Our Calculations Based on Third National Communications to the UNFCCC

Explanatory Notes:
(a) "With Measures" scenario refers to measures adopted until year 2000.

Greece: Agriculture & LUCF GHG Emissions With Measures					
	1990 (Historical Gg. CO2 eq.)	2000 (Historical Gg. CO2 eq.)	2005 (Gg. CO2 eq. projected)	2010 (Gg. CO2 eq. projected)	2015 (Gg. CO2 eq. projected)
	CO2				
Agriculture	**0**	**0**	**0**	**0**	**0**
Land Use Change and Forestry (*)	**1441**	**-1328**	**1776**	**1776**	**1776**
	CH4				
Agriculture	**3628**	**3677,25**	**3591**	**3578**	**3566**
Land Use Change and Forestry (*)	**120**	**52,56**	**208**	**208**	**208**
	N2O				
Agriculture	**6820**	**6341,75**	**6145**	**6089**	**6000**
Land Use Change and Forestry (*)	**22**	**5,33**	**47**	**47**	**47**
TOTAL Gg. CO2 eq.	**12031,00**	**8749,00**	**11767**	**11698**	**11597**

Source: Our Calculations Based on Third National Communications to the UNFCCC

Explanatory Notes:
(a) "With Measures" scenario refers to policies either implemented or adopted in the period 1995-2000 in accordance to the "Hellenic Action Plan for the Abatement of CO2 and other Greenhouse Gas Emissions".

(b) Greece IIIrd National Communication to the UNFCCC proposes also a "With Additional Measures" scenario,
but with particular respect to the agricultural and forestry sectors, differences are negligible respect to the With Measures" scenario. In the specific LUCF sink potential is unchanged and total greenhouse gas emissions are" only the 0.34% and the 0.66% lower in the "With Additional Measures" scenario than in the the "With Measures" scenario in 2005 and 2010 respectively. Moreover information provided by the "With Additional Measures" scenario are aggregated and the relative contribution of the single GHG gas cannot be appreciated. Accordingly it has been decided to report data for the "With Measures" scenario only.

(c) Selected macroeconomic indicators driving scenario building:

	2000-2005	2005-2010	2010-2015
GDP	4,4%	3,4%	3%
Population	0,5%	0,4%	0,3%
Oil Prices	-7,7%	0%	0,8%

Hungary: Agriculture & LUCF GHG Emissions With Measures			
	1990 (Historical Gg. CO2 eq.)	2001 (Historical Gg. CO2 eq.)	2010 (Gg. CO2 eq. projected)
	CO2		
Agriculture	**0**	**0**	**0**
Land Use Change and Forestry (*)	**-2363,28**	**-4513,60**	**-4513,60**
	CH4		
Agriculture	**2432,01**	**2200,08**	**1500,00**
TOTAL Gg. CO2 eq.	**68,73**	**-2313,52**	**-3013,60**

Source: Our Calculations Based on Third National Communications to the UNFCCC

Explanatory Notes:
(a) "With Measures" scenario refers to scenario "C" in Hungarian IIIrd National Communication. It is considered the most likely. It implies that during the accession process Hungary and the EU agree to the production quotas in about halfway between Hungarian claim and the 2002 proposal of the EC.

(b) LUCF sink potential in Hungarian IIIrd National Communication is not clearly defined. The "scenario II" assumes that average afforestation rates in the years 1990-2000 (8,000 ha./yr) are maintained until 2050 and corresponds to the "WM" scenario. Nevertheless the values reported for year 2000 are apparently lower than the historical value in 1990. Our choice has thus been to keep LUCF sink potential in 2010 constant at the 2001 historical value.

Ireland: Agriculture & LUCF GHG Emissions With Measures					
	1990 (Historical Gg. CO2 eq.)	2001 (Historical Gg. CO2 eq.)	2005 (Gg. CO2 eq. projected)	2010 (Gg. CO2 eq. projected)	2012 (Gg. CO2 eq. projected)
	CO2				
Agriculture	**0**	**0**	**0**	**0**	**0**
Land Use Change and Forestry (*)	**-65,66**	**-629**	**na**	**-628,72**	**na**
	CH4				
Agriculture	**10440,99**	**11072,67**	**10571**	**6352**	**9106**
	N2O				
Agriculture	**7495,8**	**8097,20**	**7405**	**6618**	**6478**
TOTAL Gg. CO2 eq.	**17871,13**	**18541,15**	**17976**	**12341,28**	**15584**

Source: Our Calculations Based on Third National Communications to the UNFCCC

Explanatory Notes:
(a) The Irish IIIrd National Communication to the UNFCCC is the only reporting in the "With Measures" Scenario the effects of "full decoupling" of production subsidies that Ireland is adopting after 2005 in response to the "Fischler reform".

Italy: Agriculture & LUCF GHG Emission with Measures				
	1990 (Historical Gg. CO2 eq.)	2001 (Historical Gg. CO2 eq.)	2005 (Gg. CO2 eq. projected)	2010 (Gg. CO2 eq. projected)
	CO2			
Land Use Change and Forestry (*)	**-23532**	**-18654,92**	**na**	**-18654,92**
	CH4			
Agriculture	**19166,7**	**18292,14**	**18024,30**	**17648,40**
Enteric Fermentation	*13624,8*	*12780,67*	*12455,10*	*11982,60*
Manure Management	*3990*	*3946,12*	*3983,70*	*4080,30*
Rice Cultivation	*1539,3*	*1554,12*	*1573*	*1573*
Field Burning of Agricultural Residues	*12,6*	*11,22*	*12,6*	*12,6*
	N2O			
Agriculture	**24180**	**24242,58**	**23963,00**	**23405,00**
Manure Management	*3844*	*4213,48*	*3875,00*	*3906,00*
Agricultural Soils	*20336*	*20025,58*	*20088,00*	*19499,00*
Field Burning of Agricultural Residues	*186*	*3,52*	*186,00*	*186,00*
TOTAL (Gg. CO2 eq.)	**19815**	**23879,79**	**41987,3**	**22398,48**

Source: Our Calculations Based on Third National Communications to the UNFCCC

Explanatory Notes:
(a) "With Measures" scenario refers to measures implemented and forseen by the Italian Law 120/2002: "Revised guidelines for national policies and measures regarding the reduction of greenhouse gas emissions".

(b) LUCF sink potential in the Italian IIIrd National Communication is stated to remain constant in the period 2000-2010 under the "With Measures" scenario and to slightly increase under the "With Additional Measures" scenario. Values projected for carbon sinks in 2010 by this last scenario are in any case lower than the observed historical value in 2001. Accordingly our choice was to keep sink potential constant at its 2001 level in the period 2001-2010 and not to report values from the "With Additional Measures" scenario.

Latvia: Agriculture & LUCF GHG Emissions With Measures					
	1990 (Historical Gg. CO2 eq.)	2001 (Historical Gg. CO2 eq.)	2005 (Gg. CO2 eq. projected)	2010 (Gg. CO2 eq. projected)	2015 (Gg. CO2 eq. projected)
	CO2				
Agriculture	**0**	**0**	**0**	**0**	**0**
Land Use Change and Forestry (*)	**-10825,58**	**-9256**	**-9602,96**	**-9664,00**	**-9919,54**
	CH4				
Agriculture	**2336,67**	**673,46**	**606,69**	**642,60**	**690,48**
Land Use Change and Forestry (*)	**33,6**	**97,03**	**62,79**	**68,04**	**75,39**
	N2O				
Agriculture	**2997,7**	**673,46**	**1171,80**	**1364,00**	**1438,40**
Land Use Change and Forestry (*)	**3,41**	**9,85**	**6,20**	**6,20**	**6,20**
TOTAL Gg. CO2 eq.	**-5454,2**	**-7802,46**	**-7755,48**	**-7583,16**	**-7709,07**

Source: Our Calculations Based on Third National Communications to the UNFCCC

Explanatory Notes:
(a) "With Measure" scenario refers to measures implemented until year 2000 and also to those included in the Special Accession Programme for Agricultural and Rural Development, specifically targeted to the introduction of agriculture-related EU acquis communitaire.

(b) Selected major macroeconomic indicators driving scenario building:

	2001-2005	2006-2010	2011-2015
GDP (av. annual growth rates)	5,4	5,2	6
Population (Thou.)	2343	2290	2200
Changes in Output (av. Annual growth rates)			
Agriculture	2,5	4,2	4,5
Industry	5,8	4,5	5,2
Services	5,5	5,7	6,5

Netherlands: Agriculture & LUCF GHG Emissions With Measures					
	1990 (Historical Gg. CO2 eq.)	2001 (Historical Gg. CO2 eq.)	2005 (Gg. CO2 eq. projected)	2010 (Gg. CO2 eq. projected)	2015 (Gg. CO2 eq. projected)
	CO2				
Land Use Change and Forestry (*)	**-1500**	**-1413,26**		**-1413,26**	
	CH4				
Agriculture	**10647**	**8622,39**	**8379,00**	**7518,00**	**7287,00**
	N2O				
Agriculture	**6820**	**7167,20**	**7440,00**	**6510,00**	**6200,00**
TOTAL Gg. CO2 eq.	**15967,00**	**14376,33**	**15819,00**	**12614,74**	**13487,00**

Netherlands: Agriculture & LUCF GHG Emissions With Additional Measures					
	1990 (Historical Gg. CO2 eq.)	2001 (Historical Gg. CO2 eq.)	2005 (Gg. CO2 eq. projected)	2010 (Gg. CO2 eq. projected)	2015 (Gg. CO2 eq. projected)
	CO2				
Land Use Change and Forestry (*)	**-1500**	**-1413,26**		**-1413,26**	
	CH4				
Agriculture	**10647**	**8622,39**	**8379,00**	**7518,00**	**na**
	N2O				
Agriculture	**6820**	**7167,20**	**6820,00**	**6200,00**	**na**
TOTAL Gg. CO2 eq.	**15967,00**	**14376,33**	**15199,00**	**12304,74**	**na**

Source: Our Calculations Based on Third National Communications to the UNFCCC

Explanatory Notes:
(a) "With Measures" scenario refers to the "Global Competition Scenario" of the Netherlands IIIrd National Communication. This scenario is particularly conservative and prudential as it refers to policies adopted before 1997. Netherlands IIIrd NC offers also the "With Additional Measures" scenario referring to post-Kyoto GHG reduction policies implemented until year 2000.

(b) No explicit assessment of LUCF sink potential is available in the Netherlands IIIrd National Communication. Our choice is to keep LUCF sink potential constant at its 2001 observed value.

(c) Selected major macroeconomic indicators driving scenario building:

	1995-2010
Economic growth	3,3
Industrial production	4,3
Population	6%
Livestock population	82%
Oil Price	65%

Poland: Agriculture & LUCF GHG Emissions With Measures			
	1990 (Historical Gg. CO2 eq.)	2001 (Historical Gg. CO2 eq.)	2010 (Gg. CO2 eq. projected)
	CO2		
Land Use Change and Forestry (*)	**-44663**	**-53639,35**	**-59003,29**
	CH4		
Agriculture	**17850**	**9464,93**	**8707,74**
	N2O		
Agriculture	**12710**	**16373,18**	**18041,25**
TOTAL Gg. CO2 eq.	**-14103**	**-27801,25**	**-32254,30**

Source: Our Calculations Based on Third National Communications to the UNFCCC

Explanatory Notes:
(a) "With Measure" scenario is based on 1999 assumptions of the agricultural policy in the context of Poland accession to the EU. Main factors reducing GHG emissions are apart from technical progress the increasing size of farms, rationalised use of fertiliser, improved manure management.

(b) LUCF sink potential is estimated assuming complete implementation of the Polish National Programme of Increasing Forest Cover.

(c) Selected major macroeconomic indicators driving scenario building:

	2010	2020
GDP (Y growth rates)	5,9	4,8
Population (million)	39,4	39,9

Portugal: Agriculture & LUCF GHG Emissions With Measures				
	1990 (Historical Gg. CO2 eq.)	2001 (Historical Gg. CO2 eq.)	2010 (Gg. CO2 eq. projected)	2020 (Gg. CO2 eq. projected)
	CO2			
Land Use Change And Forestry	**-3751**	**-2151,608**	**-2151,61**	**na**
	CH4+N2O			
Agriculture	**12300**	**11755,46**	**12200**	**12700**
TOTAL Gg. CO2 eq.	**8549**	**9603,85**	**10048,39**	**na**

Source: Our Calculations Based on Third National Communications to the UNFCCC

Explanatory Notes:
(a) "With Measures" scenario refers to the "High End" scenario in Portugal III National Communication.
It is a scenario projecting in the future recent trends of Portugal development and taking into account measures for GHG reduction adopted until 1999. It explicitly takes an optimistic stand on technological development. For what concerns the agricultural sectors, no difference appears between the "High End" and the "Low End" scenario more pessimistic on the rate of technological progress.

(b) LUCF sink potential is excluded from Portugal IIIrd National Communication. Our choice is thus to keep Portugal LUCF sink potential constant at its observed value in 2001.

(c) Selected major macroeconomic indicators driving scenario building:

	2005	2010	2015
Population (thou.)	10430	10597	10729
Oil Price ($/bbl)	20	21	23
	2000/2015	2015/2025	
VA (Year. average %)	4,2	3,8	

Slovakia: Agriculture & LUCF GHG Emissions With Measures					
	1990 (Historical Gg. CO2 eq.)	2001 (Historical Gg. CO2 eq.)	2005 (Gg. CO2 eq. projected)	2010 (Gg. CO2 eq. projected)	2015 (Gg. CO2 eq. projected)
	CO2				
Land Use Change and Forestry (*)	**-2345**	**-5264,42**	**-1825**	**-1807**	**-2290**
	CH4				
Agriculture	**2838,15**	**1311,93**	**1504,65**	**1503,60**	**1433,67**
	N2O				
Agriculture	**5022**	**2871,32**	**3971,10**	**4243,90**	**4197,40**
TOTAL Gg. CO2 eq.	**5515,15**	**-1081,17**	**3650,75**	**3940,50**	**3341,07**

Slovakia: Agriculture & LUCF GHG Emissions With Additional Measures					
	1990 (Historical Gg. CO2 eq.)	2001 (Historical Gg. CO2 eq.)	2005 (Gg. CO2 eq. projected)	2010 (Gg. CO2 eq. projected)	2015 (Gg. CO2 eq. projected)
	CO2				
Land Use Change and Forestry (*)	**-2345**	**-5264,42**	**-2171**	**-2169**	**-2673**
	CH4				
Agriculture	**2838,15**	**1311,93**	**1472,73**	**1434,09**	**1266,51**
	N2O				
Agriculture	**5022**	**2871,32**	**3574,30**	**3394,50**	**2824,10**
TOTAL Gg. CO2 eq.	**5515,15**	**-1081,17**	**2876,03**	**2659,59**	**1417,61**

Source: Our Calculations Based on Third National Communications to the UNFCCC

Explanatory Notes:

(a) "With Measures" in relation to **CH4** is based on the assumption of high dynamics of animal production intensification where the expected number of livestock set according to the directives of the EU CAP is reached in 2005.
"With Additional Measures" in relation to **CH4** considers additionally the treatment of animal excrements to biogas (10% by 2005, 50% by 2015)

(b) "With Measures" in relation to **N2O** considers high dynamic of vegetal production intensification. In the case of Livestock-related N2O livestock dynamics is the same as that for CH4.
"With Additional Measures" in relation to **N2O** considers higher dynamic of vegetal production intensification and a reduction of direct input of nitrogenous substances. Livestock dynamics is the same as that for CH4.

(c) "With Measures" in relation to **Forestry** refers to afforestation policies

implemented within the period 1995-2000.
"With Additional Measures" in relation to **Forestry** refers to the same policies, but assuming optimistically their higher impact.

Slovenia: Agriculture & LUCF GHG Emissions With Measures						
	1990 (Historical Gg. CO2 eq.)	1996 (Historical Gg. CO2 eq.)	2005 (Gg. CO2 eq. projected)	2010 (Gg. CO2 eq. projected)	2015 (Gg. CO2 eq. projected)	2020 (Gg. CO2 eq. projected)
	CO2					
Agriculture	**0**	**0**	**0**	**0**	**0**	**0**
Land Use Change and Forestry (*)	**-4334**	**-5560**		**-5560**		
	CH4					
Agriculture	**1041,6**	**896,70**	**896,7**	**896,7**	**896,7**	**896,7**
	N2O					
Agriculture	**1435,3**	**1407,40**	**1407,40**	**1407,40**	**1407,40**	**1407,40**
TOTAL Gg. CO2 eq.	**-1857,10**	**-3255,90**	**2304,10**	**-3255,90**	**2304,10**	**2304,10**

Slovenia: Agriculture & LUCF GHG Emissions With Additional Measures						
	1990 (Historical Gg. CO2 eq.)	1996 (Historical Gg. CO2 eq.)	2005 (Gg. CO2 eq. projected)	2010 (Gg. CO2 eq. projected)	2015 (Gg. CO2 eq. projected)	2020 (Gg. CO2 eq. projected)
	CO2					
Agriculture	**0**	**0**	**0**	**0**	**0**	**0**
Land Use Change and Forestry (*)	**-4334**	**-5560**		**-5560**		
	CH4					
Agriculture	**1041,6**	**896,70**	**865,20**	**848,40**	**831,60**	**812,70**
	N2O					
Agriculture	**1435,3**	**1407,40**	**1364,00**	**1357,80**	**1339,20**	**1314,40**
TOTAL Gg. CO2 eq.	**-1857,10**	**-3255,90**	**2229,20**	**-3353,80**	**2170,80**	**2127,10**

Source: Our Calculations Based on Third National Communications to the UNFCCC

Explanatory Notes:
(a) "With Measures" scenario corresponds to scenario "A" in Slovenian IIIrd National Communication. It is a scenario that considers the implemented measures contained in the "Strategy and Short-Term Action Plan of Reduction in GHG Emissions" adopted by Slovenia in November 2000.

(b) "With Additional Measures" scenario corresponds to scenario "B" in Slovenian III National Communication considering planned and under-investigation GHG reduction measures.

(c) LUCF sink potential is not reported in Slovenian IIIrd National Communication. Our choice is to keep LUCF sink potential constant at its 2001 level.

(d) Selected major macroeconomic indicators driving scenario building:

	2005	2010	2015
GDP [SIT97]	4.079	4.774	5.686
Exports [SIT97]	2.587	3.318	4.134
Energy prices	IEA World Energy Outlook 1998		

Sweden: Agriculture & LUCF GHG Emissions With Measures				
	1990 (Historical Gg. CO2 eq.)	2001 (Historical Gg. CO2 eq.)	2010 (Gg. CO2 eq. projected)	2020 (Gg. CO2 eq. projected)
	CO2			
Agriculture	**0**	**0**	**0**	**0**
Land Use Change And Forestry	**-20292**	**-33083,249**	**-24305**	**na**
	CH4			
Agriculture	**3473**	**3286,40**	**3194**	**3194**
	N2O			
Agriculture	**4518**	**5581,34**	**4175**	**4175**
TOTAL Gg. CO2 eq.	**-12301**	**-24215,51**	**-16936**	**7369**

Source: Our Calculations Based on Third National Communications to the UNFCCC

Explanatory Notes:

(a) "With Measures" scenario is based on the assumption that the Swedish agricultural policy remains as decided within the framework of Agenda 2000 until 2010.

(b) Selected major macroeconomic indicators driving scenario building:

	1997-2010	2010-2020
GDP (Year. % change)	1,9	1,1
Industrial production (Year. % change)	2,3	2,1
	2010	2020
Crude oil ($/bbl)	17	22,5

UK: Agriculture & LUCF GHG Emissions With Measures				
	1990 (Historical Gg. CO2 eq.)	2001 (Historical Gg. CO2 eq.)	2010 (Gg. CO2 eq. projected)	2020 (Gg. CO2 eq. projected)
	CO2			
Agriculture	**0**	**0**	**0**	**0**
Land Use Change and Forestry (*)	**8791,21**	**3220,30**	**2800**	**1900**
	CH4			
Agriculture	**21781,2**	**19194,87**	**10710**	**11130**
	N2O			
Agriculture	**31133,3**	**27185,52**	**26352**	**26718**
TOTAL Gg. CO2 eq.	**61705,71**	**49600,70**	**39862**	**39748**

Source: Our Calculations Based on Third National Communications to the UNFCCC

Explanatory Notes:
(a) "With Measures" scenario refers to policies implemented in the period 1997-2000.

	2010 GHG Emissions Projections With Measures (Mt. CO2 eq.) (**)	2010 GHG Emissions Projections From Agriculture and LUCF With Measures (Mt. CO2 eq.) (*)	2010 GHG Emissions Projections from Agriculture and LUCF With Additional Measures (Mt. CO2 eq.) (*)	2010 LUCF GHG Sink Potential With Measures (Mt. CO2 eq.) (*)	2010 LUCF GHG Sink Potential With Additional Measures (Mt. CO2 eq.) (*)	2010 GHG Emissions Projections From Agriculture With Measures (Mt. CO2 eq.) (*)	2010 GHG Emissions Projections from Agriculture With Additional Measures (Mt. CO2 eq.) (*)
Austria	86,05	-2,87	-3,01	-7,633	-7,633	4,76	4,62
Belgium	171,18	14,98	14,98	0,729	0,729	14,25	14,25
Denmark	80,42	9,55	9,55	-1,202	-1,202	10,75	10,75
Finland	89,90	-0,20	-0,30	-7,000	-7,000	6,80	6,70
France	582,50	26,23	25,23	-58,968	-58,968	85,20	84,20
Germany	812,08	13,94	13,94	-30,000	-30,000	43,94	43,94
Greece	147,21	11,70	11,70	2,031	2,031	9,67	9,67
Ireland	74,00	12,34	12,34	-0,629	-0,629	12,97	12,97
Italy	540,10	22,40	22,40	-18,655	-18,655	41,05	41,05
Luxembourg	na	na	na	na	na	na	na
The Netherlands	256,00	12,61	12,30	-1,413	-1,413	14,03	13,72
Portugal	95,20	10,05	10,05	-2,152	-2,152	12,20	12,20
Spain	307,40	na	na	na	na	na	na
Sweden	70,88	-16,94	-16,94	-24,305	-24,305	7,37	7,37
United Kingdom	630,67	39,86	39,86	2,800	2,800	37,06	37,06

Cyprus	na	na	na	na	na	na	na
Czech Republic	128,29	4,47	4,47	-3,487	-3,487	7,96	7,96
Estonia	18,86	-5,81	-7,31	-7,200	-8,290	1,39	0,98
Hungary	65,91	-3,01	-3,01	-4,514	-4,514	1,50	1,50
Latvia	12,81	-7,58	-7,58	-9,590	-9,590	2,01	2,01
Lithuania	na	na	na	na	na	na	na
Malta	na	na	na	na	na	na	na
Poland	394,00	-32,25	-32,25	-59,003	-59,003	26,75	26,75
Slovakia	53,19	3,94	2,66	-1,807	-2,169	5,75	4,83
Slovenia	22,15	-3,26	-3,35	-5,560	-5,560	2,30	2,21
EU 25 TOTAL	**4638,80**	**110,15**	**105,72**	**-237,56**	**-239,01**	**347,71**	**344,73**

Source: Our Calculations Based on Third National Communications to the UNFCCC