



Future Options for Forest Carbon Markets in Scotland and the UK

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Acronyms

AAU	Assigned Amount Unit
AB32	Assembly Bill 32 – Global Warming Solutions Act of 2006 (California)
ACCU	Australian Carbon Credit Unit
AFOLU	Agriculture, Forestry and Other Land Use
AR	Afforestation/Reforestation
CAR	Climate Action Reserve
CARB	California Air Resources Board
CCA	California Carbon Allowance
CCX	Chicago Climate Exchange
CDM	Clean Development Mechanism
CEH	Centre for Ecology and Hydrology
CER	Certified Emission Reduction
CFI	Carbon Farming Initiative
CH₄	Methane
CO₂	Carbon dioxide
CO₂e	Carbon dioxide equivalent
CPM	Carbon Pricing Mechanism (Australia)
CRC	Carbon Reduction Commitment
CRT	Climate Reserve Ton (CAR unit)
DA	Devolved Administration
DECC	Department of Energy and Climate Change
Defra	Department of Environment, Food and Rural Affairs
ERU	Emission Reduction Unit
EU	European Union
EU ETS	European Union Emissions Trading System
EUA	EU Allowance
FFBC	Farming for a Better Climate (Scotland)
GHG	Greenhouse gas
HFCs	Hydrofluorocarbons
IPCC	Intergovernmental Panel on Climate Change
JI	Joint Implementation
KP	Kyoto Protocol
LULUCF	Land Use, Land-Use Change and Forestry
Mt	Megatonne (one million tonnes)
N₂O	Nitrous oxide
NGO	Non-governmental Organisation
NSEA	Net Scottish Emissions Account
NZ ETS	New Zealand Emissions Trading Scheme
NZU	New Zealand Unit
OTC	Over-the-counter
PFCs	Perfluorocarbons
PFSI	Permanent Forest Sink Initiative (Australia)
RMU	Removal Unit
RPP2	Second Report on Policies and Proposals
SF₆	Sulphur hexafluoride

t	Tonne (metric)
UK	United Kingdom
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Verified Carbon Standard
VCU	Verified Carbon Unit

1. Executive Summary

- The options currently available for UK or Scottish forest owners to benefit from the carbon value of their forests through carbon markets are very limited.
- Forests contributed around 3.56 million carbon credits to the UK's national Kyoto Protocol account in 2010, due to net increase in forest cover and forest management. Scottish forests contributed around 2.6 million of these carbon credits. There is no regulatory framework currently in place in the UK or Scotland to devolve the value or ownership of these carbon credits to forest owners.
- There is currently no possibility for UK or Scottish forests to participate in any of the major regulatory carbon markets, and participation in the leading voluntary carbon market standards is limited by double-counting rules, leaving the Woodland Carbon Code as the only significant option available, with the challenge here being limited market demand for UK-specific credits that assist the UK in meeting its emission reduction targets.
- Future options for UK or Scottish forest owners to benefit from carbon markets are also very limited. However, two options appear to be both technically feasible and possible to implement over a relatively short period: direct allocation of Kyoto Protocol Assigned Amount Units to forestry projects (similar to a scheme in New Zealand), and establishing procedures for cancelling Kyoto units to enable voluntary carbon credits to be issued to domestic projects. Both would require policy change at UK level.
- The rationale for any government to either give away or cancel Kyoto units would be to incentivise the private sector to make emission reduction investments that *would not otherwise be made*. A government's willingness to do this may therefore depend on a variety of factors, including the extent to which it is possible to separate truly additional emission reductions from those that would occur anyway, or that are already subsidised by the government. Given that much UK forestry activity is supported by government grants and other incentives, the forestry community needs to realise that any crediting mechanism might either only apply to unsupported investments, or be accompanied by a withdrawal of other incentives.
- A promising recent development is the EU's Decision to require Member States to report on land use and forestry related actions by June 2014. This may indicate a new interest and attention to the role of forestry and land management in European climate policy, which may help to spur the required policy change to enable forest owners to benefit from carbon markets, or for governments to provide other incentives. However, it seems unlikely that the EU will mandate any specific land use or forestry related targets before 2020 at the earliest.
- Participation in carbon markets inevitably brings with it certain risks. If a forest owner wishes to receive a market-priced financial benefit from having increased their storage of carbon, they should also be prepared to accept a financial liability if that stored carbon is ever released. Prices in a carbon market are also uncertain, and currently very low in most carbon markets. Transaction costs for measuring and crediting the carbon stored in forests can be significant, and proportionately higher for smaller projects, which are more typical of UK forestry.

2. Introduction

This report was commissioned by ClimateXchange in response to a request from the Forestry Commission for a study, with particular reference to Scotland, to identify future options for the operation of forest carbon markets in the UK which could recognise the potential contribution of UK forests.

The central problem motivating this research is that currently, there is a perception that owners of UK forests do not receive the full benefit from the 'climate service' provided by maintaining and increasing the stock of carbon locked up in their forests (both above and below ground). While some UK forestry grant schemes are explicitly set up to help combat climate change by encouraging enhancement of carbon stocks in woodlands, forest owners may question why there are not more options available for them to benefit directly from some kind of tradable carbon credit.

The principal objectives of the report were to review current international and national mechanisms which administer the flow of carbon credits generated by forestry and to detail options for the development and future operation of forest carbon markets in the UK, including identifying barriers to the above options and how they could potentially be overcome, as well as the likely scale of impacts on the forest sector in the UK.

The research was carried out in two stages: first, via a desk-based literature review, followed by a set of five semi-structured interviews with key experts including carbon brokers/traders, government officials and UN staff during March and April 2013. As some interviewees requested anonymity, none have been cited in this report. The authors are grateful to all of the interviewees for their assistance with this research, and also to the reviewers who commented on a first draft of this report.

The report is structured as follows:

- **Section 1** is our executive summary;
- **Section 2** is this introduction;
- **Section 3** sets out the current situation with respect to forest carbon accounting under relevant international, UK and Scotland specific national accounting rules, as well as in the major regulatory carbon markets and voluntary carbon market standards;
- **Section 4** describes possible options for the future operation of forest carbon markets in the UK, and summarises our conclusions.

The views expressed in this report are those of the authors and do not necessarily represent the views of the Forestry Commission, ClimateXchange, the University of Edinburgh, the James Hutton Institute or any other organisation with which the authors are affiliated.

3. Current Situation

This section sets out the current situation with respect to forest carbon accounting under relevant international, EU, UK and Scotland specific national accounting rules, as well as in the major regulatory carbon markets and voluntary carbon market standards.

3.1. Regulatory Forest Carbon Accounting

3.1.1. UNFCCC and Kyoto Protocol national carbon accounting

The UK, together with most other developed countries, is required to account and report annually for its national greenhouse gas (GHG) emissions and removals under two international carbon accounting frameworks: the United Nations Framework Convention on Climate Change (UNFCCC) and its subsidiary instrument, the Kyoto Protocol (KP). Although the two frameworks are closely related, they have different purposes and coverage. Reporting under the UNFCCC meets scientific and policy objectives and is relatively comprehensive, including all significant non-natural sources of GHG emissions and removals within the national boundary, including from forestry as a sub-sector of the 'Land use, land-use change and forestry' (LULUCF) sector. However, it does not give rise to any benefits or obligations, and hence carries no financial value. Kyoto Protocol accounting, on the other hand, has the more specific purpose of measuring compliance against each developed country's KP emission reduction target (initially for the first commitment period 2008-2012, then more recently for a second commitment period 2013-2020), compared with base year emission levels (usually based on the year 1990). Hence KP accounting gives rise to both benefits and obligations which have financial value. Under the KP, emissions of six GHGs are reported – carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF₆).¹ The emissions of each are estimated using reporting guidelines produced by the Intergovernmental Panel on Climate Change (IPCC), which also apply to UNFCCC reporting. Coverage within the LULUCF sector under the KP is far less extensive than under the UNFCCC, including only (for the first commitment period):

- Net emissions and removals from direct, human-induced afforestation, reforestation and deforestation activities (mandatory under KP Article 3.3); and
- Net emissions and removals from forest management, cropland management, grazing land management, and/or revegetation (optional under KP Article 3.4).

From 2013 onward, accounting for forest management will become mandatory, and wetland drainage and rewetting is added to the list of optional activities.²

Afforestation, reforestation, deforestation and forest management are all accounted using a 'gross-net' approach, which simply means that they are excluded from the calculation of the baseline (1990) emissions, but included in the calculation of annual emissions towards the target. Cropland management, grazing land management and revegetation, if optionally included, are accounted 'net-net' – i.e. included in both the baseline and target calculations.

Within the second set of optional activities, the UK has opted to include forest management only. Land can only be classified under one activity, with the mandatory activities taking precedence over the optional activities. Once a land area is classified as an eligible KP

¹ From 1 January 2013, emissions of nitrogen trifluoride (NF₃) will also be included (UNFCCC Decision 1/CMP.8).

² UNFCCC Decision 2/CMP.7.

activity, all emissions and removals from that land must continue to be accounted thereafter.

The technical scope of each of the above activities is heavily influenced by the definition of 'forest'. Countries are allowed some discretion in this, and the UK has determined that in the national context for the first KP commitment period a forest is defined as a minimum area of 0.1 hectares with a minimum width of 20 metres; tree crown cover of at least 20%, or the potential to achieve it; and a minimum height of 2 metres, or the potential to achieve it (Defra 2006).

Afforestation is defined as the conversion to 'forest' of land that has been non-forested for at least 50 years at the time of conversion, while reforestation is defined as conversion to 'forest' of land that has been non-forested for a shorter period of time; otherwise, they are identical and hence generically termed AR. Conversely, deforestation means the conversion of forested land to a non-forested state. In all cases, what is relevant is the change in land use since 31 December 1989. In other words, afforestation and reforestation may only be counted on land that did *not* meet the definition of 'forest' on 31 December 1989, while any land that *did* meet that definition then, and subsequently fails to meet it, is classed as deforestation. Temporary de-stocking, whether due to natural causes such as forest fire or human interventions such as harvesting, is not classed as deforestation as long as the land is expected to revert to forest.

'Forest management' under the KP definition involves sustainable stewardship and use of both natural and plantation forests. In practice, this means forests that were established pre-1990, as otherwise they would be counted (mandatorily) as AR. However, the scope for crediting removals of carbon dioxide through forest management is capped for the first commitment period in various ways; for the UK, it is limited to 1.36 MtCO₂e per year, or 6.78 MtCO₂e in total over 2008-2012 (Defra 2006).

Box 1: Kyoto Protocol accounting and 'flexibility mechanisms'

Countries which have ratified the Kyoto Protocol each have a target inscribed in Annex B to the Protocol, in the form of a percentage of 'base year' emissions which must be achieved, on average, initially over the period 2008-2012 (first commitment period), and more recently, a second commitment period of 2013-2020. The EU's target for the first commitment period is 92% of 1990 levels (or an 8% reduction). This is converted into a fixed number of 'Assigned Amount Units' (AAUs) by multiplying the target percentage by the base year emissions (in tonnes of carbon dioxide equivalent, tCO₂e) and then multiplying again by five (for the years 2008-2012). If a country's actual emissions over 2008-2012 exceed its AAUs, it will be in breach of its KP target and face a compliance procedure, unless it has obtained a sufficient amount of extra eligible units to bring its account into balance. Eligible units include:

- AAUs obtained from another country (under 'International Emissions Trading');
- 'Emission Reduction Units' (ERUs) from emission reductions at a project level in another developed country (under 'Joint Implementation or JI – see section 3.2.2 below);
- 'Certified Emission Reductions' (CERs) from emission reductions at a project level in a developing country (under the 'Clean Development Mechanism or CDM); or
- 'Removal Units' (RMUs) from net removals from LULUCF activities within the country, or obtained from another country.

The European Union (EU) has agreed to fulfil its commitments under the KP jointly. Under the so-called 'Burden Sharing Agreement', the EU's overall 8% reduction target was shared out between countries, with the UK adopting a 12.5% reduction target, whereas some other countries were allowed to increase emissions. Therefore the UK's Assigned Amount for 2008-2012 is equal to 1990 emissions of 779,904,144 tCO₂e x 87.5% x 5 = **3,412,080,630** AAUs (Defra 2006).

The UK's national GHG inventory is currently compiled by AEA Technology, with inputs from the Centre for Ecology and Hydrology (CEH) on LULUCF, for the UK Department of Energy and Climate Change (DECC) and the governments of the Devolved Administrations. The national GHG inventory forms the basis for both the more comprehensive UNFCCC report and the more restricted KP report. The most recent report on the UK's KP accounting, from 2012, shows that since 1990 the areas covered by tree planting (AR) grew by just below 300,000 ha, while only about a tenth of that area was lost to deforestation.³ With an increasing area, tree planting gives rise to a net sink of 2.2 MtCO₂e/year. There is also 1.4 million hectares (ha) of managed forests that create a further sink of about 7.5 MtCO₂e/year, of which only about 20% can actually be credited towards the UK's KP emission reduction target (because of the cap set at 1.36 MtCO₂e/year mentioned above). In total, forests and forest management contributed 3.56 MtCO₂e to the UK's national KP account in 2010.

Scotland has 62% of the UK land area classified as AR, contributing 60% of the removals from these activities, and only 28% of the area lost to deforestation, thereby contributing to net removals of around 1.6 MtCO₂e/year, or 72% of the UK total. Scotland also has 61% of the UK area of managed forests, creating 77% of the removals from this activity (around 5.8 MtCO₂e). However, not all of this actually counts, due to the aforementioned cap on forest management credits. If the UK's forest management cap was divided up on the basis of share of contribution to the activity, Scotland would notionally provide a further 1.04 MtCO₂e/year to the UK's KP account.

The implication of this is that Scotland's land management sector is contributing around 2.6m carbon credits annually towards the UK's national mitigation targets, or roughly 13m over the five years from 2008-2012.⁴ The UK has opted to account for these only once-off at the end of the Kyoto Protocol's first commitment period, which means that the UK's national KP account will be credited with an equivalent number of RMUs when review procedures conclude in late 2014. These carbon credits have potential economic value because they count towards the national GHG reduction target, allowing the UK to purchase fewer carbon credits from elsewhere and/or to relax emission restraints in other sectors. However, as the UK has managed to reduce its emissions below its first commitment period target and as RMUs cannot be carried forward, the UK's first commitment period RMUs are likely to have little or no value, unless another country is interested in purchasing them (discussed further in section 4.4 below).

A significant share of the carbon credits to accrue to the UK KP account for its land-management sector being a net sink reflects the planting, growth and management of trees in Scotland. In an analogous situation, New Zealand has set up an emissions trading scheme (see section 3.2.5 below) that issues landowners with carbon credits for the trees on their

³ Available from:

http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/6598.php

⁴ This figure simply multiplies the 2010 contribution from Scotland by five – the actual amount would depend on trends in each year.

lands and passes on both the benefits of carbon growth and the liabilities of carbon release to the landowners. To a distinct but similar effect Russia and Romania have approved forestry Joint Implementation (JI) projects where landowners receive carbon credits for their forests' emission reductions (see section 3.2.2 below).

In the UK, however, the accounting for land management activities under the Kyoto Protocol does not generate economic opportunities for landowners. There is not currently regulation in place to give forest owners any ownership of Kyoto Protocol forest carbon credits.

Box 2: The relationship between domestic forestry projects and national Kyoto Protocol accounting

An afforestation project in a country with a Kyoto Protocol target will result in RMUs being credited to the national account, provided the activity is captured by the national accounting system (which generally uses higher-level data rather than being the sum of project-specific data). Therefore if the project has come about due to purely voluntary action by the forest owner, and not due to any government policies or incentives, it could be argued that the government is receiving a 'free' benefit – i.e. it is able to avoid a penalty for non-compliance, or to increase emissions elsewhere – that ought to belong to the forest owner. The government could pass this benefit back to the forest owner in several ways:

- Issuing RMUs to the forest owner (this could not occur before the government itself receives the RMUs, which in the UK's case is not expected before 2015);
- Issuing AAUs to the forest owner (this could be done at any time, as an 'advance' on the expected RMUs the government would later receive);
- Cancelling an RMU and issuing an ERU to the forest owner (in the UK's case, this could only occur once the government has received the RMUs in 2015); or
- Through any other subsidy or incentive mechanism, not involving any transfer of KP units, which could occur at any time.

Most KP units can be carried forward from one compliance period to the next, if surplus to requirements. However, no LULUCF units (i.e. RMUs or forestry ERUs, which are converted from RMUs) can be carried forward.

3.1.2. EU carbon accounting

The EU is a signatory to the Kyoto Protocol in its own right as a 'regional economic integration organization', with an emission reduction target of 8% for 2008-2012, and 20% for 2013-2020. What this means in practice is that the EU has adopted an aggregate KP target that covers all of its Member States. As explained in Box 1 above, the EU has then agreed internally to redistribute this target between the Member States, such that some are allowed to increase emissions while others decrease emissions.

At the same time, the EU has its own internal climate change policies and targets. The current framework principally comprises a set of targets and measures first proposed in 2007 and enacted in 2009 as the 'Climate and Energy Package'. The chief targets are also known as the '20-20-20' targets for 2020:

- A 20% reduction in EU greenhouse gas emissions from 1990 levels;
- Raising the share of EU energy consumption produced from renewable resources to 20%; and

- A 20% improvement in the EU's energy efficiency.⁵

The first of these looks superficially similar to the EU's second commitment period KP target. However, it is not the same. The 'Climate and Energy' target is essentially divided into a target for the EU ETS (which includes international aviation, which is not covered by KP accounting) and a target for other non-EU ETS sectors (which includes many other relevant KP sectors such as agriculture, but excludes LULUCF). In addition, the 'Climate and Energy' target must only be achieved *by* 2020, whereas the KP target must be achieved *on average* over 2013-2020. There are also other minor differences, such as including different GHGs and using different Global Warming Potentials to commensurate the climate effects of different GHGs (European Commission 2012).

The result of this difference between the targets is that effectively LULUCF is excluded from European-level climate policy at present. As explained further in section 3.2.1 below, roughly half of the EU's emissions are covered by the EU ETS, which must reduce emissions by 21% on 2005 levels by 2020. Other sectors which are not covered by the EU ETS, but not including LULUCF, are subject to the so-called 'Effort Sharing Decision', which requires an aggregate reduction of around 10% on 2005 emissions for these sectors, varying from +20% for some Member States to -20% for others (the UK's target is -16%). Taken together, these targets will result in a -14% reduction on 2005 emissions for the EU, which is equivalent to -20% on 1990 emissions levels: the 'Climate and Energy' target.

LULUCF's contribution to Europe's net emissions is not insignificant. In 2008, LULUCF contributed a net sink across the 27 EU Member States of 410 MtCO₂e, or about 8% of total EU GHG emissions. Yet until very recently it has largely been ignored at the EU policy level (although it may feature in individual Member State policies).

The European Commission issued a consultation in September 2010 on the role of agriculture and forestry in meeting the EU's climate change commitments. A number of policy options were put forward in November 2011, leading to a formal proposal from the European Commission in March 2012 for harmonised LULUCF accounting rules, which was formally approved by the European Parliament in March 2013 and is expected to come into force in mid-2013.⁶

The policy options originally put forward in November 2011 included:

1. A 'no action' option;
2. Development of a new legal framework, separate to the EU ETS and Effort Sharing Decision, with or without emission reduction targets;
3. Inclusion of LULUCF in the Effort Sharing Decision; and
4. Inclusion of LULUCF in the EU ETS.

The first option was immediately rejected, on the grounds that this would only delay necessary action. The fourth option was also discarded, for reasons including the incompatibility between the annual compliance cycle for the EU ETS and the slower growth cycles for LULUCF, which are also subject to high inter-annual variability due to natural disturbances and harvesting, as well as the difficulty of dealing with reversals of carbon storage and the high transaction costs involved in including large numbers of relatively small forest owners in a scheme designed for relatively small numbers of large emitters. Option 3

⁵ See http://ec.europa.eu/clima/policies/package/index_en.htm

⁶ See http://ec.europa.eu/clima/policies/forests/lulucf/documentation_en.htm

was rejected for similar reasons, in particular the issue of inter-annual variability and incompatibility with annual linearly declining targets.

Accordingly, the final Decision establishes a new legal framework for LULUCF in the EU, separate from the Effort Sharing Decision and EU ETS, initially setting harmonised accounting rules. While this might lead to quantitative targets in future (once the accounting rules and monitoring and reporting framework are in place) it can be observed that all earlier references to targets were removed from the final version of the Decision. Thus EU-mandated targets seem unlikely to be introduced before 2020 at the earliest, and would most likely be part of a new, more ambitious target for 2030 (otherwise, including LULUCF would simply make existing targets easier to achieve). The key features of the new legal framework are:

- Mandatory reporting, from 1 January 2013, of forest management in addition to afforestation, reforestation and deforestation, which were already mandatory;
- Mandatory reporting, from 1 January 2021, of cropland management and grazing land management, in addition to the previously mandatory categories;
- Voluntary reporting of revegetation and the new category of wetland drainage and rewetting;
- Adding harvested wood products to the ‘pools’ of carbon that must be accounted for (i.e. along with above-ground biomass, below-ground biomass, soil organic carbon, etc);
- Rules for accounting for natural disturbances; and
- A requirement for Member States to report, by the end of June 2014, on actions to limit or reduce emissions by sources and maintain or increase removals by sinks associated with LULUCF activities.

3.1.3.Scottish national accounting

National GHG inventories have been calculated for the Devolved Administrations (DAs) of England, Scotland, Wales and Northern Ireland separately every year since 1998 (and for some years previously also). These then feed into the overall GHG inventory for the whole of the UK.

Each DA develops legislation relevant to its own priorities – the Climate Change (Scotland) Act (2009), for example, requires the Scottish GHG emissions inventory to include all existing anthropogenic sources and sinks of emissions in Scotland, together with emissions from the traded sector (i.e. the EU ETS – see section 3.2.1 below), and also a ‘Scottish share’ of GHG emissions from international shipping and aviation. Scotland currently emits 9.1% of total UK GHG emissions, with its national emissions having declined by 24% since the base year (1990 for CO₂). The uncertainty of the overall estimates of GHG emissions is also high for Scotland due to the large contribution from agriculture, land use change, and forestry.

Within the agriculture sector, which occupies about 80% of the land area and contributes around 15% of Scotland’s national emissions, the two largest sources of GHGs are N₂O from crop growth and fertiliser application (4.1 MtCO₂e/year), and CH₄ from livestock production (~3 MtCO₂e/year), with a much smaller amount of CO₂ coming from combustion of fuel in farm machinery and generators (~0.8 MtCO₂e/year). Agricultural emissions are calculated from UK activity data and Scottish estimates of arable land area and livestock numbers. The Scottish Government is currently promoting their *Farming For a Better Climate* (FFBC)

initiative to encourage farmers to reduce their emissions by increasing fuel use efficiency, using or generating renewable fuels, adopting practices that sequester more carbon in their soils, optimising management of fertilisers, and improving livestock management practices. The draft *Second Report on Policies and Proposals* (RPP2) estimates that this will contribute to a reduction in emissions of 0.107 MtCO₂/year by 2027 (Scottish Government 2013).

Scotland's LULUCF sector is a large net sink of GHGs (~10% of total national emissions), with most emissions or uptake being CO₂ from carbon stock changes, with small amounts of N₂O being emitted from land use change to croplands. The net size of the LULUCF sink in Scotland has increased by 161% since 1990, mainly as a result of less land being converted to cropland and more to forestry. Forestry currently occupies about 17% of the land area of Scotland, but the Scottish Government, following the Woodlands Expansion Advisory Group report in 2012, has set a target to plant an extra 10,000 hectares of trees per year through to 2022, providing an extra 100,000 hectares of land under forestry and woodland. The draft RPP2 estimates that this will contribute a reduction in emissions of about 0.687 MtCO₂e/year by 2027 (Scottish Government 2013).

Components of LULUCF emissions reported in the Scottish inventory include harvested wood products (-2 MtCO₂e/year), creation and maintenance of settlements (+1.6 MtCO₂e/year), land use conversion (+2 MtCO₂e/year), biomass burning (+0.104 MtCO₂e/year), N-fertilisation (+0.00075 MtCO₂e/year), and carbon sequestration in soils and vegetation (-7.2 MtCO₂e/year). Note that these figures correspond with comprehensive UNFCCC accounting rather than the more restricted scope of Kyoto Protocol accounting (see section 3.1.1 above), which is nevertheless derived as a sub-set of the same data. Matrices of the areas of land use and land use change, grouped into the IPCC classifications of Grassland, Cropland, Forest Land, Settlements and Other Land, for each UK country are derived from surveys on land use conducted in 1947, 1980, 1984, 1990, 1998 and 2007, and statistics from the Forestry Commission, which has carried out inventories of woodlands in Great Britain at 15-20 year intervals since 1924. Annual planting data and management information are used to estimate the size and age structure of the national forest estate between the periodic inventories. This information, together with data derived from the growth characteristics of UK forests (i.e. 'yield classes') and soil survey data, feeds into a dynamic carbon accounting model (C FLOW) to estimate annual uptake and storage of atmospheric carbon by trees and soils. Uncertainties in the LULUCF sector estimates arise both from natural variability in vegetation and soils and incomplete knowledge on the extent of activities and the underlying processes affecting sinks and sources.

Peatlands occupy about 1.7 million hectares or 20% of the land area of Scotland, much of which is drained or damaged and so has emitted large amounts of CO₂ from oxidation of the carbon it previously stored. Peatland restoration (through blocking of drains, and by harvesting conifer plantations), which allows it to begin to sequester CO₂ again, is not currently included in national GHG inventories, but becomes optional from 2013 onwards, as explained in sections 3.1.1 and 3.1.2 above. IPCC Technical Guidelines for the inclusion of wetland management within national greenhouse gas inventories are expected in mid-2013 (Scottish Government 2013). Since 1990, some 47,000 hectares of peatland have been restored in Scotland, but the RPP2 suggests that this rate could be increased to 21,000 hectares/year, with potential to reduce emissions by 0.515 MtCO₂e/year by 2027 (Scottish Government 2013). There are also plans to phase out the use of peat in horticulture, which is estimated to contribute about 0.1 MtCO₂e/year. Emissions of CO₂ due to the use of peat as a fuel, which used to be reported under the LULUCF sector, were removed in 2006, and are now reported under the Energy sector.

Under the Climate Change (Scotland) Act 2009, Scotland has set a precedent of diverging its climate policy from that of the UK, adopting a 42% emission reduction target for 2020 (on 1990 levels) compared with the UK target of 34%. The Act also sets statutory annual targets (from 2010 onwards) for Scottish emissions, reported as the Net Scottish Emissions Account (NSEA). The 2010 target is 53.652 MtCO₂e. A separate accounting and reporting framework applies to these targets, set out in the Carbon Accounting Scheme (Scotland) Regulations 2010.⁷ Section 14 (3) of the Act specifies that a maximum of 20% of each annual target may be met with the use of purchased carbon units (as opposed to domestic emission reductions), with allowable units and precise limits to be set by regulation. Accordingly, the Climate Change (Limit on Carbon Units) (Scotland) Order 2010⁸ specifies that no additional carbon units, other than allowances originating from the EU ETS (see section 3.2.1 below), may be credited to the NSEA for the period 2010-2012. The Climate Change (Limit on Carbon Units) (Scotland) Order 2011⁹ sets the following limits on the use of Kyoto Protocol units (AAUs, ERUs and CERs) for the years 2013-2017:

Table 1: Limits on credits counted towards Scottish targets, 2013-2017

Year	Limit
2013	1,050,000
2014	203,600
2015	206,000
2016	199,000
2017	197,400
Total	1,856,000

These limits are not immediately relevant to UK forest owners, as they apply principally to purchase, by the Scottish Government, of carbon units originating from other countries. However, under some of the options discussed in section 4 below which involve crediting forest owners with AAUs or ERUs, the Scottish Government would have limited capacity to use such credits to permit any increase in Scottish non-EU ETS emissions.

It is also worth noting that the above targets and limits on the use of carbon units apply to the Scottish Government, which does not (yet) have any policy to devolve direct responsibility for meeting the targets – or the ability to benefit by creating carbon credits from emission removals – to other entities, other than via the EU ETS. Rather, the government is relying on a range of incentives, regulations and other mechanisms to deliver its targets (Scottish Government 2013).

Finally, it should be noted that while the Scottish targets and carbon accounting procedures apply only within Scotland in the first instance, all transactions and cancellations of Kyoto Protocol and EU ETS units actually take place within the UK's national accounts. Thus, while removals from forest planting and forest management occurring within Scotland will count towards the NSEA target, the RMUs generated by such activity will in fact be credited to the UK's national account for Kyoto Protocol compliance purposes, as Scotland has no Kyoto Protocol target or accounting system of its own.

⁷ Available at: <http://www.legislation.gov.uk/ssi/2010/216/contents/made>

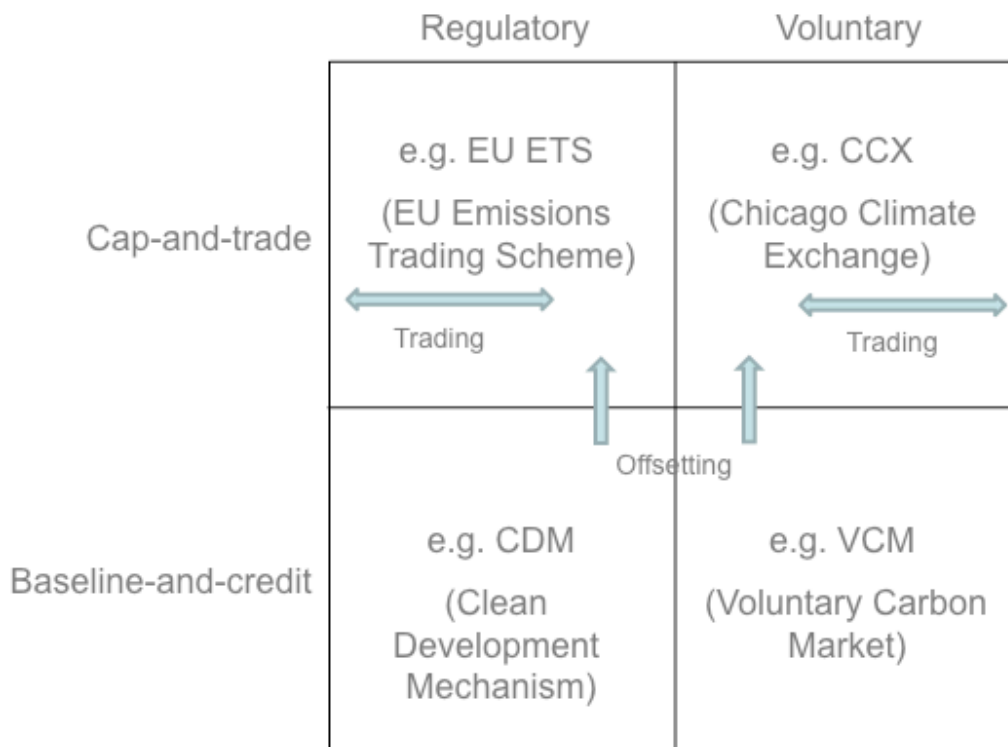
⁸ Available at: <http://www.legislation.gov.uk/ssi/2010/217/contents/made>

⁹ Available at: <http://www.legislation.gov.uk/ssi/2011/440/contents/made>

3.2. Forests in Regulatory Carbon Markets

The global carbon market is actually many different markets, which can be divided into regulatory (also known as mandatory or compliance) and voluntary markets, and into cap-and-trade and baseline-and-credit schemes (see Figure 1 below).

Figure 1: Overview of the carbon market



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In **regulatory markets**, the rules of participation are stipulated by governments and backed by some degree of legal enforcement, while in the **voluntary market**, individuals and/or organisations freely choose to adopt emission limits or to acknowledge emission reductions in one place as equivalent to an emission reduction elsewhere (known as **offsetting**, which can also occur in regulatory markets). Entities within a **cap-and-trade** system have a limit on the total amount of greenhouse gases that they are allowed to emit. The rights to emit greenhouse gases can then be expressed in the form of emission permits or allowances, which participants can **trade** with one another. At the end of each year, or other specified period, each participant must surrender enough allowances to cover its emissions. **Baseline-and-credit** schemes reward participants for reducing emissions below an established baseline. Reductions below the baseline are turned into carbon credits, which can be traded and used to offset emissions elsewhere. Each carbon credit usually represents an emission reduction equivalent to one tonne of CO₂e. Removals of carbon dioxide from the atmosphere through forestry activities may be recognised with carbon credits under either regulatory or voluntary baseline-and-credit schemes, or forestry may be included as a sector under cap-and-trade schemes (such as the Kyoto Protocol – see section 3.1.1 above, or the New Zealand Emissions Trading Scheme – see section 3.2.5 below).

There are now dozens of carbon markets in existence or under development around the world, a few of which are illustrated in Figure 1. So, for example, the European Union Emission Trading System (EU ETS) is a **regulated cap-and-trade** scheme, which started in 2005 and is now the largest scheme of its kind in the world (see section 3.2.1 below). The

California Air Resources Board (CARB) recently launched its own regulated cap-and-trade programme, which covers major sources of GHG emissions in California.

The Kyoto Protocol’s Clean Development Mechanism (CDM), which allows Annex I (developed) countries to buy Certified Emission Reduction (CER) credits originating from projects in non-Annex I (developing) countries to help meet their targets, is the best known and largest **regulatory baseline-and credit scheme**. The CARB now also has an offset project registry where projects that reduce emissions (below a baseline established by following approved CARB methodologies) can be awarded credits.

The Chicago Climate Exchange (CCX) was a **voluntary cap-and-trade** system in North America that required member entities, who joined it voluntarily, to commit to reducing GHG emissions by a specified level. The CCX was North America’s largest and longest running GHG emission reduction programme until transactions ceased in January 2011. The CCX now operates as an offsets registry, and together with a number of other different standards, such as the Verified Carbon Standard (VCS), Gold Standard and the Climate Action Reserve (CAR), provides essential standardization and infrastructure to support the **baseline-and-credit** side of the **voluntary market**.

The main buyers of voluntary carbon credits are corporations, with the principal drivers of demand being corporate social responsibility, public relations or branding, and pre-compliance (purchasing offsets voluntarily, in the expectation that these credits may ultimately be recognised for compliance within a future regulatory scheme) (Peters-Stanley & Hamilton 2012). In a sense, even when corporations or individuals are acting alone in purchasing voluntary carbon credits, they are behaving as if they were in a voluntary cap-and-trade scheme, subject to a cap on their emissions, which is met through a combination of internal abatement and offsetting.

Carbon credits in the voluntary market are primarily traded on the decentralised ‘over-the-counter’ (OTC) market, where buyers and sellers engage directly with one another or through a broker, as opposed to trading a standardised product on an exchange (which is more common in regulatory carbon markets).

Table 2 provides an overview of the volume and value of the different segments of the global carbon market. It should be noted that ‘volume’ represents transactions, not final demand (i.e. a single carbon credit may be counted several times as it is transacted, before finally being ‘used’ or retired from the market). It can be observed that the voluntary market is several orders of magnitude smaller than the regulatory market, and that forestry makes up a significant part of the voluntary market, but much less of the regulatory market.

Table 2: Volume and value of the regulatory and voluntary carbon markets (adapted from Peters-Stanley & Hamilton 2012; Peters-Stanley et al. 2012)

	Volume (MtCO ₂ e)		Value (USD million)	
	2010	2011	2010	2011
EU ETS	6,789	7,853	133,598	147,848
CDM	1,540	2,113	23,843	26,570
Other allowances and exchanges	373	228	1336	1,033
Total Regulatory Market	8,702	10,094	158,777	175,451
<i>of which forestry:</i>	4.4	7.3	25	52
Voluntary OTC-traded	128	93	422	572
CCX and other exchanges	4	2	11.2	4

Total Voluntary Market	133	95	433	576
<i>of which forestry:</i>	<i>28.4</i>	<i>18.3</i>	<i>158</i>	<i>185</i>
Total Carbon Market	8,835	10,189	159,210	176,027
<i>of which forestry:</i>	<i>33</i>	<i>26</i>	<i>177</i>	<i>237</i>

In both regulatory and voluntary markets, the cost of developing a project to generate carbon credits can be substantial. Developing a project usually requires specialised expertise (whether sourced internally, or from consultants) to elaborate the necessary project design documentation, much data needs to be collected, and specifically accredited auditors need to be retained to verify the claimed emission reductions, on a recurrent basis. Projects and credits must usually be registered with an approved registry operator, which typically charges a per-credit fee, there may be search costs in finding a buyer or using an exchange or broker, and specialised lawyers may need to be retained to draw up a contract. These carbon project development and transaction costs can vary considerably depending on the market or standard in question, ranging from as little as £500-£1,000 for initial validation of a Woodland Carbon Code project, up to around €200,000 for overall development of a particularly complicated large-scale forestry VCS project.¹⁰ Many of the costs are fixed rather than varying with project size, which generally makes smaller projects less cost-effective, because the rate at which they accumulate carbon credits is directly proportional to their size. Commonly used ‘rules of thumb’ indicate that tree planting projects under the VCS are viable at around 2-3,000 hectares and forest conservation at around 50-100,000 hectares. However, standards with lower development costs such as the Woodland Carbon Code offer the possibility of developing smaller-scale projects, as does the option of ‘grouping’ projects, which is available under various standards, including both the VCS and Woodland Carbon Code (see sections 3.3.1 and 3.3.5 below for more information on these standards).

A large part of these costs occur up-front, during project development. However, under most credible forest carbon market standards, the carbon credits are only issued to the project **after** emission reductions are verified to have occurred (known as ex-post crediting, as opposed to ex-ante crediting which would involve giving credits in advance, on the expectation of future emission reductions). In addition, a feature of forest carbon projects in particular is that they tend to generate small amounts of reductions initially, with most benefits accruing during later years. This is in particular true for projects involving tree planting, because growth accelerates only at a certain tree age. In many cases, forest conservation and management projects also need some years to become fully effective. As payments for carbon credits are typically made only on delivery of the credit, it is important to realise that carbon markets generally provide back-loaded revenue support rather than up-front expenditure support for projects, which may be rather different to forest owner cash flow needs or expectations. Of course, a buyer or investor may be willing to provide payment or investment up-front, in anticipation of future credit deliveries and returns – but this will generally come at a cost.

In the following sections we now discuss the main regulatory and voluntary carbon markets of possible relevance to UK forestry.

3.2.1. EU Emissions Trading System (EU ETS)

The European Union Emissions Trading System (EU ETS) is the largest and longest-running carbon market in the world. It started in 2005 and is divided into phases: Phase I from 2005-

¹⁰ Figures for Woodland Carbon Code validation from Pat Snowdon, pers. comm., 30 May 2013; VCS costs based on the authors’ experience. See also Covell (2011).

2007, Phase II corresponding with the first Kyoto Protocol commitment period from 2008-2012 and Phase III corresponding with the second Kyoto Protocol commitment period from 2013-2020. The scheme covers around 50% of EU emissions or 2,000 MtCO₂e/year. However, coverage is limited to large industrial direct sources of emissions, such as from power generation, steel and cement production. Agriculture and forestry sector emissions and removals are excluded from the scheme.

The scheme works by creating a legal obligation to surrender one EU Allowance (EUA) for every tonne of carbon dioxide equivalent emitted during a compliance (calendar) year, with a penalty for non-compliance of €100/tCO₂e. The supply of EUAs is then limited to a specified amount, equating to a cap being imposed on emissions from the covered sectors. For 2013-2020, the EU-wide cap reduces by 1.74% each year, in order to reach a level 21% below 2005 emissions in 2020. The only way in which emissions are allowed to increase above the cap is through the purchase of CERs and ERUs, again up to specified limits. CERs and ERUs originating from forestry projects are specifically excluded. When making this decision, the EU reasoned that *"... with LULUCF activities... carbon sequestration is inherently temporary and reversible, and it is not clear how this can be reconciled with entity-level emissions trading, as this would necessitate the later attribution of subsequent releases of greenhouse gases back to the beneficiary (operator) of the initial sequestration credit. This makes it inconsistent with the objectives of the Community emissions allowance trading scheme, which is designed as a technological driver to achieve permanent emission reductions."* (European Commission 2003). Thus there is presently no possibility for UK forestry to participate in the EU ETS, neither as a sector within the scheme, nor as a provider of offsets.

3.2.2. Joint Implementation (JI)

Joint implementation (JI) is one of the Kyoto Protocol's so-called 'flexibility mechanisms' (see Box 1 above) that were designed to enhance efficiency in achieving mitigation targets. Emission reduction projects register under JI in order to receive carbon credits for emission reductions or removals, known as Emission Reduction Units (ERUs), that function as offsets under the Kyoto Protocol, allowing the buyer of the ERU to increase emissions by one tonne of CO₂e above their cap. In some cases, ERUs can also be imported into the EU ETS (see section 3.2.1 above). At the time of writing in early 2013 around 600 JI projects had achieved registration, with the potential to issue over a billion ERUs by the end of 2012.¹¹

JI is a mechanism for crediting emission reductions or removals only in countries with a cap on their total emissions under the Kyoto Protocol. Issuing ERUs thus requires cancelling an equal amount of existing carbon credits (AAUs or RMUs) from the national registry. This is necessary because otherwise the JI project's emission reductions would be counted twice: once in the form of ERUs issued to the project, and again as a reduction in emissions in the national GHG inventory.

There are two sets of procedures (also known as tracks) used to implement JI projects. Which track a given JI project decides to follow will depend upon the availability of the necessary regulatory infrastructure in the host country and on how strict its approval procedures are. Under Track 1 the host country uses their own procedures for assessing the project and its emission reductions, and under Track 2 projects are assessed and registered by the JI Supervisory Committee, an international body set up under the UNFCCC for this purpose.

¹¹ Data as of 1 April 2013 from UNEP Risoe CDM/JI pipeline, <http://www.cdmpipeline.org/ji-projects.htm> (accessed 1 April 2013).

In principle all LULUCF activities that are covered by the Kyoto Protocol (see section 3.1.1 above: afforestation/reforestation, forest management, cropland management, grazing land management and revegetation) are eligible under the JI mechanism. However, in order to carry out a JI project in any particular LULUCF activity, the host country must have elected to account for that activity, and must have RMUs available from the activity to cancel (i.e. removals must exceed emissions for the activity in the country as a whole). This restricts the scope for LULUCF JI. To date in early 2013 only three out of approximately 600 registered JI projects are land-management activities – one afforestation and two reforestation projects.¹²

In addition, the host government has to be willing to support JI projects. JI was originally conceived as a mechanism for more advanced developed countries to assist former Soviet Union countries, and most JI projects are based in these countries. Only a few other countries, such as France, have also elected to host JI projects, specifically as a way of providing incentives for emission reductions in sectors not covered by other policy instruments such as the EU ETS. This is sometimes called ‘domestic’ JI, indicating that the driver is domestic emissions abatement, rather than assistance from another country.

The UK government does not support JI projects in the UK. Since all projects require formal approval from the host country government, it is currently impossible for UK landowners to generate JI carbon credits from projects in the UK. This limitation applies to all technology scopes including forestry, and to both Track 1 and Track 2 projects.

3.2.3. California

A new carbon market commenced operation in January 2013 in California, officially known as California’s cap-and-trade scheme, or AB32 after the enabling legislation, the Global Warming Solutions Act of 2006 or Assembly Bill 32. In the first compliance period from 2013-2014, the scheme will cover large stationary sources of more than 25,000 tCO₂e/year in industry and power generation sectors. The second phase, from 2015-2020, will add coverage of emissions from transport, household and commercial fuels, via accounting and compliance obligations on fuel distributors, bringing overall coverage of the scheme to 85% of the state’s emissions (Kossoy & Guignon 2012).

The scheme does not cover agricultural emissions (apart from fuel combustion) or forestry or other land management emissions or removals. However, offsets may be generated from certain activities in these sectors for which the California Air Resources Board (CARB) has approved a protocol or carbon accounting methodology. To date, CARB has approved four protocols: livestock methane abatement, afforestation, urban forestry and destruction of ozone depleting substances. Projects can either generate ‘Compliance Offsets Credits’ by following the approved CARB protocols, or ‘Early Action Offsets Credits’ by following an equivalent Climate Action Reserve protocol (see section 3.3.3 below). In all cases, project activities are limited to the US, meaning that there is no current opportunity for UK landowners to generate carbon credits for this market.

The scheme allows for possible future recognition of Compliance Offset Credits issued by a linked regulatory programme. However, this is mainly intended for mutual recognition of offsets with other North American carbon markets, starting with Quebec, which also commenced a cap-and-trade scheme in January 2013. It is possible that the California

¹² UNEP Risoe CDM/JI pipeline, <http://www.cdmpipeline.org/ji-projects.htm> (accessed 1 April 2013).

scheme could link to the EU ETS at some point in future, but in the authors' opinion this is considered very unlikely before 2020.

3.2.4. Australia

Australia's Carbon Pricing Mechanism (CPM) commenced on 1 July 2012 with an initial 'fixed price' phase (essentially a carbon tax) which will run until 2015, before evolving into a 'flexible price' cap-and-trade scheme from 2015 onwards. Coverage of the scheme is limited to large power generation and industrial facilities, fugitive emissions from coal mining or natural gas production, and waste management facilities, with emissions over 25,000 tCO₂e/year, corresponding to around 60% of Australia's total GHG emissions.

Agricultural and LULUCF emissions and removals are not covered by the scheme directly, but instead emission reductions or enhanced removals may be credited via a separate mechanism known as the Carbon Farming Initiative (CFI). However, credits can only be generated for an activity for which a carbon accounting methodology has been developed (either by the government or a private sector project developer) and approved by the relevant Minister, on the advice of an independent Domestic Offsets Integrity Committee.

CFI carbon credits are known as Australian Carbon Credit Units (ACCUs) and are divided into 'Kyoto' and 'non-Kyoto' versions, depending on whether they qualify for recognition under Kyoto Protocol accounting rules. Either version can be used for compliance with the CPM, or sold into the voluntary carbon market. A mechanism exists for cancelling ACCUs which are exported internationally. Kyoto ACCUs may also be converted into either AAUs or ERUs and exported.

In August 2012, in-principle agreement was reached with the European Union to link the EU ETS and Australian schemes from 2015. The link will be one-way (allowing EUAs to flow to Australia to meet up to 50% of Australian liabilities, but not for Australian units to flow in the reverse direction) for an interim period until 1 July 2018, when a full two-way link will commence. The exact way in which these linkages will work is subject to on-going consultation on the interim link and the development of a treaty between Australia and the EU on the full two-way link. One of the key issues for consideration is the role of land-based ACCUs from the CFI and whether these would be recognised for compliance in the EU ETS.¹³

3.2.5. New Zealand

New Zealand was the first, and is to date still the only, country to have included forestry within the scope of a national GHG cap-and-trade scheme. In fact, forestry was the first sector to be covered by the New Zealand Emissions Trading Scheme (NZ ETS) when it was introduced on 1 January 2008. Large stationary power generation and industrial emitters, plus liquid fossil fuels, were brought into the scheme on 1 July 2010. The scheme's basic mechanics are similar to the EU ETS (see section 3.2.1 above): emitters must surrender allowances, known as New Zealand Units (NZUs), to cover their emissions as measured according to specified carbon accounting rules.

Forest owners in New Zealand **must** participate in the NZ ETS and surrender NZUs for their net emissions if they deforest more than two hectares of any non-exempt pre-1990 forest land. Until 31 December 2012, forest owners have had the option to pay a fixed tax of NZ\$25/tCO₂e instead of surrendering NZUs (Ministry of Agriculture and Forestry 2011). The

¹³ See http://europa.eu/rapid/press-release_MEMO-12-631_en.htm (accessed 5 November 2012) and <http://www.climatechange.gov.au/government/submissions/registry-arrangements-EU-trading.aspx> (accessed 10 April 2013).

1990 threshold ensures consistency with Kyoto Protocol accounting. Owners of pre-1990 forests are only liable for deforestation and cannot benefit from further increases in carbon stored in their forests. However, they are compensated by the Government for possible loss in land value by being given a free allocation of NZUs which they can sell on the market, or retain in case of future deforestation.

Owners of post-1990 forests have a choice between participating voluntarily in the NZ ETS, or in other afforestation incentive schemes such as the Permanent Forest Sink Initiative (PFSI), or not participating in any scheme whatsoever. If they participate in the NZ ETS, they receive NZUs for additional net removals, but are also then liable for any net deforestation. No restrictions are placed on managing the forest, and the owner can leave the scheme at any time, provided they pay back any NZUs received.

Under the PFSI, by contrast, the forest owner enters into a 50-year covenant with the government to establish or maintain the forest sink, which is registered against the land title. The forest owner is compensated not with NZUs but with AAUs, corresponding to the removals accounted during the first Kyoto Protocol commitment period, 2008-2012. Every issued AAU carries a contingent liability, with the forest owner having to surrender eligible carbon units¹⁴ if the level of carbon storage decreases or has been over-estimated. The original reason for issuing AAUs under the PFSI was because at the time the scheme was developed, which was before the start of the NZ ETS, these were effectively the only units the Government was able to issue. The scheme also allows the Government to incentivise forest owners earlier than Kyoto Protocol accounting rules would normally allow: forest owners can claim NZUs or AAUs on an annual basis if they wish, whereas the New Zealand Government will only see the benefit of the additional carbon storage from PFSI projects in the form of RMUs in the national account in 2015, once the national compliance report on the first Kyoto Protocol commitment period shows a net carbon sink in the forestry sector (see section 3.1.1 above).

The Government is currently consulting on proposals to amend the PFSI to issue NZUs instead of AAUs from 2013 onwards.¹⁵ For the forest owner, NZUs are only tradable in the domestic market, whereas AAUs can be traded internationally. However, the prices of each are linked, due to linkages between the NZ ETS and Kyoto Protocol. International demand for AAUs was active until 2010 but has now dried up and is unlikely to be reinvigorated much earlier than 2020. Hence the proposal to issue NZUs in future is likely to be seen as the better option by most forest owners.

New Zealand provides a very interesting case study on how governments can allow forest owners in developed countries to participate in national and international carbon markets. However, there is also a cautionary tale: in 2012 the government reoriented its climate change mitigation strategy and removed all limits on importing Kyoto carbon credits. This effectively put domestic mitigation efforts on hold, as carbon prices plummeted to close to zero. This may well lead to increased deforestation in the coming years, as the penalty for doing so is now negligible. In addition, it is worth noting that the NZ forestry sector is very different to that of the UK, with little multi-purpose forestry and more 'tree farming'.

¹⁴ Eligible units include New Zealand AAUs (not AAUs from any other country), NZUs, or other Kyoto Protocol units (CERs, ERUs or RMUs).

¹⁵ See consultation paper available at: <http://www.mpi.govt.nz/Default.aspx?TabId=126&id=1784> (accessed 10 May 2013).

3.3. Forests in Voluntary Carbon Markets

3.3.1. Verified Carbon Standard (VCS)

The Verified Carbon Standard (VCS) aspires to be the industry benchmark for voluntary offsetting. It was set up in 2005 by the Climate Group, the International Emissions Trading Association and the World Economic Forum together with The World Business Council for Sustainable Development. The VCS Association is run as a not-for-profit from Washington and is financed by proceeds from transactions of its carbon credits, known as Verified Carbon Units (VCUs). According to the Ecosystem Marketplace's State of the Voluntary Carbon Markets 2012, the VCS is by far the leading standard in these markets, attracting 58% of transaction volume in 2011 (Peters-Stanley & Hamilton 2012).

The VCS is a comprehensive standard for project-based emission reductions. It covers the major kinds of carbon reductions and industry sectors. In land-management ("AFOLU" under the VCS), the scope includes all of the most common project types: Afforestation, Reforestation and Revegetation, Agricultural Land Management, Improved Forest Management, Reduced Emissions from Deforestation and Degradation, Avoided Conversion of Grasslands and Shrublands, and Wetlands Restoration and Conservation. Carbon accounting methodologies available for all of these project types. Some of the methodologies derive from the Kyoto Protocol's CDM, while others have been developed specifically for the VCS.

The VCS has a set of specific rules for land-management projects to ensure that all credited emission reductions are permanent. Ensuring permanence is problematic for land-management projects that store carbon in biomass because the carbon storage can easily be reversed, for example if a forest burns. The approach taken to this under the CDM was to issue temporary credits, which ended up being unattractive to buyers because of the unknown liability attached to the requirement to renew these credits in future (Neeff & Ascui 2009). Other options include legal covenants (used in the PFSI in New Zealand, see section 3.2.5 above) and mandatory insurance requirements. The VCS ensures permanence through a buffer requirement. This means that land-management projects receive VCUs corresponding to a certain percentage of their verified emission reductions and contribute the remainder to a centrally administered buffer pool. Over time, if there is no reversal of storage, the project can claim more of the VCUs back from the buffer account, but if there is a reversal of storage, VCUs can be cancelled from the buffer account to ensure environmental integrity of the already-issued credits. Although some carbon loss is unavoidable, this ensures that all issued carbon credits from VCS land management projects are real and permanent.

VCS projects can, in principle, be carried out in any country. However, in order to safeguard the environmental integrity of the standard, GHG reductions cannot be double counted in more than one GHG programme. An example of double counting would be a reduction in emissions claimed to contribute to a company's voluntary 'carbon neutrality', while simultaneously contributing to meeting the company's compliance obligation under a regulatory cap-and-trade scheme. In the case of a forestry project anywhere in the UK, any reduction in emissions which might potentially lead to credits under the VCS would also be recognised in the UK's national KP account (see section 3.1.3). The same GHG reduction would therefore be counted twice.

For this reason, the VCS includes specific regulations for the case of overlaps with other GHG programmes. In order to register a land-management based VCS project and its carbon

credits in the UK, the UK's national focal point would need to confirm in writing that an equivalent number of carbon credits have been cancelled from the national KP accounts. Alternatively, project developers can also provide proof of purchase and retirement of an equal amount of carbon credits from the UK inventory. In both cases, any eligible KP unit would suffice – this could include AAUs, RMUs, ERUs or CERs (see Box 1 for definitions). A third alternative is to provide proof that a given project is outwith the scope of the UK's commitments under the Kyoto Protocol.

In practice, this renders registration of afforestation/reforestation and forest management projects under the VCS almost impossible in the UK. In the first place, the UK Government does not have procedures for cancelling KP units from the national KP account for such purposes, nor does it seem likely to wish to develop such procedures. From 2008 to 2011, the UK Government backed a voluntary Code of Best Practice (later re-named a Quality Assurance Scheme) for carbon offsetting, which essentially only supported the use of regulatory carbon credits, such as KP units or EU ETS allowances, for carbon offsetting. Although the scheme was withdrawn in June 2011, this does not indicate any change in the Government's stance toward voluntary carbon credits. In addition, even if the Government were to develop such procedures, it might not be willing to cancel KP units for free, even if the project ultimately benefited the national account by an equivalent amount. The second option – the project developer purchasing and retiring KP units themselves – is technically feasible, but would only benefit the developer to the extent of the price differential between such units and VCU, which is unlikely to be financially attractive, especially after inclusion of transaction costs. This leaves only the third option, which is not applicable to afforestation or forest management. In practice, therefore, the VCS does not currently offer a viable avenue for development of forestry projects in the UK or Scotland.

Nevertheless, according to the choices that the UK made in reporting under the Kyoto Protocol's first commitment period (see section 3.1.1), cropland management, grazing land management and revegetation activities are excluded from the national GHG inventory, and furthermore, harvested wood products and wetland drainage and rewetting were not within the scope of KP accounting during that period. The UK has not yet confirmed which of the voluntary activities it will account for in the second KP commitment period, although harvested wood products will definitely be included from 2013 (see section 3.1.2 above). Double counting of emissions is therefore not an issue for non-reported KP activities, and this would enable project developers interested in working in these sectors to register their activities under the VCS. However, most of these sectors also face significant challenges (most likely leading to high costs) in measuring and verifying emission reductions, which would reduce the viability of such projects.

3.3.2. Gold Standard/CarbonFix

A group of environmental NGOs, led by WWF, set up the Gold Standard in 2003 to provide a premium product certification for the Kyoto Protocol's project-based mechanisms as well as for voluntary offsetting. The Gold Standard Foundation is run from Switzerland on donations, government grants and fees from its projects. Unlike most other carbon standards, certification under the Gold Standard covers a full range of sustainable development indicators in addition to carbon reductions. As such it caters to corporate social responsibility motivations fuelling the voluntary carbon markets, where relatively modest volumes of Gold Standard credits have been able to garner prices around US\$10/tCO₂e, which is better than for most other carbon standards and more than twice as much as the average for the VCS (Peters-Stanley & Hamilton 2012). The Gold Standard took

equal second place (with the Climate Action Reserve, see section 3.3.3 below) in 2011 in terms of market transaction volume, with 12% market share (ibid).

Currently, the Gold Standard only applies to energy efficiency and renewable energy projects. However, from mid-2013 the Gold Standard will also apply to carbon credits from forestry projects. The scope has been expanded through integrating the CarbonFix Standard that since 2007 has specifically targeted the forestry sector. Although detailed rules had not yet been published at the time of writing, the new scope is expected to cover reforestation, forest management and agriculture projects.

As with the VCS (see section 3.3.1) the eligibility of any project in the UK to use the Gold Standard is restricted by rules against potential double counting. In order for a project to use the Gold Standard in the UK, the project developer would have to show that an equivalent number of AAUs have been retired, which could happen either through the government having a procedure to cancel those units, or the developer purchasing and cancelling them. Until now, the scope of the Gold Standard has been limited to energy sector activities which are always covered by KP accounting, so there has been no third option of undertaking a project in a sector outside the scope of a country's KP target. With the expansion of the standard's scope to also include forestry, further clarification on this may be expected, as well as perhaps the possibility of cancelling RMUs as an alternative to AAUs. Currently, in the absence of further guidance, it seems most likely that the limitations described in section 3.3.1 above in relation to the VCS will also apply to Gold Standard forestry projects anywhere in the UK.

3.3.3. Climate Action Reserve (CAR)

The Climate Action Reserve (CAR) sets out to provide the necessary infrastructure for a carbon offsetting scheme catering to the North American carbon markets. The CAR was launched in 2008 to scale up the work on carbon projects that the California Climate Action Registry had been doing since 2001. While covering all of the United States for voluntary offsetting it also functions as an offset registry for the compliance scheme in California under its Global Warming Solutions Act (AB 32 – see section 3.2.3 above). The CAR is incorporated as a not-for-profit in California and levies fees on registering projects and transacting its carbon credits (known as Climate Reserve Tons or CRTs). In 2011 the CAR was equal second largest standard in the voluntary market offsets, and much of its 12% market share is likely to have gone to the 41% of the voluntary market represented by buyers from North America.

The CAR does not provide opportunities for forestry activities in the UK or Scotland. Although eligible project types include reforestation, forest management, avoided forest conversion and urban forestry, and further extension is underway, the scope is geographically limited to projects in the United States, Canada and Mexico. This does not currently seem likely to change.

3.3.4. Plan Vivo

The Plan Vivo Foundation is a Scottish charity that as early as 1994 developed a carbon standard targeted at small-scale land-management activities in developing countries. The standard was overhauled in 2008 to adapt to momentum in the markets around that time. The Plan Vivo Standard does not aim to comprehensively serve the voluntary carbon markets, nor does it compete on the rigour of its carbon accounting and certification principles. Rather, the Plan Vivo Standard focuses on practical solutions for rural

communities in developing countries. In 2011, the Plan Vivo Standard attracted only about 1% of transaction volume in the voluntary carbon markets (Peters-Stanley & Hamilton 2012).

The Plan Vivo Standard only covers activities in developing countries. Although the scope of eligible land-management activities is relatively broad and its safeguards against double-counting appear less rigid than other carbon standards, it does not provide an option for UK forest owners to monetise the carbon benefits of their lands.

3.3.5. Woodland Carbon Code

The UK Forestry Commission launched the Woodland Carbon Code in 2011. It provides a set of procedures and infrastructure to register tree planting projects in the UK for the generation of carbon credits (Woodland Carbon Units). Unlike most other carbon standards, the Woodland Carbon Code is not meant to generate internationally tradable offsets that could be accounted against the emission profiles of their users and support claims of carbon neutrality. Rather, it provides a means to document a contribution to the UK's emission reduction targets.

The UK Department for Environment, Food and Rural Affairs (Defra) has supported the Woodland Carbon Code by including specific references to it within its reporting guidance for UK business (Defra 2009; Defra 2011). While this reporting guidance is voluntary, regulations are about to be introduced that will make carbon reporting mandatory for businesses listed on the London Stock Exchange, from 30 September 2013. The current draft regulation¹⁶ does not require any particular reporting standard to be followed, but nevertheless, many companies can be expected to follow the Defra guidance. This could enhance demand for Woodland Carbon Units, as the Defra guidance permits these credits to be reported as a deduction against gross emissions. Nevertheless, it is important to note that mandatory carbon reporting on its own does not require companies to reduce or offset their emissions; but it may indirectly encourage some UK listed companies to do so, due to greater public scrutiny of their emissions.

The Woodland Carbon Code was set up for woodland creation and tree planting anywhere in the UK. Scottish landowners can therefore use the Woodland Carbon Code to document the carbon removals through tree growth on their lands and potentially attract funding through sales of carbon credits. In 2011, the Woodland Carbon Code counted among the largest of the country-specific standards – although such standards amounted to only 7% of transaction volume in the voluntary carbon markets in that year (Peters-Stanley & Hamilton 2012).

3.4. Summary of the current situation

The options currently available for UK or Scottish forest owners to benefit from the carbon value of their forests through carbon markets are very limited. UK and Scottish forests in particular are making a substantial contribution to the UK's national Kyoto Protocol account, but no mechanism exists to transfer those credits to forest owners – or indeed to Devolved Administrations. There is currently no possibility for UK or Scottish forests to participate in any of the major regulatory carbon markets, and participation in the leading voluntary carbon market standards is limited by double-counting rules, leaving the Woodland Carbon Code as the only significant option available, with the challenge here being limited market demand for UK-specific credits that assist the UK in meeting its emission reduction targets.

¹⁶ See https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/82573/consult-ghg-regulations-20131.pdf (accessed 30 May 2013)

The EU's recent Decision to harmonise LULUCF accounting rules across Europe, and to require Member States to report on their LULUCF actions by June 2014, may indicate a new interest and attention to the role of LULUCF in European climate policy. In time, this may translate into improved policy incentives for forest owners to enhance and expand their carbon stocks, even if these incentives do not necessarily come in the form of participation in carbon markets.

4. Options for Forest Carbon Markets in Scotland

In this section we briefly consider options arising from discussion of the current situation in the previous section 3, for UK or Scottish forest owners to benefit from the carbon value of their forests through carbon markets.

Before considering these options, however, it is worth asking the question *why* a forest owner might want to participate in a carbon market.

The most obvious answer is to receive a financial benefit. Yet there may be other reasons, such as wanting to make a contribution to climate change mitigation more tangible: there is something reassuringly ‘material’ about a carbon credit that can be bought and sold in markets. It may also have to do with distrust of government subsidies and a preference for ‘the market’. For forest owners used to the idea of harvesting timber from their forests, ‘harvesting’ carbon credits may seem more appealing than being paid to stop or reduce harvesting, although both may have the same effect in practice.

Whatever the reason, participation in carbon markets is always accompanied by certain risks: in particular, regulatory risks, some of which are common and others which are unique to each individual carbon market, since every carbon market is effectively created by some form of government regulation, or voluntary self-regulation. Two of the key challenges for forests in carbon markets include:

- The fact that monitoring forest carbon is technically difficult and can therefore be costly (there is a trade-off between accuracy and cost); and
- The fact that carbon stored in forests can easily be reversed – released back into the atmosphere through human or natural causes.

The second challenge is particularly relevant, because effectively it means that if a forest owner wishes to receive a market-priced financial benefit from having increased their storage of carbon, they should also be prepared to accept a financial liability if that stored carbon is ever released – and for that liability to be based on an unknown future market price. Governments may step in to limit this liability or reduce market risk in various ways, but effectively they do so by taking on the liability and risk themselves.

Technically, if stored carbon is to be considered equal to a ‘negative emission’ of carbon (a basic assumption underlying the concept of trading carbon in a market), then it ought to be removed from the atmosphere for around the same amount of time as the emitted carbon would be resident in the atmosphere – which runs to hundreds of years. Whilst different legal frameworks will define the relevant period of responsibility in a variety of ways, forest owners should be prepared for long-term commitments and uncertain risks if they participate in carbon markets. The good news is that there are different approaches to dealing with impermanence of forest carbon in carbon markets, some of which (such as the shared buffer approach used by the VCS and Woodland Carbon Code) are seen to be far more market-friendly than others (such as the temporary crediting approach used by the CDM) (Neeff & Ascui 2009). In addition, the UK regulatory framework for forestry already puts controls on deforestation under the Forestry Act 1967 and provides assurance of sustainable forest management under the UK Forestry Standard (Forestry Commission 2011), which means that assurance of permanence should be less of a challenge in the UK than it may be elsewhere.

A final observation is that if the primary motivation is the financial benefit, then it makes sense to consider which carbon markets provide the highest carbon prices. This is difficult to state with any precision, since prices in each market fluctuate. However, general economic theory suggests that the cost of abatement in larger, more comprehensive markets should be lower than in smaller, more constrained markets. Although this relies on many assumptions which are not met in practice, the current state of global carbon markets suggests that prices are indeed higher in some of the smaller, constrained markets (such as British Columbia, where province-specific offsets achieved prices of US\$17/tCO₂e in 2011 – Peters-Stanley & Hamilton 2012)) than in larger markets such as the EU ETS, where prices at the time of writing were just €4.29/tCO₂e.¹⁸ ‘Constraints’ can be voluntary as well as regulatory in nature, such as voluntary demand for ‘high quality’ or ‘local’ credits, which also tends to result in higher prices for producers of such credits.

4.1. Option 1: Inclusion of forestry in the EU ETS

Including forestry in the EU ETS is initially attractive because it would mean joining the largest and most liquid carbon market in the world. However, as discussed in section 3.2.1 above, given that inclusion of LULUCF in the EU ETS was explicitly considered, and rejected, in the European Commission’s consultations on this topic in 2010 and 2011, and given the recent introduction of a new, separate legal framework for LULUCF in the EU as described in section 3.1.2 above, the likelihood of direct inclusion of LULUCF as a covered sector is considered to be zero, at least until after 2020. The only other way that UK forestry activities could benefit from the EU ETS would be if they could generate ERUs through the mechanism of Joint Implementation, and if the EU’s 2003 reasoning on the exclusion of such LULUCF ERUs could be overturned. This is considered possible, but again unlikely before 2020.

4.2. Option 2: Recognition of UK forestry credits in Australia

The recently announced two-way linkage between the EU ETS and Australia’s carbon market in 2018 may potentially allow Australian LULUCF credits from the Carbon Farming Initiative to be exported for use anywhere in Europe under the EU ETS, after that date. This suggests an intriguing alternative: could Australia in turn accept LULUCF credits from Europe for compliance in the Australian carbon market?

The Australian legislation allows for various international units to be accepted for compliance, including ERUs from Joint Implementation (with no exclusion for forestry ERUs) or RMUs issued on the basis of eligible Kyoto Protocol activities. The possibility exists, therefore, that the treaty which is under negotiation between the EU and Australia to enable the 2018 linkage could enable EU-to-Australia flows of either of these units, perhaps in return for accepting Australia-to-EU flows of Kyoto ACCUs. However, there are significant barriers which would need to be overcome, starting with the problem that the units in question are not eligible for compliance in the EU ETS (nor likely to become so), and therefore outwith the scope of a treaty linking the two emission trading schemes, not to mention counter-acting the two-way nature of the linkage. Furthermore, even if these barriers could be overcome, UK or Scottish forest owners would still face the challenge of obtaining ERUs or RMUs for their projects in the first place (see options 4 and 5 below).

4.3. Option 3: Inclusion of forestry within a UK or Scottish domestic carbon market

In principle, the UK or Scottish Government could set up a domestic carbon market that is separate to the EU ETS, and enable forest owners to participate in the scheme, either on a

¹⁸ Prices quoted at <https://www.theice.com/emissions.jhtml> (accessed 10 April 2013).

voluntary or mandatory basis. In essence, this would be similar to the NZ ETS described in section 3.2.5 above. In a purely domestic scheme, credits would not necessarily have to conform with KP accounting rules. One option, for example, could be to recognise Woodland Carbon Code credits as valid offsets within the scheme (see section 3.3.5 above).

Any market needs a balance between supply and demand in order to work effectively. In the case of a carbon market, demand (for emission reductions, which could be met in part with supply of forestry offsets) comes from the emission constraints or caps placed on emitters covered by the scheme. It is therefore important to consider what emitters could be included within a new domestic carbon market in the UK or Scotland.

It would not be practical for a domestic carbon market to cover any emissions that are already covered by the EU ETS. This eliminates the power sector and all other high emitting point sources. The next tranche of high energy using companies (e.g. supermarkets, banks and large public sector organisations) is already covered by the Carbon Reduction Commitment (CRC) Energy Efficiency Scheme.¹⁹ This was originally envisaged as a kind of domestic carbon market, but has been simplified to a carbon tax. This illustrates the practical challenges that would face any attempt to set up yet another carbon market scheme in the UK. Any new scheme would be restricted in its coverage to only those sectors or smaller sources of emissions that have already been excluded from the EU ETS and CRC, precisely because of the rationale that a market mechanism becomes progressively less cost-effective when the individual sources of emissions are smaller, more numerous and/or difficult to monitor. Therefore a new scheme does not appear to be a realistic option.

An alternative to setting up a new domestic carbon market might be to add forestry offsets as valid compliance options to another existing policy instrument. It is not possible to do this with the EU ETS, for the reasons outlined under option 1 above; and it seems unlikely for the CRC given that the scheme has just recently been reviewed and simplified. Another possibility might be some kind of amendment to the Climate Change Agreements scheme, which involves industry commitments in return for reductions in taxes paid on energy consumption (the Climate Change Levy). However, the problem with any major change to an existing instrument is that it would usually require legislative amendment. This takes time and government resources, and it seems unlikely that a case could be made so compelling for the inclusion of forestry offsets as to justify this.

4.4. Option 4: Allocating RMUs or AAUs directly to forest owners

The UK Government could allocate RMUs or AAUs directly to forest owners, in much the same way as the New Zealand PFSI (see section 3.2.5 above). Allocating RMUs is probably impractical, unless the UK elects to change from commitment period accounting to annual accounting for the second KP commitment period, which seems unlikely. Under commitment period accounting, applied by the UK at present, RMUs for the first commitment period are only credited to the national account in 2015. If also applied to the second commitment period, forest owners would only be able to receive RMUs by around 2023.

It should be relatively straightforward to set up a procedure to allocate AAUs directly to forest owners. Essentially, this means the Government would issue AAUs as a kind of 'advance' on the RMUs that would in due course be recognised in the national account. However, the Government would almost certainly wish to place a contingent liability on

¹⁹ See <https://www.gov.uk/crc-energy-efficiency-scheme>

forest owners to replace these AAUs (or equivalent units) if a reversal of storage occurred – otherwise the Government would have to bear this liability. Also, if the forestry investment was in any way subsidised by the Government, there would be a strong case for the Government retaining at least part of the credits. The Government would also be wary of crediting emission reductions that would have happened anyway, for example due to other economic or policy factors, as otherwise by giving away AAUs to such projects, it would simply be making it harder to reach its own targets.

It is worth noting that we are currently in an ‘in-between’ phase in terms of KP accounting, known as the ‘true-up’ period for the first commitment period. This true-up period runs from 2013-2015. As RMUs cannot be carried forward into the next commitment period (see Box 1 above), any RMUs issued in 2015 would only have a value if there was residual demand for them at that time, from either the UK Government or any other country with a KP target that was still not in compliance by that point in time. It seems unlikely that there would be any such demand, therefore these RMUs would have no value. AAUs, on the other hand, should still have some value as they can be carried forward to the next commitment period. Hence the UK Government would probably not wish to give forest owners AAUs with respect to first commitment period forestry projects, as effectively this entails swapping an asset with some value (an AAU) for an asset with no value (an RMU).

The same will not necessarily be true for the second commitment period, as the UK may find it more challenging to meet its target, hence second commitment period RMUs may be more valuable to the UK, perhaps on a par with AAUs. Therefore this option is seen as a possibility for the future, but not before 2015 at the earliest, as the UK will not be able to use second commitment period AAUs until after the end of the ‘true-up’ period.

4.5. Option 5: Domestic JI for forestry in the UK

The UK could set up a domestic incentive scheme for landowners to participate in Joint Implementation under the Kyoto Protocol. Several EU countries have set up such schemes, allowing domestic projects to register under Track 1 of the JI mechanism, after which they can receive ERUs directly from the host government, and sell these in the carbon markets. Apart from Romania, none of the domestic JI schemes in other EU countries is known to cover land-management based activities, however. This may in part be because the main source of demand for ERUs, the EU ETS, will not accept ERUs originating from forestry projects.

Until now, the UK has decided not to allow any type of JI projects to be carried out in the UK. The reasons for this include concerns about additionality, possible double-counting, permanence, leakage of emissions from the UK to other countries, and challenges with monitoring, reporting and verification. The UK also has fundamental concerns about the integrity of JI as a mechanism, mainly due to it being seen as a possible way for some countries to legitimise their ‘hot air’ (extra AAUs which accrued to countries in the former Soviet Union in particular, as a result of economic factors and the choice of baseline year, rather than real emission reductions). The UK has comprehensive policies in place to reduce emissions, and regards these policy measures as more effective than a domestic JI mechanism. However, this last point could change in future, as the UK’s targets become ever more challenging.

In order to issue an ERU for a domestic JI project, the UK would have to cancel an AAU (or RMU in the case of a LULUCF project). As explained in Box 2 above, as long as the project is captured by the national accounting system, and if it is additional and not already subsidised

in any way, then the Government is effectively passing the benefit of the emission reductions, that would otherwise accrue to the national account, on to the project owner. This simply returns the Government to its original position, as if the project had not occurred. The ERU is then ultimately used by an entity (e.g. an EU ETS participant, or a country with a KP target) in order to allow an increase in emissions beyond what would otherwise have been allowed. The net effect on the global atmosphere should be neutral, as the increase in emissions is compensated by the reduction in emissions from the JI project. Alternatively, it can have a beneficial impact on the atmosphere if the actual emission reductions are not credited in full.

The rationale for any government to allow domestic JI is to incentivise the private sector to make emission reduction investments that *would not otherwise be made*. If the latter condition holds, then the cancellation of AAUs (or RMUs in the case of a forestry project) from the national account costs the national government nothing, as it simply returns the national account to the position it was in without the project. A government's willingness to do this may therefore depend on a variety of factors, including the extent to which it is possible to separate truly additional emission reductions from those that would occur anyway, or that are already subsidised by the government.²⁰ If the emission reductions are already compensated in some other way – for example, through a tax incentive scheme, direct grants, rebates etc. – then the government would be justified in claiming the emission reductions as its own, and not providing a double incentive in the form of carbon credits. Given that much UK forestry activity is supported by government grants and other incentives, the forestry community would need to acknowledge that any domestic JI mechanism would either only apply to unsupported investments, or be accompanied by a withdrawal of other incentives.

Domestic JI is a policy option that could be relatively easily implemented, over a relatively short time horizon (e.g. 1-2 years). However, it is problematic for forestry because it requires cancellation of RMUs. Unless the UK decides to change to annual as opposed to commitment period accounting for the second KP commitment period (which seems unlikely), RMUs, and hence forestry ERUs, would not be available until around 2023. In addition, at present ERUs are trading at just €0.09/tCO₂e, due to a combination of over-supply of allowances in the EU ETS and lack of demand for ERUs specifically.²¹ Forestry ERUs, because they are not eligible for compliance in the EU ETS and cannot be carried over into subsequent commitment periods, would have even lower demand and price than this – which is basically not even worth the transaction cost of trading, let alone investing in the forest activity and developing the carbon credit. There is a chance that prices may recover in future, particularly if a new global climate deal for the post-2020 period is negotiated by 2015, as currently planned, but at present, for a combination of reasons, domestic JI does not appear to be a viable option for forestry in the UK or Scotland.

4.6. Option 6: Recognition of UK forestry credits under the VCS or the Gold Standard

The UK could install the necessary procedures for enabling the recognition of UK forestry credits under the major voluntary carbon standards, such as the VCS and the Gold Standard (see sections 3.3.1 and 3.3.2). This would enable project developers to produce offsets for

²⁰ It is worth noting that crediting need not be all-or-nothing – options could include sharing the benefit between the government and project owner through partial crediting. For example, the French domestic JI scheme credits only 90% of the verified emission reductions from a project.

²¹ Prices quoted at <https://www.theice.com/emissions.jhtml> (accessed 10 April 2013).

the international voluntary carbon markets, which is currently prevented by double counting restrictions.

The UK Government does not currently have procedures to cancel carbon credits from the UK's national accounts under the Kyoto Protocol to enable the issuance of voluntary carbon credits. However, as with domestic JI, there do not appear to be insurmountable barriers to doing so, but rather the will to implement a policy change is required. There could be greater flexibility in the units cancelled, which could be AAUs, RMUs or potentially even CERs or ERUs held in the UK's account.

The Bulgarian government recently created a procedure to reserve and cancel AAUs for approved voluntary carbon projects taking place within the country, showing that this can be done in an EU country with a KP target. However, there are some important differences in the context. Bulgaria already had a JI approval process in place, as it was one of the transitional economies JI was originally designed for. A window of opportunity opened when the legislation needed to be amended anyway, making it relatively easy to add a definition of voluntary carbon credits and simplify the cancellation procedure. Finally, the Bulgarian legislation does not cover LULUCF, so would require further amendment to enable forestry projects to go ahead. Therefore the example indicates that setting up such procedures is possible, but by no means entirely straightforward in the different context of the UK, for forestry in particular.

4.7. Option 7: Enhancing the international attractiveness of Woodland Carbon Code credits

At present, demand for Woodland Carbon Code credits is limited due to the fact that the emission reductions are double-counted, reducing the UK's KP liability at the same time as being recognised under the Code. This prohibits them from being treated as carbon offsets under any of the major international carbon offsetting standards (Defra 2011, p.9). If the UK Government were to set up a procedure to cancel KP units upon the issuance of Woodland Carbon Code units, in the same way as discussed in the previous section in relation to the VCS and Gold Standard, then the double-counting issue could be eliminated, allowing these credits access to a potentially larger slice of the international voluntary carbon market.

This option is limited by the same procedural barriers discussed in relation to option 6. It is difficult to say whether such enhanced Woodland Carbon Code credits would be more or less attractive than equivalent VCS or Gold Standard credits. The likelihood is that such credits would command different prices in different segments of the market – for example, enhanced Woodland Carbon Code credits might be very attractive to UK companies wishing to demonstrate local offsetting, but much less attractive to US companies more interested in using an internationally recognised standard.

4.8. Summary of options for the future

As with the current situation, the options for UK or Scottish forest owners to benefit from carbon markets in future (over the period to 2020) are very limited. However, two options appear to be both technically feasible and possible to implement over a relatively short period: direct allocation of AAUs to forestry projects (similar to the NZ PFSI), and establishing procedures for cancelling Kyoto units to enable voluntary carbon credits (whether developed under the VCS, Gold Standard, Woodland Carbon Code or potentially other standards) to be issued to domestic projects. The new EU requirement to report on LULUCF actions by June 2014 may provide a unique 'policy window' (Kingdon 1995) to re-open the debate on these two options. Alternatively, it may provide an opportunity to consider other,

non-market ways of incentivising forest carbon stock enhancement in the UK, which could potentially offer lower risks and liabilities for forest owners than participation in carbon markets.

4.9. Implications of possible Scottish independence

The implications of possible Scottish independence on the above options have not been assessed in detail, as this would require extensive legal review which is beyond the scope of the current report. However, as a general point, an independent Scotland would be able to apply (if not automatically eligible) for the same status as currently enjoyed by the UK under international treaties such as the Kyoto Protocol, and hence would, in time, see the benefit of LULUCF activities in Scotland in the form of RMUs added to its own national account, rather than accruing to the UK national account at present. This would then make it technically possible for Scotland, rather than the UK, to make the kind of policy decisions called for under the various options described above.

References

- Covell, P., 2011. Business guidance: Forest carbon marketing and finance. In J. Olander & J. Ebeling, eds. *Building Forest Carbon Projects*. Washington, D.C., USA: Forest Trends.
- Defra, 2009. *Guidance on how to measure and report your greenhouse gas emissions*, London, UK.
- Defra, 2011. *Guidance on reporting greenhouse gas removals and emissions from domestic woodland creation*, London, UK.
- Defra, 2006. *The United Kingdom's Initial Report under the Kyoto Protocol*, London, UK.
- European Commission, 2003. *Extended Impact Assessment on the Directive of the European Parliament and of the Council amending Directive establishing a scheme for greenhouse gas emission allowance trading within the Community, in respect of the Kyoto Protocol's project based mechanisms*, Brussels, Belgium.
- European Commission, 2012. *Submission by Denmark and the European Commission on behalf of the European Union and its Member States. Subject: Information on the quantified emission limitation or reduction objectives (QELROs) for the second commitment period under the Kyoto Protocol*, Bonn, Germany: United Nations Framework Convention on Climate Change.
- Forestry Commission, 2011. *The UK Forestry Standard: The governments' approach to sustainable forestry*, Edinburgh, UK.
- Kingdon, J.W., 1995. *Agendas, Alternatives and Public Policies*, New York, NY, USA: Harper Collins College Publishers.
- Kossoy, A. & Guignon, P., 2012. *State and trends of the carbon market 2012*, Washington, DC, USA.
- Ministry of Agriculture and Forestry, 2011. *A guide to forestry in the Emissions Trading Scheme*, Wellington, New Zealand.
- Neeff, T. & Ascui, F., 2009. Lessons from carbon markets for designing an effective REDD architecture. *Climate Policy*, 9(3), pp.306–315.
- Peters-Stanley, M. & Hamilton, K., 2012. *Developing Dimension: State of the Voluntary Carbon Markets 2012*, Washington, DC, USA and New York, NY, USA.
- Peters-Stanley, M., Hamilton, K. & Yin, D., 2012. *Leveraging the Landscape: State of the Forest Carbon Markets 2012*, Washington, DC, USA.
- Scottish Government, 2013. *Low Carbon Scotland: Meeting our Emissions Reduction Targets 2013-2027 - The Draft Second Report on Proposals and Policies*, Edinburgh, UK.