

Climate change action plan

A strategy for the Forestry Commission estate in England

1st August 2011

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1 Introduction

This document summarises much of the work available on the subject of climate change. Links are provided within the document to this more detailed work which is held on the FC England [Climate Change Resource intranet site](#).

1.1 Background

Climate change is a matter of international importance and has become increasingly prominent in the Government's policy agenda.

The Climate Change Act, published in 2008, sets a challenging and legally binding target to reduce greenhouse gas emissions by 80% by 2050. The Act also introduced powers for Government to ask public sector organisations and 'statutory undertakers' to report on their assessment of the risks climate change poses to them, and the actions they are going to take in response. Forestry Commission England has been invited to report under the terms of these 'Reporting Powers'.

Our woodlands have been established over many years assuming a relatively stable climate. **This key assumption is unlikely to apply in the future.**

We need to ensure that our forests and associated habitats are resilient to climate change and have the capacity to adapt to its likely effects. We must implement adaptation strategies today, as the forests we manage will be maturing in a very different climate.

Over-arching objectives for forestry in England include addressing key climate change issues, both on the land we manage and for the benefit of others.

[The Read report](#) (Combating Climate Change 2009) states, "UK's forests and trees have the potential to play an important role in the nation's response to the challenge of the changing climate. Substantial responses from the UK forestry sector will contribute both to mitigation by abatement of green house emissions and to adaptation, so ensuring that the multiple benefits of sustainable forestry continue to be provided in the UK".

In 2011 the new United Kingdom Forestry Standard (UKFS) Guideline document, ['Forests and Climate Change'](#), will be introduced and the other Guidelines will be amended to take this guidance into account. The UKFS Guideline states; "Guidance on adapting to climate change is inevitably provisional because of the uncertainty associated with climate change projections. **However, there are actions that can be taken now to mitigate the effects of climate change and adapt to its effects. It is these actions on which these guidelines are initially focussed.** The publication will be updated and improved as climate change science develops and our understanding of its effects on forests increases".

[Forestry Commission Research Note 201](#), 'Climate change: impacts and adaptation in England's woodlands', describes the likely changes in climate, its impacts on forests, and offers factors that forest managers should consider when planning to make their woodlands resilient to climate change.

The Research Note explains how climate projections are made in the UK, and describes scenarios for a future climate based on the amount of green house gas

emissions already as well as those possibly emitted into the future. These are described as high and low emissions.

2 The Climate Change Action Plan (CCAP)

The climate change action plan will ensure the woods managed by the Forestry Commission play their part in responding to the challenges of climate change. Our programme of work will contribute to both adaptation and mitigation, creating the best opportunity for our woodlands and trees to continue to deliver the multiple benefits of sustainable forestry. This plan is complementary to the Forestry Commission's ['Business Sustainability Plan'](#) that is intended to reduce the Forestry Commission's carbon footprint.

We will do this by:

- implementing the recommendations contained within the new UKFS. Our progress will be independently audited against the UK Woodland Assurance Standard (UKWAS), accredited by FSC and PEFC.
- managing our business in a sustainable way, within an Environmental Management System (EMS), consistently reducing our demands on non-renewable resources. Our progress against this will be independently audited against the ISO 14001

In summary 'sustainable work practices' should be a consideration of everything we do.

- We will adopt the principle of **anticipatory adaptation** as this offers the highest potential gains for forest resilience, and the benefits they provide.
- We will take an approach that is **'not risk averse'** (that is, we will take considered risks, rather than doing nothing, or act only on proven facts).
- We will identify who will participate in the activities, when this will happen, and how we will be able monitor and evaluate the rate of progress towards the outcome.
- The plan will be monitored annually and reviewed every 5 years.

This plan outlines actions to increase the resilience of our woodlands to the middle of the century under a range of GHG emissions scenarios. If global emissions are not effectively reduced and a 'high emissions scenario' becomes a reality, a greater level of intervention will be required to start transforming our forests to ensure their long-term survival.

The measures outlined within this plan will increase the resilience of our woodlands to a changing climate and through practising *adaptive management*, hopefully put forest managers of the future in a position to react to such dramatic change.

2.1 The underlying assumptions

- England's woodlands and forests have developed within a relatively stable climate.
- An important consideration for native woodlands and their associated biodiversity is that the English Channel has been a barrier to natural migration for more than 8,500 years – however it is no barrier to climate change.
- England has warmed by around one degree Celsius since 1970.
- Under a medium emissions scenario, warming is predicted to increase by a further degree during the next decade and by up to four degrees by 2080.
- This projected rate of warming is equivalent to southern England moving south **at three miles per year!**
- Winters are predicted to become wetter and summers drier, with more frequent and severe periods of summer drought and intense rainfall events.
- England's woods and forests have not been subjected to such rapid change since the last ice-age.
- These changes are predicted to be more severe in the east and south.
- Due to the inability of the earth's climate system to respond to past emissions quickly, we are locked into a certain level of climate change over the coming decades.
- Global emissions are currently tracking close to some of the more extreme emissions scenarios that have been published.

2.2 What will be the impacts on the Forestry Commission Estate?

- The current range of broadleaf species, assuming that we use the right species and origin/provenance, will probably remain suitable for forestry across much of England. Towards the end of the century, south and east England are likely to prove the exception.
- Where water is not limiting, and pests and diseases present no threat, tree growth rates are predicted to increase as a result of longer growing seasons, increased warmth and the rising level of CO₂.
- Conifer crops, currently in the ground, if not affected by pests and diseases, are likely to reach maturity before there are any serious impacts.
- Forests are likely to be increasingly seen as a cool shady refuge for healthy exercise, but public access to the forests may be interrupted by closures due to storm damage, and roads and paths being washed away.
- The impacts of climate change are likely to be first seen with declining tree health in some species, increasingly difficult establishment, and limited mortality. However, as climate change progresses, some mature trees will die as a result of both direct and indirect impacts.

- Even where the composition of the tree canopy of woodlands remains unchanged, the composition, structure and character of the ground flora may change significantly.
- It is very likely that climate change will have serious impacts on drought sensitive tree species on shallow free-draining soils, particularly in southern and eastern England.
- The current range of timber producing tree species is very narrow and planting in monoculture is common. The risks associated with an over reliance on a few key species has been highlighted by serious outbreaks of Red Band Needle Blight (RBNB) in forest stands dominated by Corsican Pine and the more recently with *Phytophthora ramorum* infection of Japanese Larch.
- Pests and diseases of forest trees, both those present in the UK and those that may be introduced, probably represent a greater threat to woodlands than the direct effects of climate change.
- Extreme rainfall is likely to cause flooding and the current forest road drainage network may be inadequate.

3 Assessment of probable impacts

Table 1: Assessment of probable impacts

Species suitability, growth, and climatic impacts				
Factor	Response	Impact	Risk	Likelihood
Longer growing season	Earlier bud burst, later bud set, more lammas growth	Increased frost damage to sensitive species. Increased yield for Others	Medium	Medium
Warmer growing season increased CO ₂ concentration	Potential for increased growth rates	Increased productivity	Low	High
Reduced summer rainfall	Potential for reduced growth, increased drought stress, increased fire frequency	Loss of yield for sensitive species Forest loss	Medium	Medium rising to High in South East
Increased winter rainfall	Increased water logging and anaerobic conditions	Increased wind damage, increased soil erosion	Medium	Medium
Disturbance, management, and natural impacts				
Factor	Response	Impact	Risk	Likelihood
Longer growing season	More generations of insect pests per	Loss of yield. Deterioration in Forest Health	High	High
Milder winters, warmer growing season, increased CO ₂ concentration	Increase in woodland mammals, tree invertebrate pests and tree diseases, colonisation of alien invasive species	Loss of yield. Difficulties in early plant survival	Medium	Medium rising to High
Increased windiness predicted in some	Increased wind damage and associated dead wood	Loss of yield	Medium	Low rising to medium

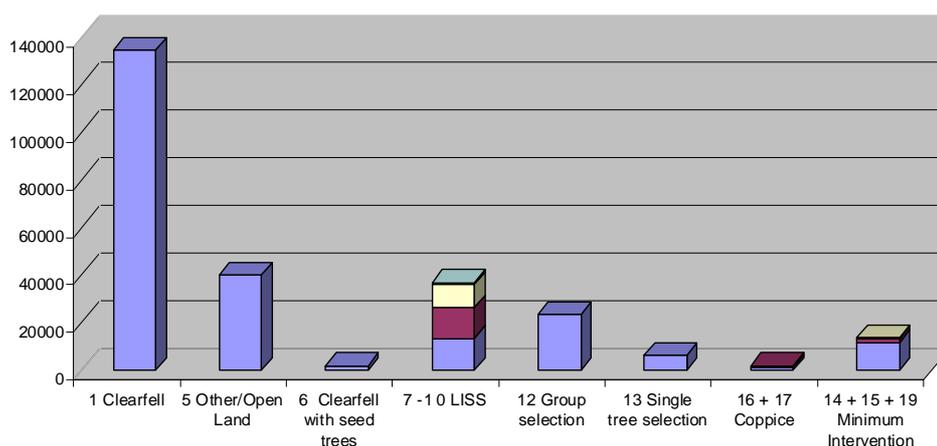
possible scenarios	leading to, increased bark beetle damage and bluestain fungi			
Reduced summer rainfall	Increased frequency of fire and drought damage, and secondary pest/pathogen outbreaks. Increased risk of secondary infection from drought stress	Poor forest health and forest loss	High	Medium
Increased winter rainfall	Anaerobic stress; endemic windthrow due to water logging; slope failure Flooding	Poor forest health Forest infrastructure failure, erosion	Medium	Medium

4 The Vision for our woodlands

4.1 Woodland structure

The majority of our conifer woodlands are planned for harvesting within a clearfell silviculture system; this is an inevitable consequence of the inheritance of even aged monoculture forests created by new woodland planting since the Forestry Commission was formed. However, over the last 20 years, forest design planning has been breaking plantations into coupes to increase age and species diversity to reflect more modern policies on what forests are for. Most ancient broadleaved woodlands have been managed by more traditional self regeneration systems and are therefore less uniform.

Figure 1 Silvicultural systems in England in 2010 (hectares)



During the last decade there has been an ever-increasing interest in types of continuous cover silviculture – see Operational Guidance Booklet (OGB) No 7 – [Managing Continuous Cover Forests](#). These systems create diversity in stand and age structure, and often create opportunities to increase species diversity. The

microclimate within these systems can mitigate the worst extremes of wind, moisture deficit and temperature.

It is not envisaged that clear felling as a management system, especially for high wind risk sites and fast growing light demanding species, will be replaced by continuous cover, but such systems should be considered on appropriate sites.

33,000 ha of FC woodlands are classed as 'Plantation on Ancient Woodland Sites' (PAWS) and there are plans to restore these sites. The transformation of these areas to sites with a diverse range of native species, often of mixed ages, is likely to improve their resilience to climate change. See: [Managing ancient and native woodlands](#).

4.1.1 General outcomes by 2050

Our woodlands, and/or stands are likely to have a significantly greater diversity of;

- age structure,
- silvicultural management systems
- species and provenance

4.2 Broadleaved woodlands, 55,000 ha

Most of our broadleaved woodland comprises native species, native species out of their historical range, or species adopted from the near continent, such as sweet chestnut and sycamore. Most of these species occupy a wide climatic range across Europe.

Before the 1800s much of the broadleaved woodland of England had been managed under some form of coppice system with an important productive understory. Most of the timber was used as fuel, for example domestic cooking heating or industrial heat, or to fulfil local markets for small diameter material. This practice gradually lost favour as energy sources shifted to fossil fuels and markets for many rural products declined.

From the 18th century onwards there was a growing interest in managing woodlands as high forest and there has been a tendency to create monoculture. Oak has replaced mixed woodland and beech and sweet chestnut have been established and then managed as monocultures.

The planting site records are generally poor preventing a full evaluation of genetic diversity in existing woodlands. However, there is much evidence to show that trees from a range of origins were planted in the past and irregular seed years have caused nurseries to seek seed from distant sites, often from continental Europe.

4.2.1 Our broadleaved woodlands by 2050

Our broadleaved woodlands should be resilient in all regions other than the south and east, where some sites on free-draining soils in these areas are expected to suffer from summer drought. The potential for improved productivity from oak and beech in the north and west may offer opportunities for the greater use of broadleaves as a

productive crop. The climatic range of most species considered native reaches well south across Europe, so we can plan to use provenances that may be better adapted to the climate of the future.

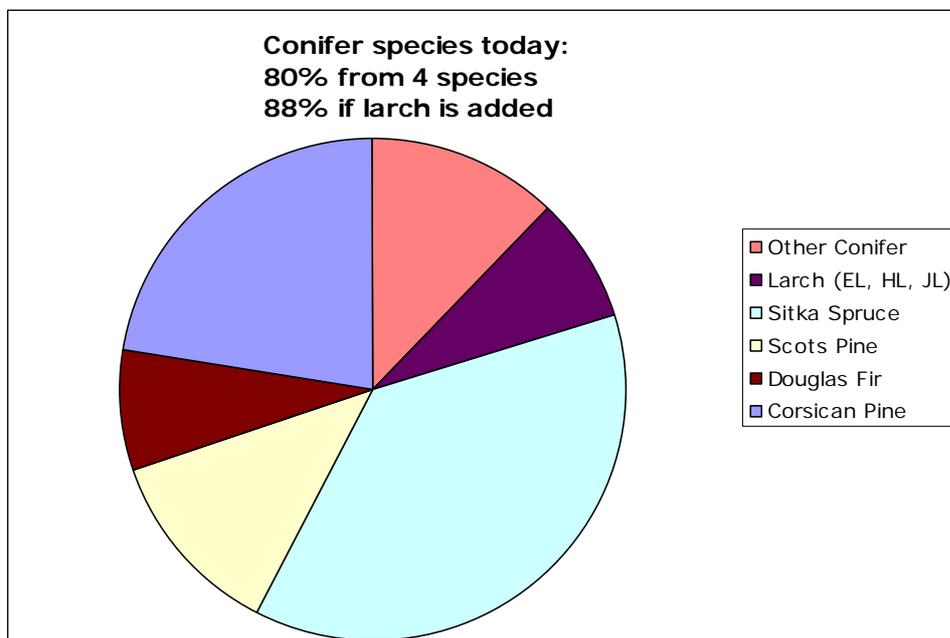
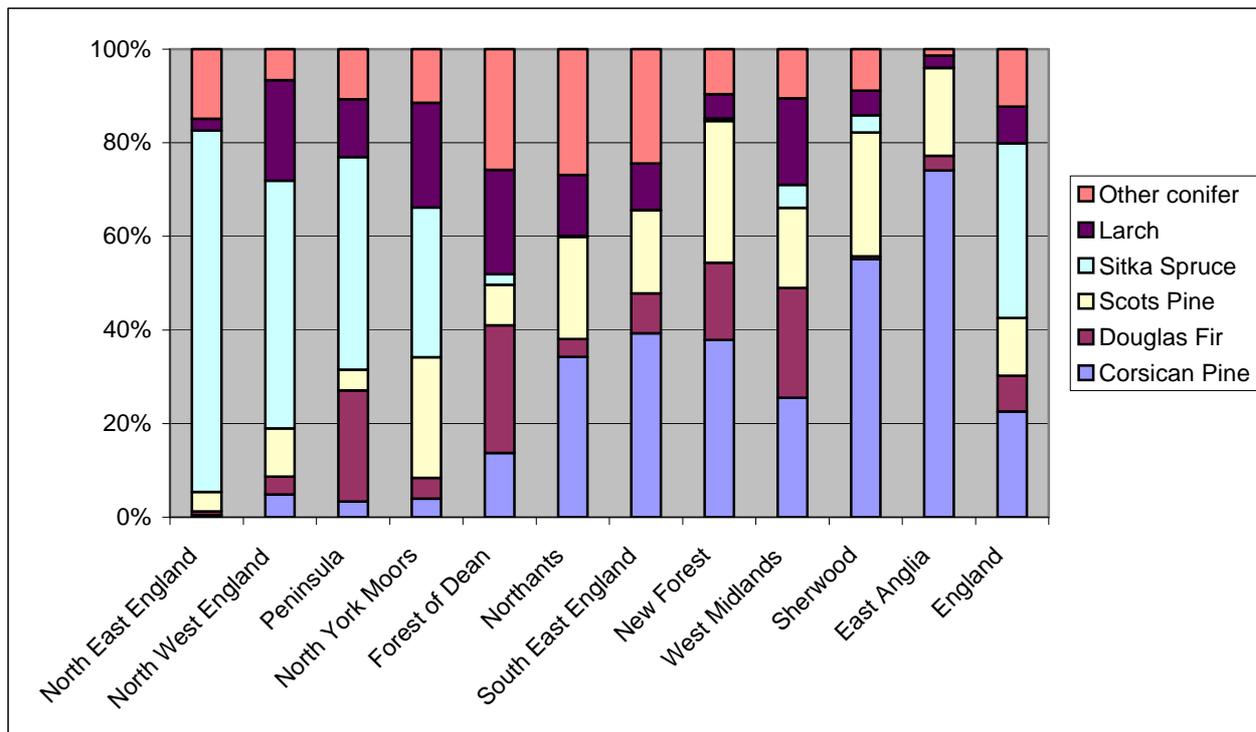
The long length of rotations reduces the crops' ability to adapt naturally. It will be important to intervene frequently to promote adaptation through planting or to encourage natural regeneration.

- Those woods that are either ancient, native, or which have retained key features of ancient woodland, should be managed to conserve important biodiversity and heritage, while not unnecessarily compromising timber production.
- Unless there are overriding environmental or social constraints, broadleaved woodland should be managed to maximise the crops' value by balancing quality and timber yield, recognising the importance of keeping the native character of our ancient woodland.
- We should have increased our use of sweet chestnut and other broadleaved species from the near continent that can take advantage of the changing climate.
- Young woodlands and regenerated woodlands will contain mixed provenance, including some local and others up to five degrees south; planting material will be sourced from improved stands, where available.
- Opportunities will be taken to diversify the species mix within woodlands; this will include the planting of native species outside their natural range in the north and west.
- We will be planting some broadleaved species new to forestry in England, particularly in the south and east.
- The character of the English landscape will be retained through our proactive, anticipatory approach to adaptation that will give us the best opportunity to establish healthy woodlands.
- There should be an increase in harvested timber volume.
- Coppice and coppice with standards should be practised more extensively as silvicultural systems for managing existing woodlands.
- In areas where abiotic and biotic factors limit the ability to grow quality broadleaves (such as East Anglia), short rotation forestry is likely to be widespread.
- Forest design plans should target the location of 'biomass plantations' close to 'bio-energy' plants to minimise haulage distances and to meet demand.
- Forests will probably be regarded by society as a cool refuge for summer recreation.

4.3 Conifer woodlands 201,000ha

These woodlands are dominated by only five species, Sitka spruce (SS), Corsican pine (CP), Scots pine (SP), Larch (L) and Douglas fir (DF). 77% of the northern plantations are dominated by SS, while 74% of East Anglia's plantations are planted with only CP.

In both cases these species were chosen because of their high productivity and timber quality, relative to other species that could have been grown on the same site.



Monoculture is potentially a high-risk strategy. The speed which Red Band Needle Blight (RBNB), a fungal pathogen of CP and other pines, spread is attributed to the fact these species are mainly grown in monoculture.

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A closer examination of the minor species found within forests, species trials and arboreta, shows us that we can grow a much wider range of species with good timber properties.

Not only do the coniferous plantations of England have limited species diversity, their genetic diversity is limited to a relatively narrow range of origins. All tree breeding and seed collection has been undertaken in the context of the climate of the mid 20th century – see OGB 31 – [Seed Sources](#).

4.3.1 Our conifer woodlands in 2050

The most serious impacts on forest health will be in drought years, particularly in the south and east. Some conifer species will find the increasing moisture deficit a limiting constraint, and by 2050, SS in eastern areas will on many sites become considered unsuitable as a productive crop.

Much of the rest of the country is likely to have a climate similar to that currently experienced across north-west France and southern England. Most species that are commonly used for forestry in England are either native across this geographic range or have been planted within this geographic range as successful timber crops.

- Pre-2011 conifer plantations should be managed to optimise carbon sequestration, within the chosen silvicultural system unless there is overriding economic, environmental or social constraints.
- Where considered appropriate, there will be an increase in the area managed using Low Impact Silvicultural Systems.
- In lowland England, only about 10% of the woodland managed within a clearfell system will have been established prior to the implementation of this plan. In upland forests a figure closer to 20% will be likely.
- Restocking should be correcting poor practices of the past, for example drainage that was carried out prior to publication of the *Forests and Water Guidelines*.
- Where existing species are replicated at restocking, many should be of more southerly origin (the timing of this change will be dependant on specific site conditions, such as frost-risk).
- Where site conditions permit, conifer plantations established after 2011 should have a greater diversity of species. Where necessary, some loss of yield will be acceptable.
- Some stands planted after 2011 should include species that have not previously been planted as timber crops in England.
- Forests and/or individual stands should have a greater diversity of origin within each species.
- Forests should be more diverse, through increased diversification of age structures and silvicultural systems.
- Some forests will be more productive, requiring management over shorter rotations to maintain stability (this may, in turn, help further diversification).
- Forest design and operational plans should be revised at renewal stage to mitigate against increased fire risk.

- Appropriate biosecurity should be as embedded in practice as health and safety is today.
- Opportunities should be taken to diversify species and stand structure after storm events or high mortality in pest/disease outbreaks.
- Forests will probably be regarded by society as a cool refuge for summer recreation.

4.4 Arboreta

The importance and relevance of the [Arboreta](#) has never been greater than today. How the tree species within the collections behave in a changing climate will provide critical information to all involved with trees. There are species within the collection that have not been considered for use more widely to date. Practitioners are encouraged to take the time to visit the collections and consider using new species for forestry use.

However, the collections are of world importance as heritage landscapes. Climate change will have a negative impact on the health and vigour of some species that play a critical role in creating this attractive landscape. These threats are true for much of the designed landscapes that are characteristic of the English countryside. Work within the Arboreta will endeavour to ensure these landscapes stay resilient.

4.4.1 Outcomes by 2050

- The collections should have adapted their picturesque landscape, using new species where required
- Species from warmer climates should be growing as possible future candidates for wider use by society
- The Arboreta should continue to be recognised as a repository of tree expertise

4.5 Open habitats + other ecosystems 57,000 ha

Our woodlands and forests are a dynamic matrix of woodland, open space and other habitats. It is by maintaining these man-made and natural ecosystems that we can make our greatest contribution to conserving and enhancing biodiversity.

These will be managed in accordance with our [‘Open habitat Strategy’](#).

4.5.1 Intended outcomes by 2050

- Where feasible, we should have restored raised bogs and removed adjacent areas of forest that adversely affect their hydrology.
- All priority habitats should be managed within a framework which ensures they continue to provide ecosystem services in a changing climate.

- Forest design planning should be making the most of our ability to improve ecological connections across the landscape.
- Where appropriate our planners will be increasingly working with adjoining landowners and others to make sure our woodlands play their role in creating landscapes suitable for wildlife conservation.

4.6 Forest soils and water

The Forestry Commission Estate has been managed to UKFS and its *Forests and Water* and *Forests and Soil Guidelines* for more than a decade and the requirements are embedded in forest practice. Measures to protect soils and waters are implemented through Ops 1's/OSA (Operational Site Assessments), contracts, constraint maps and detailed Practice Guidance is available.

Harvesting companies are now seeking to harvest branchwood. On sites where guidance shows us that this is sustainable, we will consider [harvesting branchwood](#).

We do not allow stumps to be harvested for biomass to protect soil carbon stocks, soil structure and archaeological remains. Stumps removed for reasons such as forest health will be considered for biomass.

4.6.1 Intended outcomes by 2050

- We should continue to protect and enhance the carbon stored within the forest ecosystem.
- Forest design planners should be working with the Environment Agency and other bodies to improve water management and alleviate flooding from the predicted increase in extreme weather events.

4.7 Forestry Civil Engineering

FCE have designed culvert drainage for a minimum 50-year rainstorm. Recent evidence suggests that this may not be enough for the current and future climates.

Recent developments in 'Ground Penetrating Radar', have given engineers the ability to assess existing road structure to work out accurately where they need to strengthen it. This offers significant savings by targeting repairs rather than the current overall treatments.

Recent developments have seen the introduction of low ground pressure systems to lorries to reduce road pressure. The use of these systems, offer the potential to significantly reduce road wear.

Intended outcomes by 2050

- We should have increased waterway capacity of all culverts and/or bridges by at least 30% from our [current standard](#).

- We should increase the number of cross-culverts during maintenance to minimise the volume or speed of run-off and reduce scouring in roadside drains.
- We should continue to use the minimum stone practicable to maintain roads, minimising the carbon costs of road haulage.
- The use of technologies such as low ground pressure systems should be widespread

4.8 Business Sustainability and Environmental Management

The [Business Sustainability Programme \(BSP\)](#) is responsible for the environmental management of the Forestry Commission's corporate business, which includes building construction and utilisation, corporate management activities such as waste management, water and energy use, transport, procurement, and human resources.

Government departments are required to adopt a credible [Environmental Management System \(EMS\)](#). An EMS is a framework through which an organisation's environmental performance can be monitored, improved and controlled.

During the plan period we will consider the implications of applying the EMS to **all** our forest operations. Operational Guidance [Booklet 43 –Business Sustainability](#) is the Action Plan for implementing and maintaining the EMS.

Our [Environmental Policy Statement](#) sets out a commitment to 'prepare, promote and instigate a Sustainable Development Action Plan for the Forestry Commission'.

The Environmental Policy Statement states that EMS will be implemented "in all parts of our business". The current programme applies "mainly to our offices, administrative and support functions". The intention is to widen the work areas to improve the sustainability of our field infrastructure and operational activities.

The Forestry Commission is working towards [ISO14001](#) accreditation, an internationally recognised Standard that addresses environmental issues.

The Forestry Commission Estate will continue to be managed and operated to the UK **Woodland Assurance Standard (UKWAS)**. To complement this, our new **Environmental Management System (EMS) and the ISO 14001 standard** will apply to our offices, administrative and support functions, thus making sure that we sustainably manage environmental impacts across all aspects of our business

Together these programmes will ensure that we are continually reducing the negative impacts to the environment of our business, while finding and implementing positive contributions to a low-carbon economy.

5 Monitoring our progress

The following tables are the actions required within our Climate Change Action Plan during the period 2011 to 2016, with progress being reported annually.

Climate Change Action Plan, monitoring our progress.

Key measures: to be reported on annually

Districts

Adaptive forest management Concise report describing 'process activity' within the FD e.g. staff days in participation with CCF groups etc (List event and man days)

Diversification of species Number of species ordered in COGNOS

Biosecurity Record of incidents reported to FR pathology

National office Collate the above

Every 5 years: Full report against CCAP

Climate change action plan

Outcome	Activity – we will	Who	When	Measure of direction of travel
Our forest are kept resilient and we manage our emissions.	Review our activity and progress in implementing the CCAP and BSP	FD	March BMR	Annual FD report
Managing our woodlands sustainably	Manage our woodlands to a minimum standard accredited under independent audit to UKWAS. In doing so we will implement the UKFS guideline on climate change.	All	Ongoing	UKWAS audit (UKWAS). FSC PEFC
That this plan is implemented	Implement an “adaptive forest management” process.	FEE FD FR FS	Ongoing	CCAP year 5 review Annual district and FEE report
FEE is an exemplar of best practice in adapting woodlands in the changing climate	Set up, then promote, field scale case studies of best practice, as part of “adaptive forest management”	FEE FR	Ongoing	CCAP year 5 review
Species and genetic diversity	Identify species/provenance at short-term risk to CC.	FR	2011	Report to FEE.
	Produce and implement guidance on species selection , use of mixtures and origin . We will use more species in planting schemes, creating diversity at stand level.	FEE FR	2011	Intranet.
		FD	Ongoing	Annual district and FEE report CCAP 5 year review
	Find seed stands for minor species across southern England.	FEE PSSB FR	Ongoing	CCAP year 5 review Annual district and FEE report

Climate change action plan

Outcome	Activity – we will	Who	When	Measure of direction of travel
Diversity in stand management	Identify stand types at immediate risk to CC.	FR	2013	CCAP year 5 review.
	Review and consolidate current CCF, LISS and coppice intentions within FDPs, looking for sustainable increases in CCF, LISS and coppice.	FD	Ongoing	CCAP year 5 review
	Widen membership and awareness of the CCF group .	FEE FD	Ongoing	CCAP year 5 review Annual district and FEE report
Resilience to pests and disease	Produce and implement biosecurity guidelines, and deliver forest health days to regions	FR FEE	2011/12	UKWAS audit. Publication CCAP. Annual district and FEE report
Resilience to fire	Review forest design plans to plan for future fire mitigation.	FD	Ongoing	UKWAS audit. Number plans review to CC
Our woodlands working with others to create landscape permeability	Seek to work in partnership with others, to ensure FDPs are linked at landscape level.	FD	Ongoing	UKWAS audit.
We are contributing to sustainable water management, and reducing the use of carbon to build and maintain our roads	Implement the UKFS, in particular Forests and soils, and water guidelines	FD	Ongoing	UKWAS audit.
	Review the capacity of the forest infrastructure to cope with increased precipitation	FCE	Ongoing	UKWAS audit.
	Review our management of reservoirs to ensure compliance with ' Flood and Water Management bill .'	FCE	Ongoing	UKWAS audit.
	Work with others to explore the opportunities our forests offer to help with water management.	FD	Ongoing	CCAP year 5 review

Climate change action plan

Outcome	Activity – we will	Who	When	Measure of direction of travel
	Use ground penetrating radar technologies to reduce the amount of aggregates used in forest roads.	FCE	Ongoing	CCAP year 5 review
	Adopt, where practicable, new technologies to reduce the impact of haulage on our roads, such as central tyre inflation systems.	FCE HMO	Ongoing	CCAP year 5 review

FC Forestry Commission (Edinburgh)

FR Forest Research

FEE Forest Enterprise England (National Office)

FD Forest District

FCE Forest Civil Engineering

HMO Harvesting Marketing Officer

L+D Learning and Development

PSSB Plant Seed Supply Branch

BSP Business Sustainability Programme

EMS Environmental Management Statement

CCAP Climate Change Action Plan

CC Climate Change

GHG Green House Gases

UKFS United Kingdom Forestry Standard

UKWAS United Kingdom Woodland Assurance Scheme

FSC Forest Stewardship Council

PEFC Programme for the Endorsement of Forest Certification

LISS Low Impact Silvicultural Systems

CCF Continuous Cover Forestry

6 Links to further information

[eConnect Climate Change England](#). This section contains a wide range of resources for FC England staff, from educational and interpretation materials, to tree information, and includes specific advice to our staff on species and diversity within species and origin/provenance.

[Forest Research – Climate Change England](#). This will be specific advice for England and will include species recommendations by climatic zones and suitability as climate change advances. There will be supplementary notes on species and advice on origin and provenance.

[Combating Climate Change - A Role For UK Forests: Main Report: An Assessment of The Potential of The UK's Trees and Woodlands to Mitigate and Adapt to Climate Change](#). You can download the report electronically as sections or complete.

[Forestry Commission - The UK Forestry Standard](#). Standards are currently under revision. You will find the Forestry and Climate Change Guidelines here.

[Forestry Commission - climate change - forests and climate change](#). The FC's headline web area. Strategic statements, resources and links.

[Forestry Commission - Climate Change in England](#). Key England messages and resources that is available to the general public.

[Forest Research - Climate change](#). General expert advice and guidance which headlines above country specific advice.

[Forestry Research Electronic Decision Support Tool](#) Various expert decision making tools. The 'Ecological Site Classification' (ESC), supports decisions on species selection within the changing climate. The EMIS tool helps decisions in ground preparation and brush harvesting to be made in the knowledge of their carbon impact.

[Forest Research - Continuous cover silviculture](#). Guidance and support tools in managing CCF or in conversion of stands to CCF.

[Forest Research - Woodfuel](#). A wide range of advice on the subject and links to the biomass centre and others.

[Forestry Commission - Woodfuel in England](#). Specific guidance for England.

[Forest Research - Tree improvement and forest genetics](#). Information on conifer breeding and links to others such as BIHIP.

[Forest Research - Slowing the Flow at Pickering](#). Case study of flood management near Pickering in Yorkshire.

Forest Research –Case studies of Climate Change Adaptation. Pages that are in development and will include case studies and a user blog.

[Operational Guidance Booklets](#). FC guidance on a range of operational issues.

[UK Climate Projections - Home](#). Official climate change predictions site for the UK.

[Defra, UK - The environment - climate change](#). Government views and policy.

Climate change action plan

[Natural England - Climate change](#). Their website.

[Climate change | RFS](#). Royal Forestry Society climate change pages.

[Met Office: Climate change](#)

[BBC - Weather - Climate Change](#)

[Home - Department of Energy and Climate Change](#)