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Trees or Food?

Re-evaluating the drive for large-scale tree planting in England.

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- In recent years there has been a drive to increase the number of trees that are planted across the UK. This has been stimulated in particular by the perceived role of trees in helping to combat climate change.
- The 2009 Read Report “Combating Climate Change” commissioned by the Forestry Commission highlighted the potential value of trees and in particular new tree planting. Following on from this, government policy, as set out in the recent white paper The Natural Choice, is itself shifting towards policies that encourage new tree planting in both urban and rural locations in England.
- This policy has also been strongly supported by the Woodland Trust which has proposed initiatives both to increase the number of trees planted and the creation of new woodlands to improve people’s access to nature and wildlife.
- Woodlands.co.uk is a private company which specialises in selling to individuals who want to own woodland for reasons of conservation and enjoyment. It gives people interested in the future of our woods and forests a chance to learn more about these proposed changes and their implications.
- **In this report we analyse the value of the dash for new tree planting in England in its rural (rather than urban) forms. We consider both the potential benefits and also identify and assess the pitfalls. The reality is that large-scale tree-planting is problematic but to date few have been willing to question its value.**

Britain's trees, woodlands and forests are valued very highly. People visit woodlands for the mental and physical health benefits they offer; they love the views of them from where they live and as they travel about the country. Others go further and buy small woods from companies like Woodlands.co.uk and enjoy the enormous benefits that owning a small wood can offer.

New policies are now being developed that would increase the rural land planted with trees in Britain significantly; these policies have been devised principally to help us meet our climate change obligations. The advocates of these policies point to previous large-scale planting in the 1950s and 60s which saw swathes of Britain's countryside planted with trees.

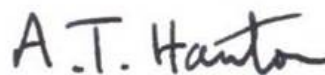
There has been little questioning of these new policies up until now: few are keen or feel able to argue the case against wide-scale tree planting. But while there are strong arguments in favour of tree planting in urban settings, there are many reasons to question whether we should be planning to remove large amounts of land in the form of either rich arable farmland or environmentally sensitive upland at a time of high and rising food prices.

In this report, we take a detailed look at these policies and set out their likely implications. We ask whether the objectives behind them could not be achieved by other and more effective means.

We very much hope that you will find this report interesting.



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- Although wide-scale new tree planting in the countryside appears a superficially attractive option in the fight against climate change, other considerations which have been largely overlooked to date indicate this initiative is:
 1. Economically and logistically unachievable.
 2. A relatively inefficient way of addressing the UK's greenhouse gas emissions.
 3. Diverting attention from the real priorities that we face in managing our woods and forests.
 4. Unworkable owing to the lack of plans for the management of these new forests.
- Large-scale new tree planting does not fit well within the existing objectives of England's forestry and woodland management. Removing enormous areas of productive farmland from our countryside for new tree planting is not only unfeasible but also an inefficient way for the UK to play its part in the fight against climate change.





1. Unachievable Targets.

- Schemes to combat climate change with large scale new tree planting focus on incentivising farmers/other land owners to remove farmland from production and plant trees instead. Although farmland has been taken out of production and planted with trees in the past, economic conditions then were very different.
- Since the 1950s when poor quality land could be planted with woodlands, land prices have increased enormously and arable/dairy land is currently valued at around £15,000 per hectare. At 2011 prices, the land that would be needed for new tree planting at the scale proposed in The Read Report (14,840 ha pa for 40 years) could be worth almost £6.5 billion. If grants/incentives were used to encourage farmers to plant trees on their land, again to the levels envisaged in The Read Report, the costs would exceed £3.5 billion.

- In addition to cost, there is the logistical issue of removing land from agricultural production. There are two major problems with the schemes currently being proposed:

Land Availability

- The assumption that there is land in England that can be earmarked for planting. Land in England is no longer readily available for other uses as it might have been in the 1950s.
- Even upland areas where food production does not occur and land prices may be lower are often important wildlife and landscape areas and are key locations for supporting biodiversity.

Impact On Food Prices

- There are long-term pressures on food prices owing to growing national and global populations and competing land uses such as from growing crops for biofuels.
- Even the removal of small amounts of productive land can have a disproportionate effect on food prices as has been seen in the US with corn being grown to produce ethanol.

- **Given the impact of corn growing for ethanol in the US both on increased prices and price volatility, it is easy to see UK home grown food prices rising by up to 25% if large-scale new tree planting is given the green light.**

2. Inefficient Approach.

- Planting new trees in England would show clear evidence that we are doing our bit to fight climate change. Trees grow well in the UK and The Read Report quantified their ability to “sequester” carbon dioxide from the atmosphere. Relative to the tropics, however, growth rates for trees in the UK are low and average just a third of the rate of these faster growing regions. In addition planting and tree management costs are far higher in developed than undeveloped countries.
- The UK’s efforts at locking up carbon in trees could be undertaken far more effectively by participating in large scale schemes to plant trees in the tropics and not by removing productive land from UK farms.

3. Priorities For England’s Forestry and Woodland.

- Large-scale new tree planting does not fit well with current priorities for the management of England’s woodlands. Much work still needs to be done to redress the twin legacies of wide-scale conifer planting in the middle of the 20th Century and the fragmentation of forests and woods that has had a devastating effect on their flora and fauna.
- Planting new trees does not create woods of wildlife value. It can take hundreds of years and much management before an adequate tree canopy creates the kinds of conditions that turns a field full of trees into a real wood. Other issues are more pressing for the health and future of England’s woodlands and these are likely to be overlooked in a rush to plant new trees.

Challenge 1. To continue with and complete the task of restoring Ancient Woodland. No woodland is valued more highly than Ancient Woodland for its biodiversity and as an amenity that all can enjoy. The Forestry Commission has embarked on a programme that seeks to restore native trees in the large areas of Ancient Woodland that were planted with conifers after WW2. It is envisaged that it will take another 20 years to fully restore all 50,000 hectares of the Ancient Woodland that it manages to principally native woodland.

Challenge 2. Research now shows the damage done to our woodlands if they become more fragmented. Larger woods are separated off into several smaller ones, woods are sliced into by roads and trees are removed for farmland. The survival chances of animals, insects and plant life are inevitably threatened when their habitats shrink. The priority is to recreate the links between these woods by selective new tree planting that both re-establish these links between woodland areas and thus enlarges greatly the habitat area available.

4. Lack of a Management Plan.

- There is no coherent plan for the management of these new forests. The UK government has already indicated in February 2011 that it is not able or willing to manage its existing 250,000 hectare English Estate.

- The area of the United Kingdom covered by trees, woodland and forests has long been low compared to other countries. This is the case both in terms of the proportion of land that is covered in trees and woodland area per head of population. Compared to the European Union average of 37% land cover by trees, the UK level is 12%.
- 100 years ago levels of forestation were considerably lower in the UK than today. By 1905, the proportion of the UK covered by trees had fallen to just 5%. High demand for timber during the First World War highlighted the need to replenish stocks. With this in mind the Forestry Commission was established in 1919 and it has overseen a gradual increase in forestation with tree planting, especially of conifers, reaching a peak in the 1950s and 60s.
- More recently the potential role for trees and woodlands has been highlighted in the fight against climate change by the capacity of trees to lock-in/sequester carbon. In addition, the importance of woods as a means of access to nature especially for those living in more urban communities is being more fully recognised.
- Pressures exist, therefore, for significant increases in the numbers of trees being planted near to urban communities and the creation of woodlands and this has been recognised both by government in its White Paper The Natural Choice published in June 2011 and by campaigning organisations such as the Woodland Trust and their promotion of large-scale new tree planting.
- **Little consideration has, however, been given to the potential effects or ramifications of these policies.** In the 1950s the rush to plant huge swathes of conifers left a legacy of a blighted landscape and devastating effects on nature and it is important that the consequences of such a radical shift in policy are examined.
- In terms of the value of new tree planting, there is debate as to the climate change benefits of such policies. In terms of the effects, there has been little assessment of the potential ramifications of removal of agricultural land on both food production and food costs. Little too has been said about the carbon usage associated with large-scale tree planting.
- This report which focuses exclusively on new tree planting in rural areas in England seeks to assess these policies objectively and to offer a balanced view both of the potential advantages and disadvantages.

Background – History of Woodlands in England and the UK.

- A number of factors have meant that the amount of woodland area in the UK and England in particular has long been low and under pressure of depletion.
- Even at the time of the Roman occupation of Britain, woodland cover would have been as low as 25 to 30% of land area (1). Levels continued to fall as wood was used as a source of fuel (for a population of about 5 million) and as a building material and owing to forest clearance by farmers for stock rearing or crop growing.
- The area that was wooded declined further over the centuries owing to land usage for farming by a slowly growing population. Later (1500 onwards) pressure on woodlands would increase with emerging industrial uses for wood as charcoal for smelting and in shipbuilding.
- While the loss of woodland cover was recognised and there were a number of initiatives through Acts of Parliament to replace lost trees, woodland cover remained low and Britain was by now dependent on imports from the Baltic nations and New England in the United States.
- By the start of the 20th Century tree cover has fallen to just 5% and after its heavy use in the First World War, consideration was given to the role of wood as a strategic resource and a committee was appointed to look at the best ways of increasing the country’s woodland areas.
- This led to the establishment of the Forestry Commission in 1919. Its original remit was to build up a strategic reserve of timber so that Britain would no longer have to rely on imports in times of war.
- In the 1950s woodland cover increased dramatically as large areas of land too poor for agricultural use were planted. Owing to the poor soil quality most of this involved large, poorly designed plantations of conifers that had negative impacts on both landscape and wildlife.
- By 2010 woodland cover had increased to just under 9% in England and just under 12% across the UK (driven by higher levels of woodland cover in Scotland than in the rest of the UK).

Year/Era (2)	England	UK
3,000 BC		50%- 60%
1st Century AD (25)		25%- 30%
1086 (Domesday Book)	c15%	c15%-20%
c1350	c10%	
17thC	c8%	
1905	5.2%	4.7%
1924	5.1%	5.0%
1947	5.8%	5.9%
1965	6.8%	7.4%
1980	7.3%	9.0%
1995-99	8.4%	11.3%
2010	8.7%	11.7%

Background (cont'd) – International Comparisons.

- As we have noted, levels of woodland area in England and throughout the UK have for many centuries been low relative to many European countries and continental areas both as a proportion of total land area and per head of population. Levels of woodland cover in two European Countries are lower than those in the UK. Ireland and Holland both have 12% woodland cover compared to the UK's level of 15%.
- Of concern worldwide is the rate of depletion of forest area. Worldwide since 1990, forest area has fallen by an annual average of 0.16% with the largest declines in South America (0.45% pa) and Africa (0.53% pa). Europe is the only continental area to have shown consistent, if small, levels of increase in woodland area over the last two decades (6).

Country/Area	Forest as a % of land area (3 & 4)	(5) Pop'n Density Inhab/km2
United Kingdom	15%	255
Ireland	12%	65
Holland	12%	402
Denmark	18%	128
France	32%	114
Germany	34%	229
Italy	33%	200
Sweden	66%	21
Finland	68%	16
European Union-27	37%	114
Russian Federation	49%	8
Africa	23%	25
Asia	19%	78
North & Central America	33%	12
Oceania	23%	4
South America	49%	28
World	31%	47

- As well as their obvious benefits to our quality of life and our access to nature, much of what has stimulated a renewed interest in new tree planting is the role that trees and woods are felt to play in the fight against climate change. At the heart of this is the capacity of trees to convert carbon dioxide (CO₂) gases into carbon (C) stored as wood through photosynthesis and thus remove it either permanently or throughout the lifetime of the timber.
- Woodlands thus have both an ability to sequester or lock in greenhouse gas emissions and also to produce materials (eg biomass) that can be used as substitutes for fossil fuel.

1. Carbon Sequestration

- Forests act as “carbon sinks” through their capacity to convert carbon dioxide (CO₂) to wood that then locks in that CO₂ as carbon (C) until it is released (eg by being burnt).

2. Fossil Fuel Substitution

- Trees/Woods can act as a substitute through:
 - Their use as a fuel substitute eg woodfuel that can be burned instead of coal, gas or oil especially in domestic home heating.
 - Their use in building materials where wood can act as a substitute for fossil fuel intensive materials such as concrete.

- Forests already play a significant role in sequestering carbon in the UK (7) but with relatively high levels of harvesting (of woods that were planted in the 1950s and have now reached maturity) and reduced levels of new planting, that role is set to diminish.
- Existing UK forests both store carbon (estimated at around 790 million tonnes of carbon (MtC) in 2007) and remove CO₂ from the atmosphere (C15 MtC in 2007). The concern is that owing to the current levels of harvesting and reduced levels of new planting since 1990, this strength of the “carbon sink” will fall and by 2020 it will be removing just 4.6 MtC per year.

Background (cont'd) –The Role of Trees and Forests in Combating Climate Change – The Read Report.

- The Read Report (7) was commissioned by the Forestry Commission to investigate the potential role of UK forests through its trees and woodlands to “mitigate and adapt to climate change”. The report was published in 2009 and has, as we have noted, been the principal prompt for the interest in discussing and setting targets for new tree planting by interested bodies such as the Woodland Trust.
- The principal findings of The Read Report are summarised as:

<p>Tree Planting Is A Cost Effective Way Of Mitigating Against Climate Change</p>	<ul style="list-style-type: none">• The Committee on Climate Change has resolved that abatement measures to tackle climate change become cost effective at a cost of less than £100 per tonne of CO2.• The woodland creation options that were considered in the Read Report, including those that included mixed woodlands containing a range of broadleaved trees and were managed for multiple objectives (including their amenity access to nature value) could deliver abatement at less than £25 per tonne CO2.
<p>In The Longer Term, The UK's Forests Can Become Sinks For A Significant Proportion Of Our Greenhouse Gas Emissions</p>	<ul style="list-style-type: none">• The UK's emissions of Greenhouses Gases (GHGs) peaked at 783 million tonnes of carbon dioxide equivalent (MtCO2e) in 1991 (8). Since that time emissions have been falling significantly and they currently stand at 582 MtCO2e (based on the provisional 2010 figures).• The Read Report notes that within the context of the legal obligation under the Climate Change Act 2008 to reduce the UK's output of GHGs by 80% from their 1990 levels by 2050, UK GHG emissions would have fallen to 156 MtCO2e.• The Read Report recommends that through an enhanced woodland creation programme consisting of planting a total of 23,200 ha pa, by 2050 the UK forests would be delivering a total annual abatement of 15 MtCO2e which would equate to 10% of total GHG emissions. The 23,200 ha pa new planting that is being advocated is made up of a “business as usual” assumption of planting 8,360 ha pa and that is “enhanced” by a further 14,840 ha of planting per year.

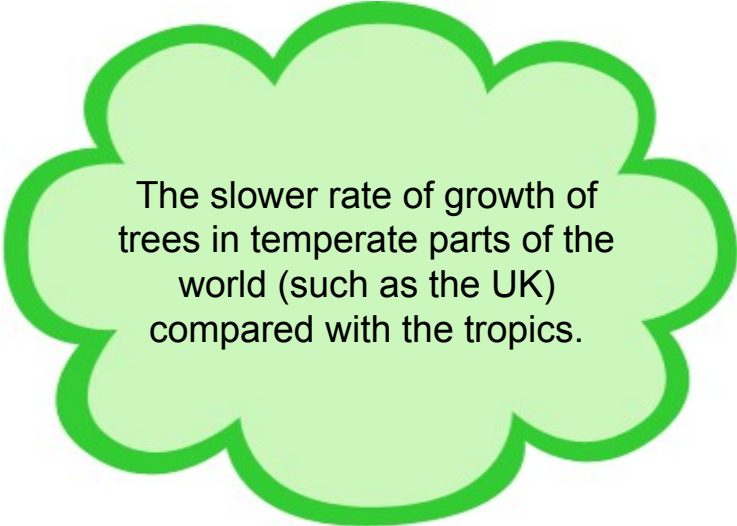
The Role Of Woodfuels and Wood Products

- The report found that wood products and wood fuel also had a significant role to play in reducing carbon emissions in the UK as a substitute for other materials with greater climate change impact.
- The report felt that forest products could make up a larger share of biomass energy than was previously envisaged and that wood products had a major role to play in as a house building material.
- Biomass for heat production was felt to provide *“one of the most cost-effective and most environmentally effective ways of decreasing UK GHG emissions”*.
- The report also stated that levels of GHG abatement could be increased significantly by planting dedicated energy forests on current agricultural land. The planting of 1 million ha in this way would deliver 7.3 MtCO₂ emission abatement per year once established.


The Changing Mix Of Tree Species In England & The UK

- The report found that existing and emerging impacts of climate change will require a rethink to the selection of tree species for particular sites. In the short to medium term the use of existing species in the UK will continue to be viable although the mixes of species used will alter.
- In the longer term, if GHG emissions do not decline, the introduction of new species will need to be considered. Care will be need to be taken from now on, therefore, as to the suitability and the mix of species that are being planted.

- Two factors call into question the value of a climate change mitigation programme of new tree planting that relies heavily on growing trees in the UK:



The slower rate of growth of trees in temperate parts of the world (such as the UK) compared with the tropics.



The far higher costs of planting in the UK.

- With high levels of deforestation in parts of the tropical rain forest and the vital role that it currently plays as a carbon sink, the UK efforts might be more effectively targeted at tree planting schemes in those parts of the world.
- Although overall doubts persist as to the value of climate change mitigation by tree planting, a recent study has confirmed the long held belief that tree growth rates are significantly higher in the tropics than in temperate zones.
- The study by Vivek K. Arora & Alvaro Montenegro published in Nature Geoscience (9) found that warming reductions per unit in afforested areas are around three times higher in the tropics than in the boreal and northern temperate regions. The report emphasised the importance of stopping deforestation and that continued afforestation in the tropics is an effective forest-management strategy from a climate perspective.
- With current levels of understanding, therefore, investment in afforestation schemes in the tropics is potentially much more efficient in sequestering carbon than those in the UK.

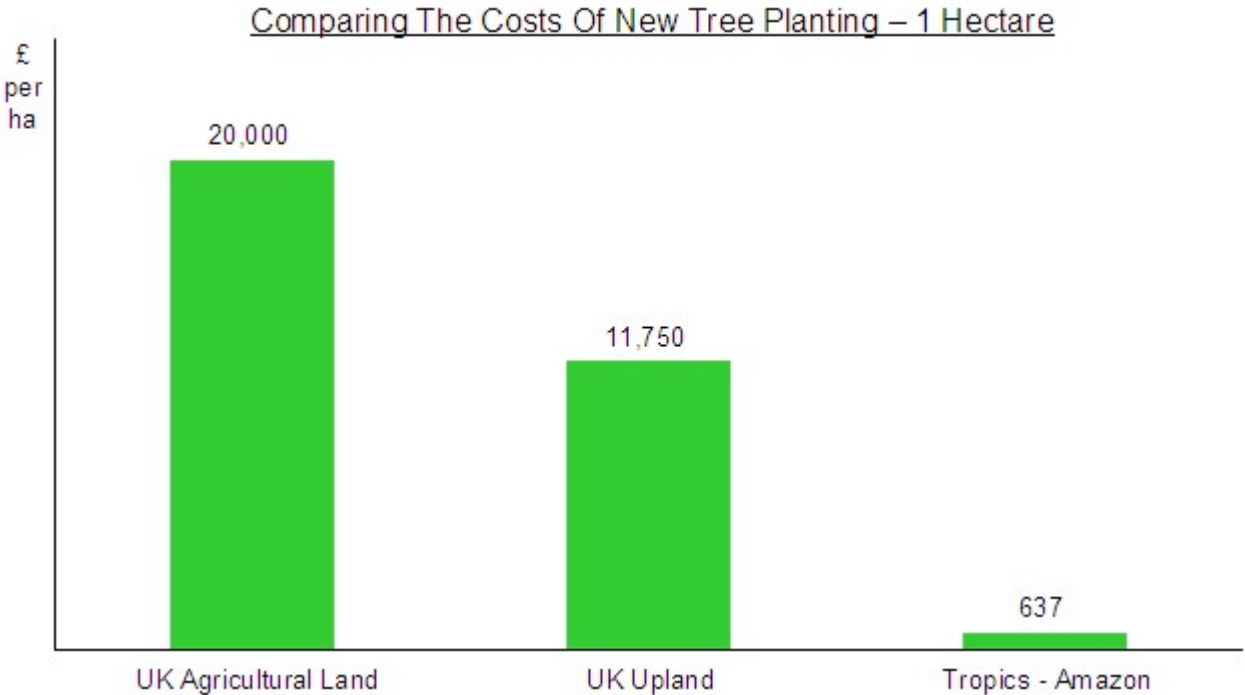
- At a purely economic level, therefore, the value of the land that may be being removed from agricultural production and be planted with trees will be of a value that is very different from that used in the 1950s both in terms of its monetary value and its far higher level of productivity. Previously poor quality land principally in Scotland was taken out of production.
- If we attempt to make projections on the basis of:
 - Current land values where the average value per hectare of agricultural land has now surpassed £15,000.
 - A mix of different types of land being used where 50% of the land used would be hill land (whose values tend to be on average just under half those of arable or dairy land). The Read Report is careful to note in its Executive Summary (page xvii) the competing demands on potential tree planting land from food production and urban development. A greater quantity of prime land will be required, however, if the aim of the planting is to increase access to larger woods for those who live in towns and cities as well as being undertaken for carbon sequestration and woodfuel purposes.
- The calculation of the value of the land that would be required on an annual basis for future planting (at 2011 prices) at a rate of 14,840 ha per year (the amount of land needed to deliver “enhanced” woodland creation outlined in The Read Report) would be:



- At 2011 prices and on the basis of the above assumptions, the value of land specifically for “enhanced woodland creation” planted at the rates proposed in The Read Report (14.84K ha for 40 years) would be almost £6.5 billion.

Background (cont'd) –The Role of Trees and Forests in Combating Climate Change – Carbon Sequestration (cont'd).

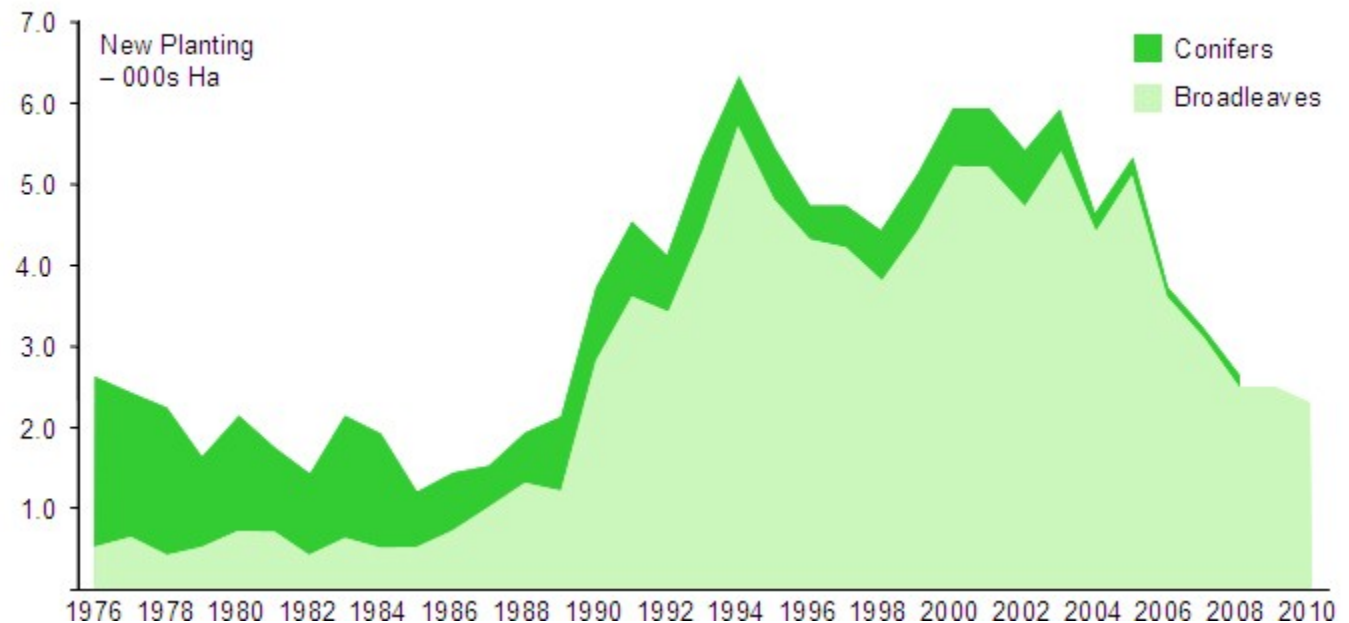
- Also underscoring this idea of efficiency are the costs of tree planting. We will go on to look at the high costs of planting in the UK owing to land values, the costs of trees and the management costs associated with their nurture.
- (10) As a guide, however, the National Forest estimates that planting and growing a tree costs around £10 (including the cost of land). Thus a hectare containing around 2,250 trees (11) would cost over £20,000 to establish. This contrasts with reforestation programmes in the Amazon (12) where the cost of planting 1,000 ha is estimated at \$1,000,000 which equates to \$1,000 per ha. Clearly if the quality of the planting can be well managed then the unit cost of tree planting is far lower in the tropics.
- If the levels of spending that are likely to be needed in either grants or land purchase (estimated at more than £6 billion - see page 18 & 26) were instead spent on participation in afforestation schemes in the tropics then the total area that could be planted would rise from 928,000 ha in England (Read Report targets) to 22,000,000 hectares in the tropics.
- This is an area more than 3 times the area of forest lost in the Amazon in 2010 (13).



- Continuing programmes of new tree planting and restocking of trees that are harvested have prompted the steady increase in woodland cover that has occurred in England and across the UK since the end of WW1. Cover in England has risen from 5.1% in 1924, to 5.8% in 1947, to 6.8% in 1965 to its current level of 8.7% in 2010.
- Levels of new planting of trees have, however, altered over the last 35 years. Across the UK levels of new planting have declined largely because of a drawing back from large scale planting of conifers which, as we have noted, originally began in the 1950s and was focused mainly on Scotland.
- New planting of conifers in England fell below 1,000 ha per year in 1985 and have remained below that level ever since.

- Levels of broadleaf tree planting, however, grew consistently through the 1990s in the UK with a peak in 2001 and exceeded 4,000 ha per year throughout the period between 1993 and 2005.
- Levels have, however, declined in more recent years. A contributing factor may well be, as we will go on to explore, the increasing value of land in England where prices have risen sharply since the start of the Millennium.

New Planting In England– Conifers & Broadleaf Trees – 1976 to 2010 (14)



- So what are the arguments behind this push for new tree planting in England and just how many trees is it being suggested should be planted?

1. The Read Report. The impetus behind this new approach to the value of trees originates in The Read Report which looked in detail at the potential of new tree planting both to sequester significant volumes of carbon and to substitute fossil fuel usage with wood based alternatives. The Read Report recommends new woodland creation at an annual rate of 23,200 ha. This figure is made up of a “business as usual assumption of planting 8,360 ha pa” which is “enhanced” by a further 14,840 ha of new tree planting per year.

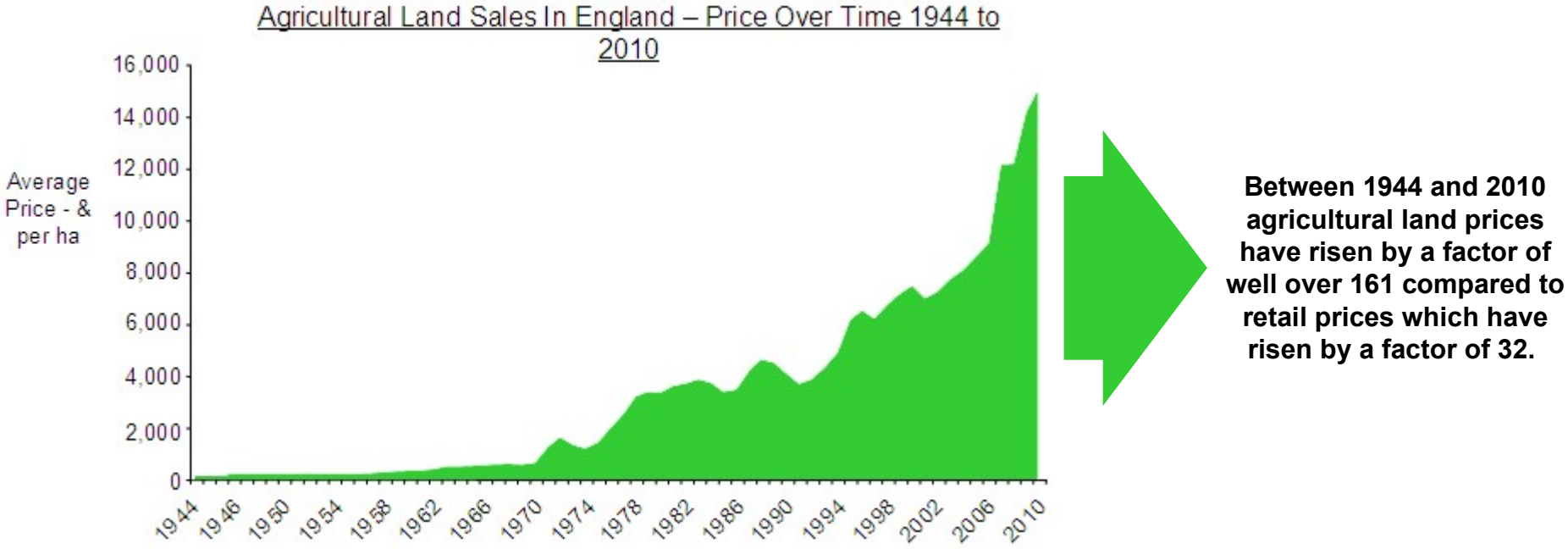
2. UK Government White Paper. Building on The Read Report, the Natural Environment White Paper for England (15) published in June 2011 entitled The Natural Choice: securing the value of nature notes its “*challenging*” woodland creation rates of 23,000 ha per year across the UK and its likely requirement that in England woodland creation rates would need to rise from the current level of 2,300 ha pa to 10,000 ha pa. The White Paper stated that the government’s ambition was for a “major increase in the area of woodland in England” but avoids setting specific targets. Instead it states that the Government has asked the Independent Panel on Forestry (established in March 2011 to advise on the future direction of forestry and woodland policy in England) “*to provide advice on an appropriate level of ambition for woodland creation*”.

3. Woodland Trust. The Woodland Trust has stated that the ambition should be to double native woodland cover and to realise the many environmental, social and economic benefits of woods and trees. For this around 15,000ha of new native woodland would need to be planted in the UK every year for the next 50 years (16). Its arguments in favour of planting combine the climate change objectives set out in The Read Report with detailed targets for access to woodland for communities.

- Whilst detailed targets have not been agreed for England through legislation, the administrations in Scotland, Wales and Northern Ireland have already set themselves extremely challenging targets to increase both the levels of new tree planting and, over time, their overall ambitions for the amount of woodland area.
- It should be noted that these targets consistently exceed, often by an extremely large margin (with the exception of Scotland), not only the average level of new tree planting since 1976 but also the highest level of planting achieved over this 35 year period.

Nation (17)	Current new planting '000 ha pa (2010)	Highest Level of new planting '000 ha pa (1976 to 2010) and year achieved (14)	Average level of new planting '000 ha pa (1976 to 2010)	Target level of new planting '000 ha pa	Current area of woodland (2010)	Resulting long term targets for woodland cover	Notes
England	2.3	6.4 (1994)	3.5	10.0	8.7%	11.7%	* Not set by the HM Government but these are proposed in The Read Report over a 40 yr period.
Scotland	2.7	26.4 (1989)	13.8	10.0	17.2%	25.0%	* (18) Target by second half of the 21st century.
Wales	0.1	1.8 (1977)	0.8	5.0	13.7%	18.5%	● (19) Target by 2030 (100,000 ha in 20 years).
Northern Ireland	0.2	1.6 (1990)	0.8	1.7	6.5%	13.0%	* (20) 2060 - doubling tree cover over the next 50 years.
Total UK	5.3	30.2 (1989)	18.9	23.0	11.7%	16.0%	* Targets from the Read Report.

- The last boom in new tree planting which began in the 1950s and continued into the 1970s occurred within the context of relatively low and static land values. In an era of increasing levels of world trade, the removal of poorer quality and relatively unproductive agricultural land was affordable (1).
- Any future increase in large-scale tree planting would, however, be occurring in a very different economic context in England to that which was undertaken after the Second World War.
- Land prices are no longer stagnant. They have been increasing at a rate well above inflation for a number of years buoyed by (21) high commodity prices and the worldwide increase in demand for food as the world population expands from its current 7 billion in 2011 to 9.3 billion in 2050 (22). As can be seen from the chart below land values have been increasing sharply in recent years.



Potential Issues Arising From The Policy - Effect on Removal of Land from Food Production.

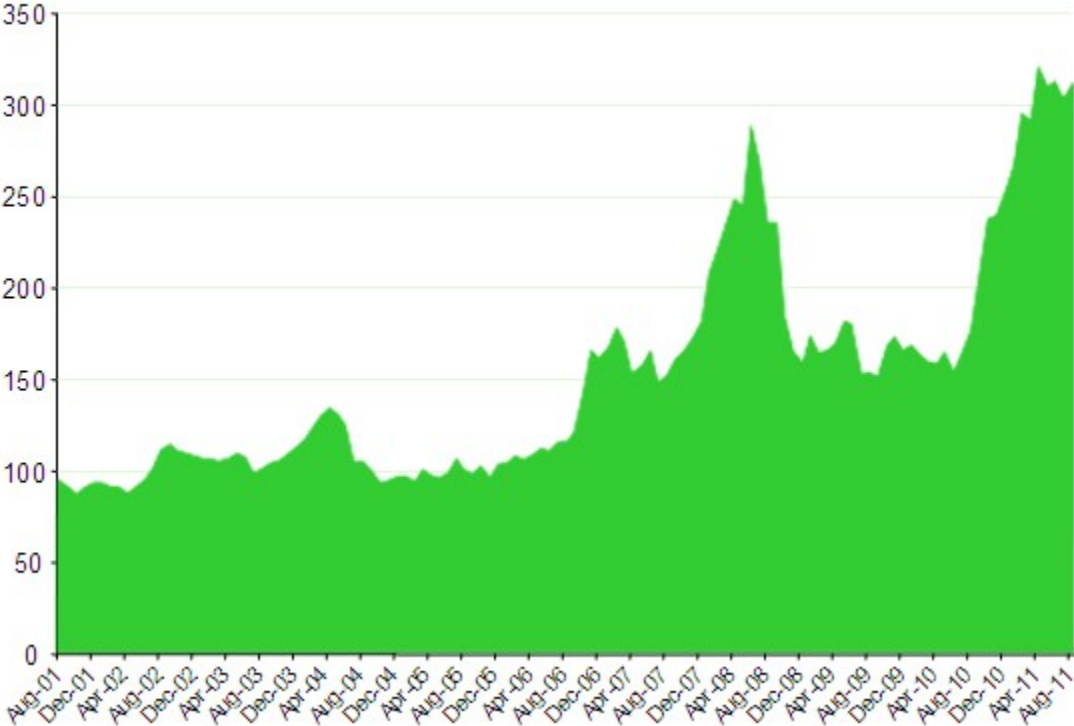
- Concerns have already been raised about a policy of far higher levels of new tree planting in those UK nations where formal targets have now been adopted in relation to its potential effect on food production. In Scotland both the Scottish Tenant Farmers Association and the National Sheep Association have raised concerns. Their worries are that such policies will be *“allowing potentially productive farmland to be removed from food production for generations without any planning control or public scrutiny”* (23). In Wales, the tree planting policy is being implemented initially under the Glastir the Agri-Environment Scheme being introduced by the Welsh Assembly Government and farmers have concerns that anomalies may lead to prime agricultural land being used (24).
- As the policy is less fully developed in England so far and no targets have been formally set, fewer concerns have been voiced to date. Over and above the value of the land that may be removed from food production, there are also potential concerns that may flow from the volumes of land that will be required in England. At its most extreme, if the full 23,200 ha per year (as outlined in The Read Report) was land that was currently being used in food production, this would represent over the 40 year period envisaged, 10.6% of all agricultural land in England.
- If all of this land had previously been used for wheat production at current yields of 7.8 tonnes of wheat per hectare (25), this would equate to removing an annual equivalent of 7.2 million tonnes from production. This is slightly more than countries like Algeria, Morocco and Australia consume annually (6.2 to 6.5 million tonnes pa) (26).

		ha	% agricultural area loss
Land area of England (27)		13,028,000	
Currently utilised agricultural area (crops, grasses and rough grazing) - 67% of land area		8,745,000	
Tree Planting Scenarios	1. Government target 2009 in UK Low Carbon Transition plan - 10,000 hectares of new tree planting annually for the next 15 years.	150,000	1.7%
	2. Woodland Trust (16) - 15,000ha of new tree planting annually for the next 50 years.	750,000	8.6%
	3. The Read Report - 23,200 ha of new tree planting annually for the next 40 years.	928,000	10.6%

Potential Issues Arising From The Policy - Effect on Removal of Land from Food Production (cont'd).

- At their lowest levels, the removal of these kinds of volumes of agricultural land may appear relatively small. It is, however, worth noting that when commodities are in high demand, as food is currently and is likely to continue to be into the long term (with an increasing world population and a drive to higher levels of more commodity intensive meat consumption), even small changes in levels of supply can have a disproportionate effect on prices.
- In the US, the introduction of policies encouraging the production of ethanol from maize (or corn as it is also known) is felt by many to have been a major contributor to the dramatic rise in the price of maize in recent years and to far greater price volatility.
- Legislation to encourage the long term and far greater use of biofuels and ethanol as a blend with gasoline was enacted in 2007 (Biofuels Security Act) (28).
- Supported by this legislation, US domestic production capacity of ethanol has risen from 1.63 billion gallons in 2000 to 13.5 billion gallons in 2010 (29).
- Out of the total US arable land area of 270 million hectares, 10 million hectares (3.7%) is now being used for ethanol crops.

Monthly Price Of Maize – 2001 to 2011 (\$ per Metric Tonne) (30)



- While there is debate as to the precise effect of this policy on food prices, these far greater levels of ethanol use have co-incided with sharp and now firmly-established rises in the price of maize. In the report Growing a Better Future (31), Oxfam outlined the effects of this policy and a spokesperson (32) said:

“When (the US) is basically diverting 15% of the world’s corn harvest into ethanol it has an impact and we can’t deny that. We have to start being sober about what impact that’s having on food prices.”

- Thus when even a small proportion of productive agricultural land is removed from production at a time of high demand, the effect on prices is likely to be disproportionate.
- Although in such a situation it would be relatively easy for the UK to import more food in an open economy, this would have significant negative impacts on food miles and once again discourage domestic food production which is currently benefitting from an interest from consumers for locally sourced food (eg from farmers’ markets).
- Concerns exist, therefore, about the impact of removing land for large-scale tree planting on arable and dairy prices in the UK where population density is much higher than in the USA. It is quite conceivable that the removal of productive agricultural land on the scale envisaged in The Read Report could lead to an up to 25% rise in home grown food prices in the UK.

- As well as the issue of the economic effects of the loss of productive farmland in planting new trees, there are also significant concerns about the potential effect of such a policy on habitats that are rich in flora and fauna.
- The benefits of woodland to biodiversity are well known and widely acknowledged. Over time and as the trees in them grow and mature, woodlands become home to a wide variety of plants, insects and animals.

Woods are more than the sum of the trees in them (33).

As individual tree canopies overlap and link into a more or less continuous canopy that shades the ground, so...

...a variety of other plants are attracted.

These include mosses, ferns and lichens, as well as small flowering herbs, grasses and shrubs.

Dead organic material supports fungi and bacteria.

The more diverse the plants...

...the greater the animal diversity.

Animals will range from herbivores that feed on the plants to carnivores who feed on other animals. Rotting wood and decaying leaf litter are a food source to a wide variety of invertebrates.

- To illustrate just how valuable trees can become in a woodland setting, around 80 different species of moss might be found growing within an oak woodland (34). Up to 300 different species of lichen have been recorded per km² in areas such as the New Forest. Oak trees alone can support up to 324 different species of lichen.
- It is important to stress, however, that it takes many years before these levels of biodiversity are achieved. Biodiversity within woodlands increases both with the age of the individual trees which it contains and the historical age of the wood (35). An oak tree, for example, will not be mature enough to flower for approximately 50 years. At this point the tree begins to offer a host of new opportunities for other life, with seasonal flowers and fruits or seeds on offer. Its bark too gains fissures and cracks over time and these provide microhabitats for plants and insects.
- Woodlands planted in the right way with a variety of tree species and managed to encourage a canopy that allows in light at different layers can become an extremely rich environment in terms of biodiversity BUT this takes time.

- When considering where to undertake large-scale new tree planting in England, it is important to note that very little land is simply waiting to be planted on. As we have already noted, rural land in England is priced at record levels and, as we have seen recently in relation to the debates over changes to the planning laws, changes of use can be very contentious.
- We have seen already that arable and dairy land may prove too expensive to take out of existing use to plant trees. So what other land types does that leave that could be planted on in England?
- One candidate for new tree planting would be upland areas in England. These are typically categorised (36) as being above the upper edge of enclosed agricultural land at around 300 metres. English uplands tend to be found in the north and south-west of England with smaller areas throughout the length of the Welsh border. Natural England warns that:

“As well as being valuable for agriculture, recreation, culture and natural resources, they are important for biodiversity.”

- English uplands comprise a variety of habitats and although much has been damaged over the years by agricultural land improvements, heavy grazing by sheep and previous afforestation (37), uplands contain the largest remaining tracts of unfragmented semi-natural habitats and landscapes in the country and many are of international importance (36).
- As well as housing globally significant stocks of certain flora such as heather and bilberry (37), habitats such as upland heathland are also important for the populations of breeding birds that they support such as curlew, snipe and redshank, black grouse, ring ouzel and red grouse, as well as birds of prey such as merlin and hen harrier.
- Clearly, given the importance of these habitats and their relative fragility (taking a long time to recover from damage), it becomes difficult to see how large scale new tree planting can occur in these locations especially owing to the length of time that it takes for woodlands themselves to become rich in biodiversity.

- Over the years there have been a number of initiatives to encourage the planting of woods on farmland with the objectives of improving the landscape, providing new habitats and increasing biodiversity (38). Schemes encourage farmers to convert productive agricultural land to woodland with annual incentives that compensate them for their lost farming income.
- The principal schemes are/have been:

Farm Woodland Scheme (FWS)	<ul style="list-style-type: none"> • Introduced – 1988. Replaced in 1992 by Farm Woodland Premium Scheme. • Annual payments for up to 40 years are made to farmers who converted agricultural land to woodlands to compensate them for loss of agricultural income. • Annual payments ranged from £30/ha for unimproved land in Less Favoured Areas to £230/ha for arable land outside less favoured areas.
Farm Woodland Premium Scheme (FWPS)	<ul style="list-style-type: none"> • Introduced – 1992. Objectives similar to FWS to convert agricultural land to woodland. The scheme closed to applicants in March 2005. Payments were for 10 years for planting conifer woodlands and 15 years for planting broadleaved woodlands. • Annual payments (at 2009 rates) ranged from £60/ha for unimproved land in Less Favoured Areas to £300/ha for arable land outside Less Favoured Areas.
Woodland Grant Scheme (WGS)	<ul style="list-style-type: none"> • The Woodland Grant Scheme (WGS) gave grants to create new woodlands and manage existing woodlands. DEFRA reports that there have been 10,217 approved applications covering 186,405 ha since January 2001. • The scheme closed to new applicants at the same time as the FWPS in March 2005.



English Woodland Grant Scheme (EWGS)	<ul style="list-style-type: none"> • English Woodland Grant Scheme (EWGS) replaced the WGS and the FWPS and consists of a series of grants for both the management of existing woodlands and the creation of new woods under the Woodland Creation Grant (WCG). • The WCG consists of a grant of up to £1,800/ha for establishing the woodland and an additional contribution of up to £2,000/ha where applications meet “regional or national priorities” and an annual Farm Woodland Payment of up to £300/ha to compensate for loss of income.
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- A review of the woodland creation schemes in England was undertaken on behalf of DEFRA and the Forestry Commission in June 2002 (39). A detailed report by John Clegg & Co and Firn Crichton Roberts Ltd assessed the impact of woodland creation policy over the period 1992/3-2000/01 and covers the core period in which the FWPS and WCS schemes were in operation. It not only reported the effectiveness and impact of those policies but also gave some pointers to the implications for future schemes whose success was dependent on large-scale new tree planting.

Findings	Implications For Large Scale New Tree Planting In The Future
<ul style="list-style-type: none"> • Rationale For Schemes. The report found that <i>“During the 1980s and 1990s the environmental and social benefits that woodlands can provide have been increasingly recognised and valued by the public. Without public sector intervention through the provision of grants, there would be market failure as the costs of woodland creation with the potential for delivering the environmental and social benefits that the public value would be unattractive to many private landowners.”</i> 	<ul style="list-style-type: none"> • In spite of the increasingly diversified nature of farm incomes and a greater recognition of the wider benefits of woodland creation, grants will still be needed to encourage planting. Payment drives participation.
<ul style="list-style-type: none"> • Motivation of Participants. Previous research cited in the report stated that farmers in general had little interest in planting and planting levels had previously been low as the incentives on offer had been inadequate and because tenure conditions pose insuperable difficulties to participation for most tenants. 	<ul style="list-style-type: none"> • Incentives are generally needed to prompt a switch from food production to woodland creation by farmers. The level of grant will determine the success of any scheme.
<ul style="list-style-type: none"> • Land Planted. <i>“Over the period 1992/93 to 2000/01 the total area of new woodland created in England, on which grants have been paid totalled c 41,925 ha.” “The percentage of new planting which benefited from support under the FWPS has ranged from 34% in 1992/93 to a maximum of 64% in 1999/00.”</i> 	<ul style="list-style-type: none"> • There appears to be a strong correlation between the implementation of the woodland creation schemes and the increases (noted on page 14) that occurred in planting in England in the 1990s. • The existence of grant-based schemes drives levels of take up.
<ul style="list-style-type: none"> • Trees Planted. <i>“The predominant species planted under WGS alone and in conjunction with FWPS have been broadleaved. The percentage of conifers planted under both schemes in England has been very small.”</i> 	<ul style="list-style-type: none"> • Broadleaf planting was encouraged effectively by the differential payment scheme and the higher level of grant for broadleaf trees over conifers.
<ul style="list-style-type: none"> • Land Used. <i>“Most of the land planted was previously in arable use (58%) with lesser amounts on improved land (37%) and unimproved land (5%).” “The area of land taken out of agricultural production with WGS/FWPS supports accounts for approximately 0.5% of the present area of agricultural land in England.”</i> 	<ul style="list-style-type: none"> • The area of land the scheme took out of production was small in overall terms but weighted towards productive arable land.
<ul style="list-style-type: none"> • Size Of Schemes. The report found that the average size of WCS schemes was 2.1 ha and the average of FWPS was 3.9ha. The average size of a farm in England is around 50 ha (40). 	<ul style="list-style-type: none"> • The size of these woodland creation schemes was very small and represented only a small area of the farms involved.

Potential Issues Arising From The Policy – Grants

- On the basis of the take up of the grants outlined in the 2002 WCS and FWPS reports which observed 58% of the land coming from arable use, 37% coming from improved land and 5% from unimproved land, we are able to begin to estimate the potential costs for the sorts of new tree planting schemes that are currently being discussed.
- Again using cost structures currently in use in the English Woodland Grant Scheme (see page 24) for both the creation of the woods and then their continuation through annual payments, the equation might be as shown below on the basis of the Government's 2009 Low Carbon Transition Plan and the targets envisaged in The Read Report:

Scenario 1. Government target of 10,000 ha per year new tree planting over the next 15 years – UK Low Carbon Transition Plan = Total Land Use (total 150,000 ha).

Type of Land & Proportion (total = 100%)	Total Required Of Each Land Type (ha)	Tree Plantation Costs (@£1,800/ha)	Annual Payment/ha (based on land type*)	Total Annual Payments**	Total Grants – Creation & Annual Payment
Arable (Arable land in the lowlands) – 58%	87,000	£156,600,000	£300	£ 208,800,000	£ 365,400,000
Improved (Other improved land in the lowlands) – 37%	55,500	£ 99,900,000	£200	£ 88,800,000	£ 188,700,000
Unimproved (Unimproved land and/or land in the uplands) – 5%	7,500	£ 13,500,000	£60	£ 3,600,000	£ 17,100,000
					£ 571,200,000

Scenario 2. Read Report target of 14,840 ha per year new tree planting over the next 40 years = Total Land Use (total 593,600 ha).

Type of Land & Proportion (total = 100%)	Total Required Of Each Land Type (ha)	Tree Plantation Costs (@£1,800/ha)	Annual Payment/ha (based on land type*)	Total Annual Payments**	Total Grants – Creation & Annual Payment
Arable (Arable land in the lowlands) – 58%	344,288	£ 619,718,400	£300	£ 1,693,896,960	£ 2,313,615,360
Improved (Other improved land in the lowlands) – 37%	219,632	£ 395,337,600	£200	£ 720,392,960	£ 1,115,730,560
Unimproved (Unimproved land and/or land in the uplands) – 5%	29,680	£ 53,424,000	£60	£ 29,205,120	£ 82,629,120
					£ 3,511,975,040

*Basis current rates for each land type as set out in the EWGS.

**Basis equal amount of new planting being added each year over 15 year period (Scenario 1)/40 year period (Scenario 2)

- Managing newly created woods is an intensive process. Although many significant costs will already have been incurred such as the cost of acquiring the land, purchasing and planting the trees themselves, preparing the site and providing protection to the newly planted trees from damage (from animals, wind etc), there are a variety of different forms of ongoing management that will then be needed (41).
- Ongoing management includes:

Weed control which will be needed for 3 to 5 years.	Replacing trees that die soon after planting or during establishment.	Removal of protection. The protection that was originally installed for each tree will need to be removed after a maximum of 7 years or will begin to restrict tree growth.	Ongoing Pruning & Thinning.	Pest & Disease Control.
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- The costs of these interventions (both regular and intermittent) are significant. There has been little mention in the proposals for new tree planting to date as to how the woodlands that are created will be managed. Clearly farmers who are provided with grants will be being incentivised to manage those woods. For other organisations, a time-limited act of creating new woodlands will be easier than their subsequent management with the ongoing organisation that will require.
- Other successful management regimes do, however, exist. Groups such as the Small Woods Association and the Small Woodlands Owners Group are principally made up from private owners of small woods. These owners invest large amounts of time and effort into the active management of their woods and the benefits that they gain are considerable both in personal and family terms and in the benefits for the woods themselves. For more details see the Woodlands.co.uk report (<http://www.woodlands.co.uk/about-us/articles/woodland-owner-survey-report.pdf>)

- As we have now seen, there are significant issues associated with new woodland creation. The costs and effort involved in creating a new wood from scratch are considerable, from acquiring the land to managing new woodlands. It is, however, possible to circumvent some of the difficulties that are posed in creating **new** woodland from farmland by making greater use of **existing** woodland.
- We believe that there are potentially two other major routes that can contribute to woodland creation that build on woodlands that are already in existence.

Encouraging the Restoration of Ancient Woodland Sites

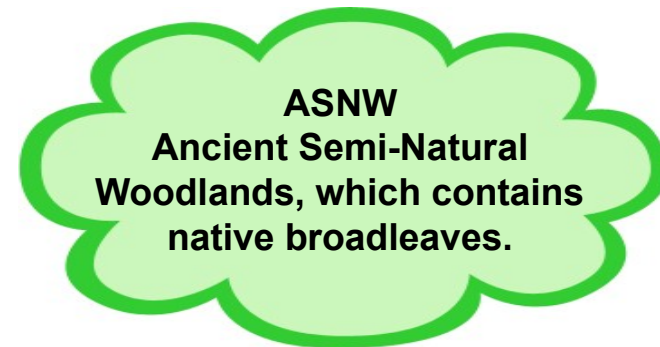
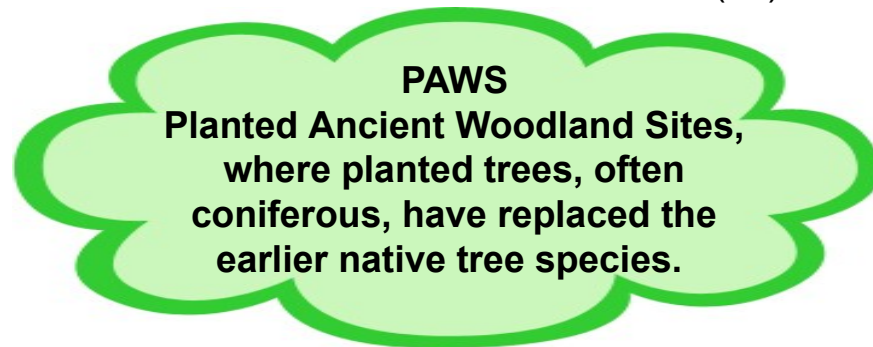
- Many ancient broadleaf woodlands have been replanted with conifers in the past 60 years.
- BUT opportunities exist to replant them with more biodiverse broadleaf species.

Extending Existing Woodlands

- There are significant benefits to extending existing woodlands rather than focusing solely on creating new woodlands on farmland.
- Higher bio-diversity levels are reached much earlier, for example, than in a newly created woodland.

1. Encouraging the Conservation of Ancient Woodland Sites (42).

- “Ancient Woodland” is defined as land that has remained as woodland for at least the last 400 years (since 1600). Out of the total of woodland area in England of 1,130,000 ha (2) (approx twice the size of Devon), some 220,000 ha is estimated to be Ancient Woodland (43). Ancient woodlands include:



- Ancient Woodland has been in steep decline for 80 years and during that time almost half of it is thought to have been lost partly to plantations and partly to agriculture. Much of the destruction in the 20th Century was caused directly by government actions through grants and advice that encouraged converting old woodlands into agricultural use and promoted the coniferisation of Ancient Woodlands.
- A combination of clearance with heavy machinery, the dense shade cast by closely-grown conifers, and the smothering effects of layers of conifer needles all took their toll on the communities of plants, insects and animals that made use of these rich habitats (44).
- These policies which were at their height between the 1930s and 1980s (45) came to an end in 1985 with the introduction of the Broadleaf Woodland Policy (46). The Forestry Commission and other government bodies now actively encourage the conservation and restoration of Ancient Woodland sites.

Potential Issues Arising From The Policy –

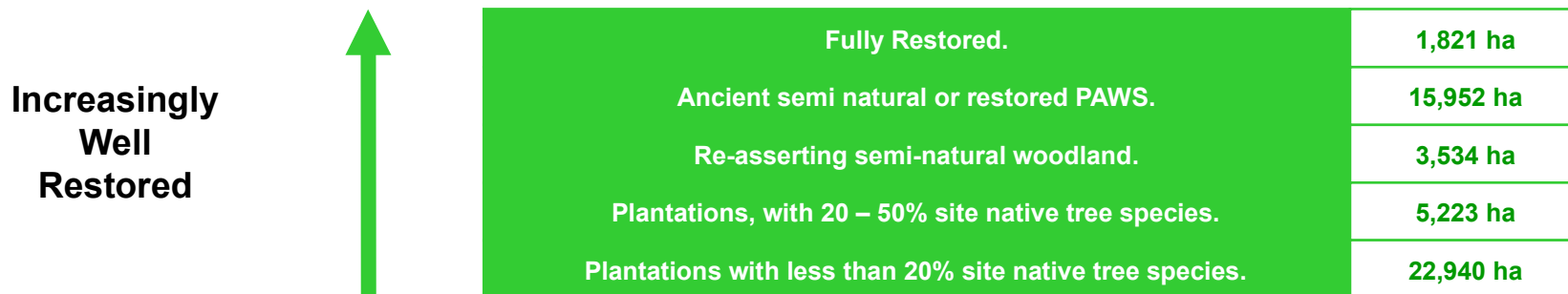
1. Restoring Ancient Woodland (cont'd).

- The future of the PAWS is of particular relevance now because:

- In spite of having been planted with conifers, many elements of the ancient woodland can survive and, with careful and gradual replanting (as against clear felling), can be used to restore the wildlife associated with Ancient Woodland.
- The replanting of a second round of conifers would undoubtedly finally extinguish this potential re-growth however.

- The conifers that were planted in the middle decades of the 20th Century are now of an age when they will be harvested and thus opportunities exist over the next 20 or 30 years to restore the native woodlands and so take advantage of the fact that many Ancient Woodlands have some residual flora that can be restored (46).

- Of the approx. 220,000 ha of Ancient Woodland, the Forestry Commission manages 49,470 ha (22%). Although the Forestry Commission has set in train long term programmes to restore **all** of the PAWS to a largely native tree species (over a 20 year period), as yet just 1,821 ha has been fully restored. While the picture of the restoration of Ancient Woodland outside the management of the Forestry Commission is unclear (being owned by private individuals, institutions, conservation groups and local authorities), the overall picture of the restoration of the 49,470 ha of Forestry Commission Ancient Woodlands, as of March 2010, is shown below (47):



- Clearly a major priority for England at present is the restoration of this Ancient Woodland. The creation of other overriding initiatives such as wide-scale new planting may endanger the success of this important programme.

2. Existing Woodlands. (42)

- We have noted earlier that it takes a long period of time for new tree planting to become more than simply the sum of the trees that have been planted and for the establishment of what can be genuinely called a woodland. Creating a woodland is about the creation of a canopy under which flora and fauna can eventually flourish.
- A rush to create **new** woodlands can overlook:

A) The benefits of extending existing woodlands and the ability of these extensions to reduce drastically the length of time that it takes between planting and the creation of a thriving woodland.

B) The increasingly well established benefits of linking woodland habitats and the disproportionate benefits this too can have to redress those previous policies that increased woodland fragmentation.

A) Extending Existing Woodlands (42).

- There are well-recognised benefits of extending existing woodlands to facilitate more rapid biodiversity gains.
- Flora and fauna from adjacent existing woods will colonise woodland extensions more rapidly than can occur with woodland newly created from farmland (48). In an example of this principle from Scotland...

“Areas round suitable former ancient woodland sites should be prioritised for expansion. Colonisation of planted native woodland is usually a slow process. Species such as capercaillie and Scottish crossbill that are able to rapidly colonise areas of new woodland will, in particular, benefit from this woodland expansion.”

B). Linking Woodland Habitats.

- As woodland area has shrunk in the UK in recent centuries, so “woodland fragmentation” has occurred by which previously large woodland areas have become both smaller (eg with former woodland being used for agriculture) and dissected (eg by roads).
- Fragmentation causes both a reduction in the area of available habitat and an increase in the distance between woodlands and can have a dramatic effect on woodland species that developed within the previous extensive network and are poorly adapted to live in fragmented landscapes (49).
- Much forestry and woodland work is, therefore, now centering on reconnecting the isolated “woodland islands” back into “woodland networks”.
- There is a focus is on:

“...habitat or ecological networks in an attempt to conserve woodland biodiversity, combat fragmentation and mitigate the impacts of climate change.” (49).

“...creating new native woodland to extend, link or complement existing woodland and other habitats ... work towards creating landscapes that are “ecologically functional.” (50)

- In Cumbria, for example, (51) the Biodiversity Action Plan for Helvellyn and Skiddaw seeks to extend existing woodland in gills, crags and screes and for small scale new native woodland planting.
- In the Habitat Action Plan for Surrey, Target 6.1 states that it seeks opportunities to extend or link ancient woodland with new native woodland.

- This report makes the following recommendations:

Levels of Tree Planting	<ul style="list-style-type: none">• Ensure that the targets for tree planting in rural areas in England are set at a fraction of those proposed in The Read Report.• Encourage focus on woodland development in and around urban areas and the benefits this offers to urban dwellers in terms of access to green space and quality of life improvements.
Objectives For Tree Planting in England	<ul style="list-style-type: none">• Ensure that the tree planting targets that are set relate to woodland extension, creating links between existing woods and PAWS restoration.
Addressing Climate Change Objectives	<ul style="list-style-type: none">• Focus new tree planting schemes on initiating and supporting planting in the tropics (eg Amazon, Central Africa and Indonesia).
Management of Newly Created Woodlands	<ul style="list-style-type: none">• Ensure cost effective management of newly created woodlands by developing management plans that include and encourage a mix of ownership including private owners of small woods who are invariably active managers of their woods..
Protecting Habitats	<ul style="list-style-type: none">• Ensure that new tree planting promotes the protection of valuable habitats (eg PAWS restoration/woodland extension) and minimises habitat damage (eg avoiding planting on uplands).

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