



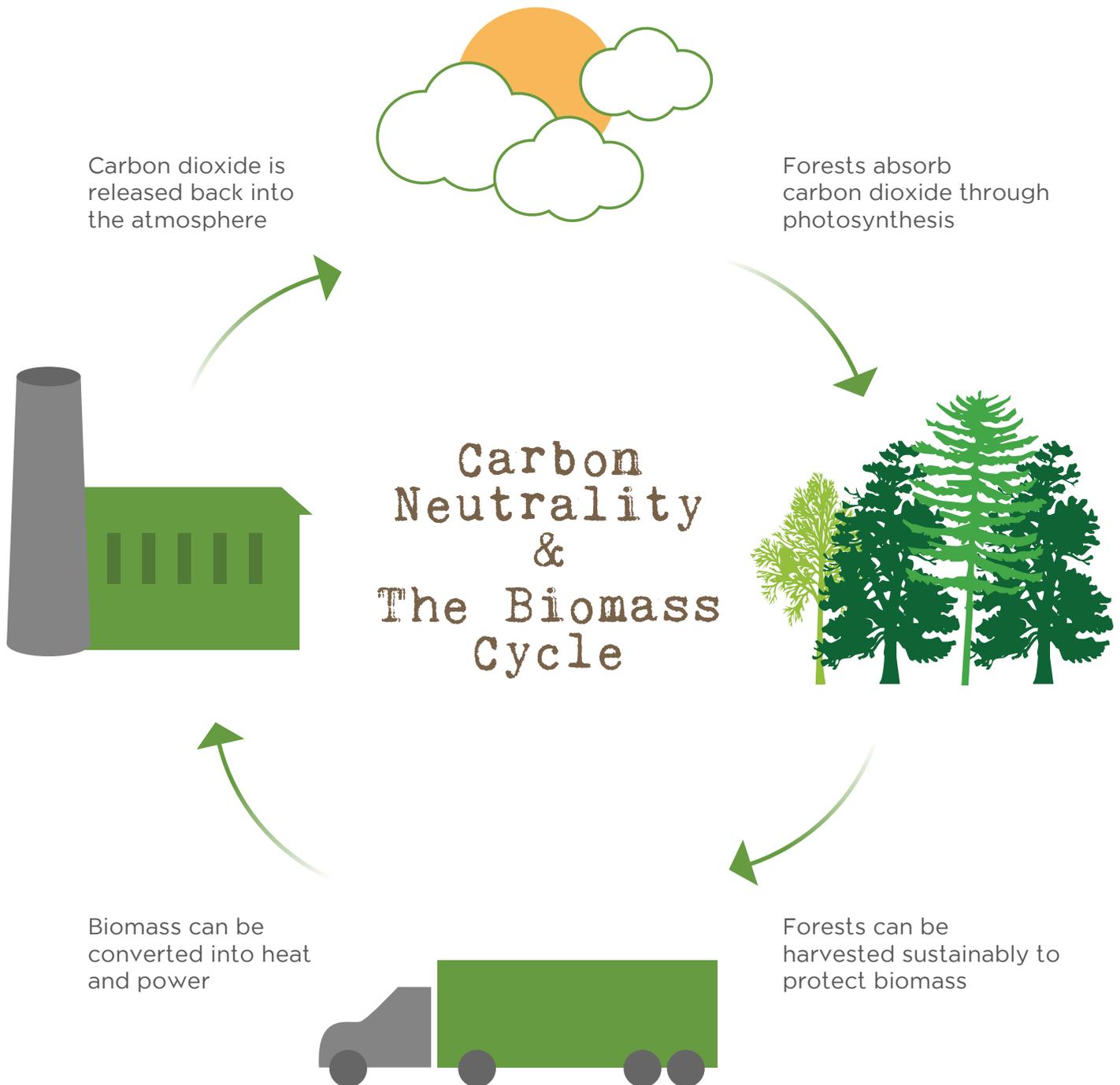
# Biomass for Power and Combined Heat and Power

A vital part of our future energy mix



# Why we need biomass

Sustainable biomass is an essential part of our low carbon energy mix



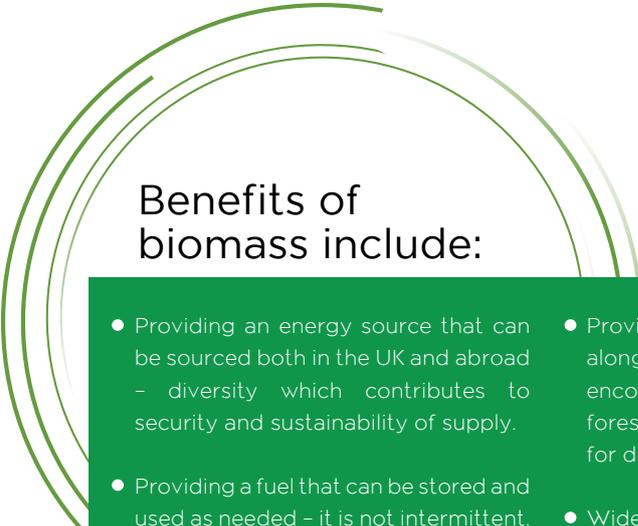
It has been estimated that a £110 billion investment will be needed in UK energy as we look to replace closing coal-fired power plants and move to a low-carbon energy system.

Our future energy mix in the UK needs a range of low-carbon energy sources that contribute to reducing green- house gas emissions. Producing power and heat by burning plant materials is an important part of that mix.

Burning wood and plant material (known collectively as biomass) releases carbon which was absorbed as it was growing.

Regrowing the trees and plants at a faster rate than they are harvested means even more carbon can be absorbed than was released. The overall effect is a net decrease in atmospheric carbon.

The biomass industry, regulated by robust, mandatory sustainability criteria, can provide a sustainable, economically competitive way to reduce carbon in our atmosphere.



## Benefits of biomass include:

- Providing an energy source that can be sourced both in the UK and abroad – diversity which contributes to security and sustainability of supply.
- Providing a fuel that can be stored and used as needed – it is not intermittent.
- Making use of existing coal-fired power station infrastructure to remove coal from the energy mix and deliver cost-effective renewable power.
- Ability to use biomass for both large-scale energy applications and Combined Heat and Power (CHP) to produce both low carbon electricity and heat.
- Making use of forestry products that have little or no other commercial markets.
- Providing a revenue stream alongside the timber industry, which encourages landowners to invest in forests rather than neglect or sell land for development.
- Wider investment in sustainable forestry practices that lead to greater biodiversity, fewer wildfires, less infestation and disease and faster rates of carbon storage.
- The adoption of robust sustainability criteria in developing countries where landowners wish to supply the UK biomass market.
- Additional markets for forestry products when traditional markets (e.g. newsprint) are in decline.



# Where biomass comes from

## Solid biomass comes from three major sources:

**1** **Forests** – residues, thinnings and less marketable wood are all sourced from sustainably managed forests. This forms the majority of UK biomass supply.

**Forest residues** include bark, sawdust, off-cuts from sawmills, twigs and small branches and deadwood from the forest floor.

**Thinnings** are small trees that have been harvested to allow other trees to achieve optimum growth. However, there are few other uses for these trees and they are often discarded.

**Less marketable wood** includes sawlogs that have been rejected by other markets. This is often due to their low quality.

**2** **Purpose-grown crops** – crops such as miscanthus, also known as elephant grass, can be burned for energy.

**3** **Agricultural by-products** – unwanted residues such as olive pits, coconut husks and straw can be used for bioenergy. This can help to support food supply chains by making them more economically valuable.



## Carbon emissions and the biomass supply chain

The UK Government's 'Sustainability Criteria' require an independently verified minimum 60% greenhouse gas saving (compared to the EU fossil fuel grid average) across the whole biomass supply chain – including harvesting, processing, storing, transporting and replanting. This means that biomass must always demonstrate a significant carbon emissions saving compared to fossil fuels.

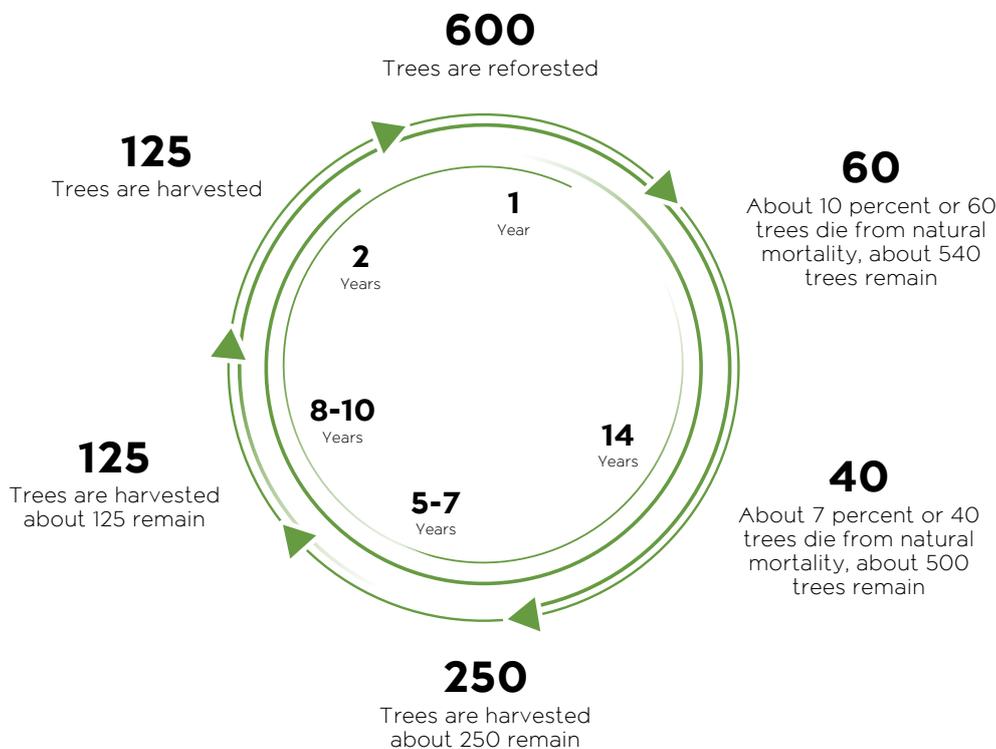
If the criteria aren't met, biomass generators will not receive the Government support required to make their businesses economically viable. Suppliers around the world who wish to sell to UK biomass generators are therefore being incentivised to reforest at a rate which ensures these significant carbon savings take place.

The two models of delivering biomass make this possible both on a local and global scale:

- Biomass can be grown locally in the UK, often very near the point of use, significantly reducing transport emissions, whilst also stimulating local supply chains and rural economies.
- Shipping, the main transportation method for biomass, is very carbon-efficient. For example, transporting a large shipment of biomass from North America has a similar carbon footprint to transporting a similar load 200 miles by road in the 1,600 lorries that would be required.

# How sustainable biomass builds healthier forests

Forest landowners view forests at a landscape level, with small sections known as 'stands' being harvested in a cycle that maintains stable levels across the forest



This graph is an example of traditional rotational harvesting in the Southeast US where a well-managed stand of trees is planted and harvested over an extended period of time. About 80 percent of the forest regrows naturally on its own. The remaining 20 percent is replanted by the forest landowner. Adapted from: Inherent Sustainability and Carbon Benefits of the US Wood Pellet Industry (Enviva LP, 2012)

Sustainable forestry involves several measures that lead to a healthier forest:

**Thinning:** Landowners aim to grow wood that attracts the greatest profits. This means timber for construction and joinery, which requires high-quality, straight, long logs. To achieve this, they plant saplings very close together, which encourages trees to grow straight. However, this means they compete for light and nutrients and some will not grow tall. Having served their purpose, they are removed to allow the larger trees to grow to maturity – a process known as ‘forest thinning’. These thinnings can be used for biomass as they usually have few other market uses.

**Removal of dead material:** Trees and other plants die naturally through disease or environmental factors. This leaves dead material in the forest canopy or on the forest floor, which can encourage infestation, disease and wildfires.

By clearing the dead material, foresters improve the health of the forest and its overall carbon absorption.

**Harvesting trees at maturity:** Trees do not grow indefinitely – they reach a point of maturity when they stop growing. Younger, growing trees absorb carbon faster. Once mature, trees absorb carbon at a much slower rate. Sustainable forestry practices involve harvesting trees at the point when they are close to maturity, thereby maximising the value of forest products and the rate at which a forest absorbs and stores carbon.

These and other measures keep a forest building its carbon stores at an optimum speed. After just a short management period, a previously unharvested forest will begin to absorb more carbon than if it was left unmanaged.

## Biomass helps all of this to occur in two important ways:

- 1 It provides an additional revenue stream to forestry landowners, alongside other industries such as timber. For example, thinnings and residues can be used.
- 2 It enforces sustainability criteria, especially relating to good forestry management, which forest landowners must meet in order to attain the economic benefits.

# Taking carbon out of the atmosphere

Sustainable forestry often leads to a rise in the amount of carbon a forest can store, with no drop in carbon storage during the regrowth period after harvesting. To understand how, we must view the forest as a whole - at the landscape level - rather than tree-by-tree

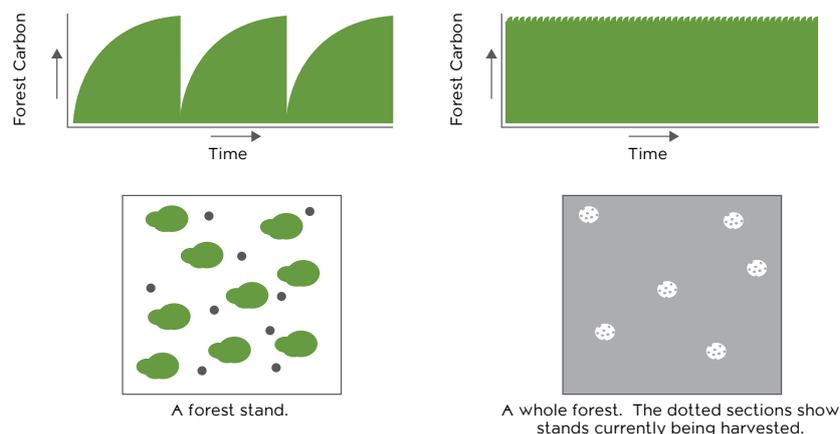
Landowners manage their forests as a whole landscape, by harvesting and regrowing different sections ('stands' or 'plots') at different stages. One stand may just have new saplings growing while another comprises mature trees about to be harvested.

This sustainable management technique makes financial sense for foresters (because it ensures stable income), while maximising growth rates and ensuring carbon is absorbed faster. Clearing forest floors of deadwood and employing anti-wildfire measures are also

standard management techniques used to encourage rapid, healthy growth and optimal carbon absorption.

Measuring carbon levels across a whole forest (in line with the landscape approach to forestry described above) might look something like this: if 100,000 trees grow by 2% a year (the forest's equivalent of 2,000 trees), then even harvesting 1,500 trees annually will still mean 0.5% forest growth every year. This growth rate is only possible if good forestry practice is employed.

Managing forests sustainably only makes sense if the forest is economically viable, and this is underpinned by demand from the biomass industry.

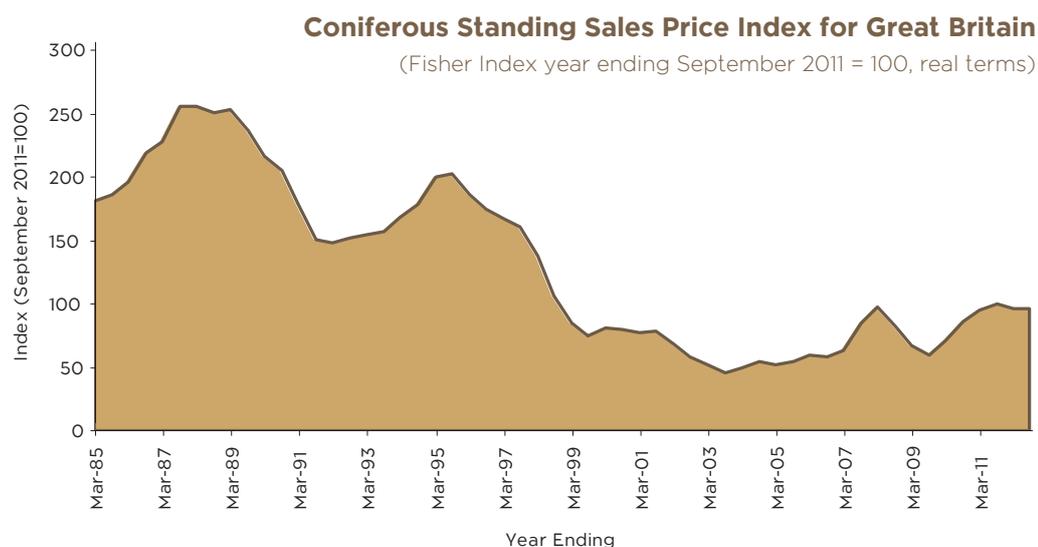


These graphs show how carbon storage can remain stable over time in a harvested forest. The left-hand graph shows carbon storage building as individual stands grow, but then dropping dramatically as they are harvested. The more accurate picture is of a whole forest landscape, shown in the right hand graph, where the harvesting cycle across many stands in the forest - all at different stages in the harvest cycle - keeps carbon storage at a steady level. If forests are managed to regrow at a faster rate than they are harvested, there is a net decrease in the carbon in the atmosphere. Image adapted from: Carbon 101: Understanding the Carbon Cycle and the Forest Carbon Debate (Dovetail Partners Inc., 2012)

# Complementing other wood products industries

It has been argued that biomass is in competition with the construction, joinery and other sectors for forestry produce. Subsidies for biomass, some people claim, are responsible for raising the price of wood. In fact, the evidence indicates that the opposite is true

Wood prices have fallen significantly over the last 20 years



**Figure 1**  
Source: Based on  
*Timber Price Indices,*  
September 2012,  
UK Forestry Commission

Although standing timber prices have risen over the past five years, the graph in Figure 1 demonstrates that real terms prices are still around half the price paid 20 years ago. Even in cash terms (i.e. excluding inflation) the price paid in 2011 was around 15% lower than in 1996. The Coniferous Standing Sales Price Index for Great Britain was also 4% lower in real terms

in the year to September 2012, compared with the previous year. Looking ahead, projections from AEA suggest the global price of biofeed is likely to increase by no more than 10% between 2010 and 2020, after which they will level out and remain roughly unchanged in real terms. (*AEA Technology PLC report to DECC, March 2011*)

## Wood prices are fixed by international market forces, not UK activity

Because wood is sourced and traded globally, UK wood prices are affected by a range of complex international factors. For example, exchange rate movements (including the falling value of the Pound against a basket of international currencies) have contributed significantly to recent price fluctuations. At just 0.2% of the world primary demand in 2010, UK wood consumption (for biomass or otherwise) is just not big enough to influence prices to any significant degree. Current projections show this share at no higher than 0.6% by 2020,

indicating the UK will remain a price taker (have no bargaining power) in the global market, not a price maker. There is no evidence to suggest that UK Government policy to incentivise renewable energy from biomass has been the driver of any price fluctuations in this market. However, there is clear data (including in the Government's Bioenergy Strategy Analytical Annex, April 2012) demonstrating that the UK wood price closely mirrors international trends and price increases.

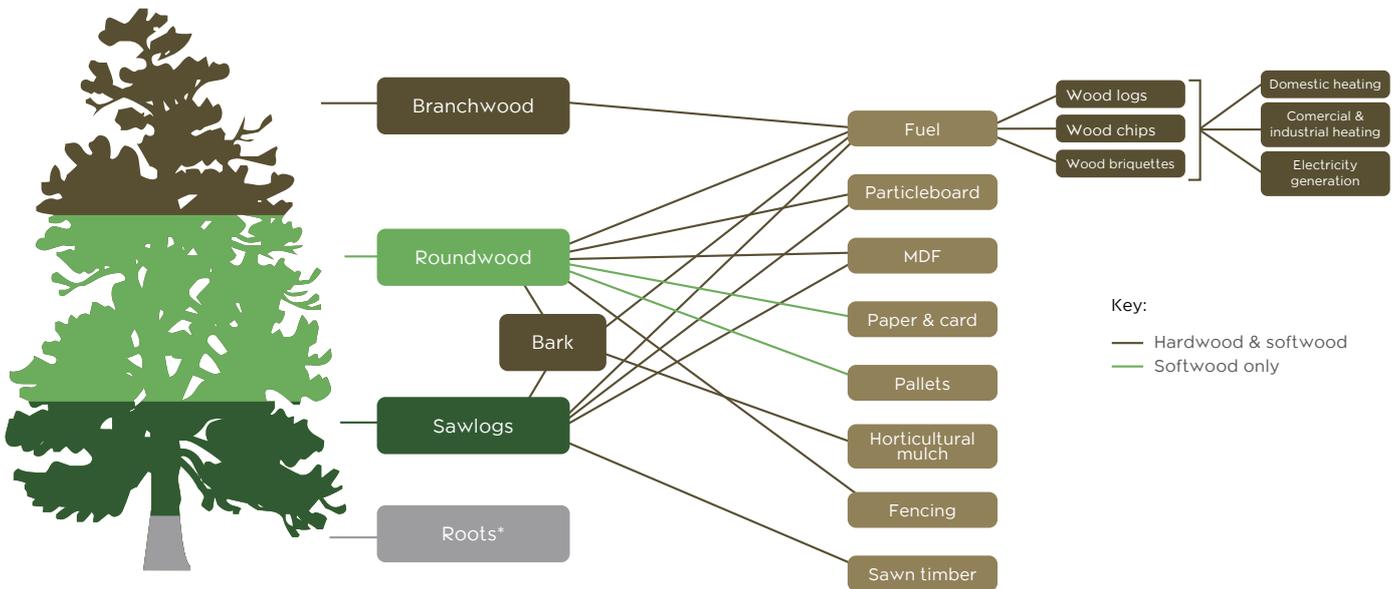
# Biomass goes hand-in-hand with other wood uses such as furniture - the biomass industry cannot afford to compete with them

Biomass suppliers do not compete with furniture supply chains to buy high-quality wood because it would not be financially viable. Good quality wood needed for construction and joinery is expensive. The biomass industry cannot afford these prices. Biomass works with other forest-product industries, not against them by creating demand for forest by-products.

Forest landowners efficiently select and separate wood materials based on quality and type, and send them to appropriate markets to achieve the best prices and maximum economic value for the forest. For example, the best quality sawlogs go to construction and joinery for the highest prices. Poorer quality wood might go to make pallets and particleboard. The biomass industry tends

to be bottom of the list, taking the cheapest materials with few or no other markets. These woody materials with much lower market value, might include forest thinnings (smaller trees which are removed to allow other trees to grow); residues (e.g. bark, twigs and sawdust); and less commercially desirable (e.g. very low grade) saw logs which would otherwise have almost no other market.

This 'mixed use' approach is the industry standard because it meets environmental requirements and is economically efficient. Demand for these by-products makes it more economically efficient for landowners to manage their forests sustainably rather than leaving it fallow or, in worst cases, selling it for development.



\* Harvesting not considered as part of Carbon impact study

## This is not a 'zero sum' game: there is significant spare woodland capacity within the UK and internationally

48% of forests in England are unmanaged, because there is currently no demand for their products. Demand from the biomass industry for forest by-products makes it more economically efficient for landowners to manage their forests sustainably rather than leaving it fallow or, in worst cases, selling it for development. The knock on effect is that more woodland is brought under active management, and the economic value and environmental profile of UK forests improves.

The Government believes the biomass industry can play a key part in making it economically viable to manage these forests, and also that biomass supply chains have huge potential

to increase overall supplies of wood. Wood supplies actually rose by 7% between 2007 and 2010. According to DECC's Bioenergy Strategy, evidence suggests this was partly the result of rising demand for wood fuel being met by the development of wood fuel supply chains, rather than a reduction in the demand for wood from sawmill or wood panels. (Bioenergy Strategy Analytical Annex, April 2012). Not only is this positive environmentally, it also benefits other forest-product industries too.



How a tree and wood from across a forest can be divided up to supply several industries simultaneously, getting the most efficient use from the biomass across a forest. The best quality wood from a forest usually goes to construction and joinery – bioenergy usually takes the residues, thinnings and lowest quality wood that has little other demand. Image adapted from: Carbon impacts of using biomass in bioenergy and other sectors: forests (North Energy Associates/Forest Research, 2011)

# How you can support biomass as part of the UK's energy mix

We want to deliver a clear message to Government that, if it puts the right policy framework in place, the biomass industry can deliver its potential as a source of low-carbon power and combined heat and power. Many projects are underway, but others are shovel-ready and willing to deliver investment, infrastructure and energy security.

**Please write to the Secretary of State for Energy and Climate Change, Rt Hon Ed Davey MP, to express your support for biomass.**

The Rt Hon Edward Davey MP  
Secretary of State for Energy and Climate Change  
Department for Energy and Climate Change  
3 Whitehall Place  
London  
SW1A 2AW

Or please send an e-mail to Ed Davey at [ps.decc.sos@decc.gsi.gov.uk](mailto:ps.decc.sos@decc.gsi.gov.uk), copying in Energy Minister John Hayes at [ps.john.hayes@decc.gsi.gov.uk](mailto:ps.john.hayes@decc.gsi.gov.uk)

To find out more about biomass and how you can support it as part of the UK's future energy mix, go to:

**[WWW.BACKBIOMASS.CO.UK](http://WWW.BACKBIOMASS.CO.UK)**



## About the Back Biomass campaign

The REA's Back Biomass campaign is an industry-led and government supported initiative launched in summer 2011 to urge Government to 'Back Biomass' as a crucial part of a secure, affordable, low carbon future for the UK. We believe that power and CHP from sustainable biomass offers proven, practical, secure low carbon energy as part of a balanced energy mix.

The Back Biomass campaign has been supported to date by the following organisations:

British Sugar, Drax, Eggborough, E.ON, Future Biogas, Estover Energy, Eco2, Heliuss Energy, USIPA and RES.

## About the REA

The Renewable Energy Association (REA) represents renewable energy producers and promotes the use of all forms of renewable energy in the UK. A trusted voice for the industry, we represent the full range of the renewable energy technologies across; power, heat, transport and renewable gas. Our ever-increasing membership ranges from major multinationals through to sole traders. The Solar Trade Association is affiliated to the Renewable Energy Association, creating a combined membership of over 900 companies.

## Contact us

You can find out more information and sign up for a regular newsletter about biomass by visiting the Back Biomass website at [www.backbiomass.co.uk](http://www.backbiomass.co.uk)

Alternatively, please call Paul Thompson of the Renewable Energy Association on +44 (0)20 7925 3580 or e-mail at [pthompson@r-e-a.net](mailto:pthompson@r-e-a.net)

