

Biomass: Key to our energy mix

Biomass is essential to the future of the UK's energy mix. It brings a low-carbon, low-cost, flexible and renewable energy resource that fulfills a wide range of our energy needs.

Benefits of biomass include:

BIOMASS FOR ENERGY IS LOW CARBON

- To qualify for Government subsidy, biomass must deliver a greenhouse gas emissions reduction of at least 60%
- Biomass is renewable, maintaining stable carbon storage through constant managed growth
- It has the potential in the future to combine with emerging technologies such as Carbon Capture and Storage to create negative carbon emissions technology.

BIOMASS CAN HELP US BEAT THE ENERGY CAPACITY CRUNCH

- Biomass is ready to be deployed right now – we don't have to wait for decades
- It is the fourth most abundant fuel on the planet and further investment can expand the resource available
- It doesn't rely on the elements – it can be stored so it's there when we need it.

BIOMASS ENERGY ENCOURAGES BETTER FORESTRY AND COMPLEMENTS OTHER WOOD PRODUCT INDUSTRIES

- It uses wood materials that no other markets want
- It brings new income for forests
- It is tied to sustainability criteria that encourage the growth of forests
- It supports forests when other sectors are in decline.

BIOMASS ENERGY IS HIGHLY COST-EFFECTIVE FOR TAXPAYERS

- It can make use of existing infrastructure and power plants
- It is a well-understood technology with potential to advance even further
- It is the fourth most abundant fuel on Earth and more investment in forestry means it can become even more abundant, raising supply and stabilising prices
- With biomass, what you see is what you get – unlike with other technologies, there are no hidden system costs relating to balancing and managing the transmissions grid
- The combination of biomass for electricity with heat systems (Combined Heat and Power, or CHP) provides additional cost-efficiency.

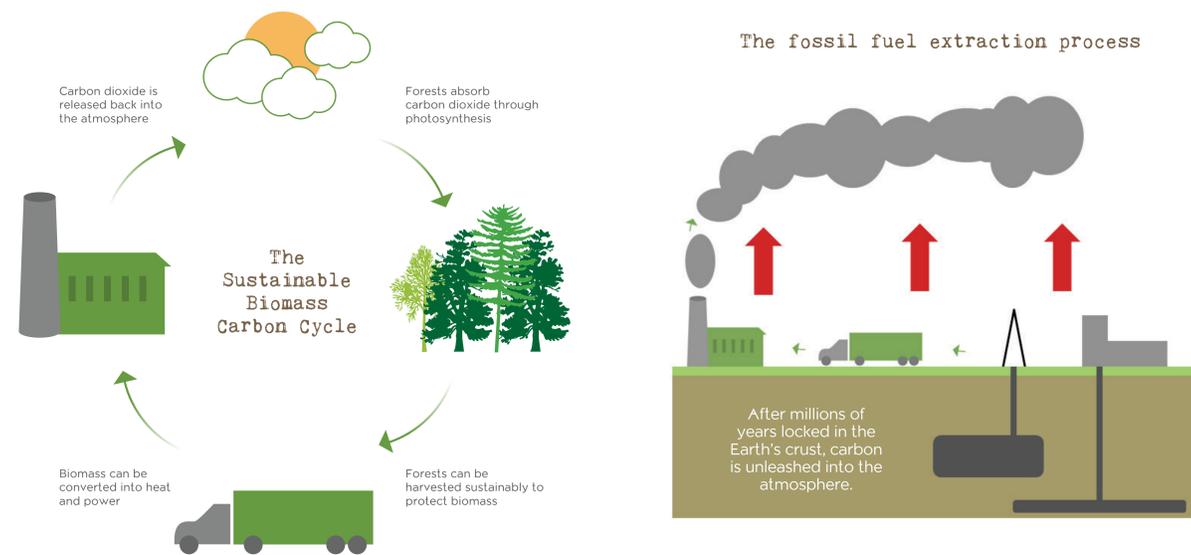


Sustainability

How biomass is different to fossil fuels

Fossil fuels store carbon for millions of years. When burned, the carbon is simply released into the atmosphere. By contrast, carbon released by producing energy from biomass is a natural part of the carbon cycle, and can be reabsorbed at a balanced rate through sustainable forestry practices.

Biomass is renewable because, like all living material, it can be regrown. Put simply, we can't 'grow' more coal or gas.



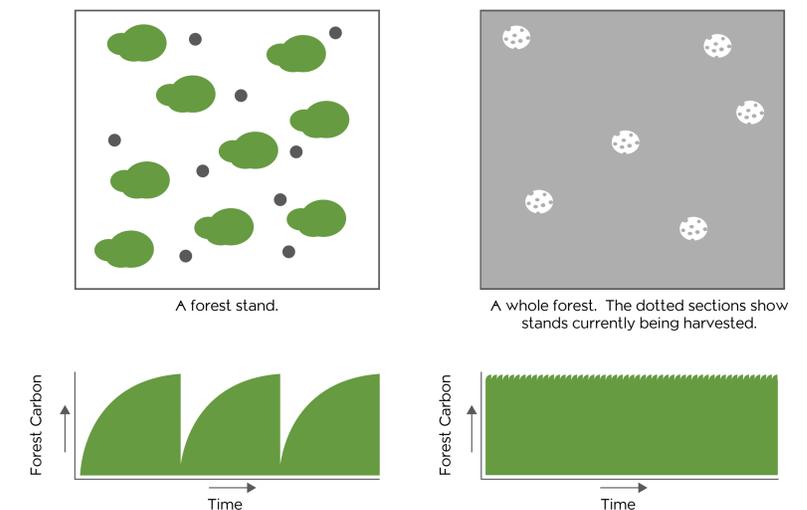
Making sure growth and harvesting of forests is balanced

By monitoring forest stocks carefully either manually or by using cutting-edge technologies such as geostationary satellites, foresters can ensure that growth rates outpace harvesting. That way they maintain the long-term ability of forests to produce wood and sequester carbon.

Through responsible management, forest growth can be maintained at a constant or increasing level.

Carbon will be immediately reabsorbed from the atmosphere at a constant or increasing rate.

This means there is no need for any delay (or 'carbon debt') waiting for forests to recover and regrow.



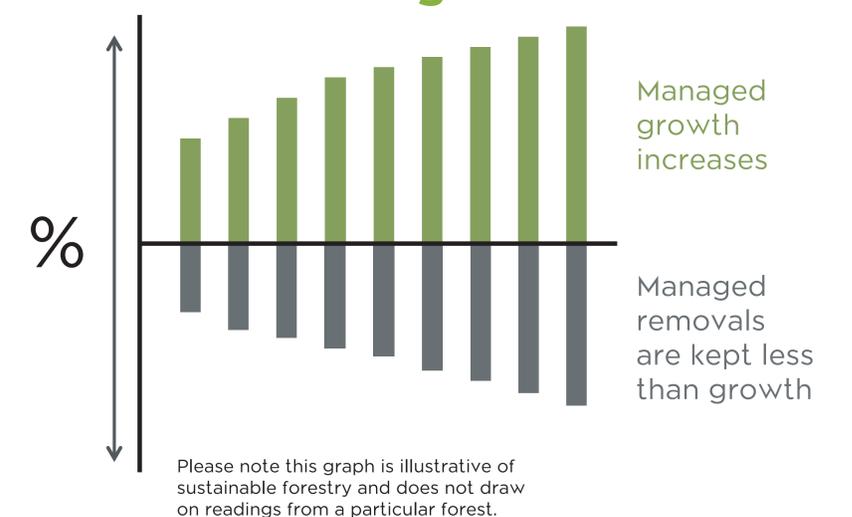
Theoretically, monitoring one tree at a time means the carbon stored in the tree drops and rises dramatically when it is harvested and regrown.

But in reality, no forester cuts down all of every tree in a forest all at once! Instead they monitor the whole forest, harvesting and replanting only some sections at a time. This keeps their income stable, and the rates of growth/harvest balanced.

For example...

100,000 trees grow at a rate of 2% annually.
If 1,500 trees are harvested each year, or 1.5% of the forest, the forest still grows by 0.5% every year - with no delay in regrowth.

Net carbon stock annual changes across a forest



Guaranteed carbon savings

Industry supports robust Government regulation to ensure biomass delivers massive carbon savings across the whole supply chain

No carbon savings? No Government support.

The biomass energy sector is not zero-carbon, but it is low-carbon. DECC's incoming Sustainability Criteria require minimum greenhouse gas savings against fossil fuels of at least 60% across the whole supply chain.

The Government is introducing world-leading and legally binding 'Sustainability Criteria' to cut greenhouse gas emissions (as against the EU fossil fuel grid average) and to ensure sustainable forestry techniques.

The 60% greenhouse gas emissions reduction applies across the whole biomass supply chain:

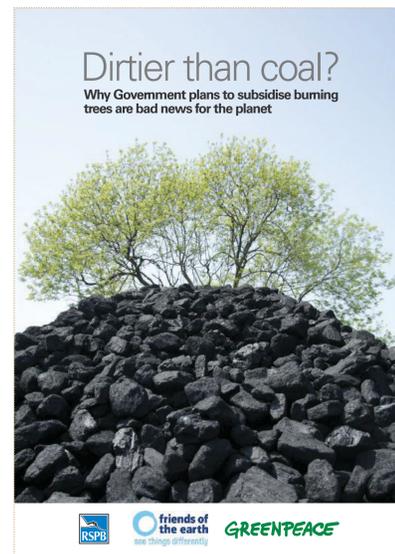


Biomass electricity generators must demonstrate this reduction, in order to qualify for UK Government support.

The knock-on effect on forests worldwide is clear: foresters anywhere wanting to supply to UK developers will need to comply, or there will be no UK market for their biomass.

This minimum saving is only possible using sustainable forestry techniques that keep the forest absorbing more carbon than is released.

The truth about 'Dirtier than coal?' claims



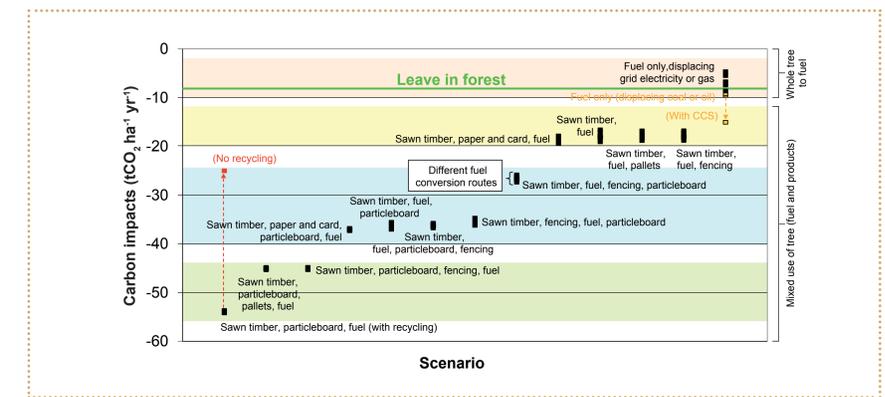
Some opponents quote DECC-commissioned research to claim biomass energy is 'dirtier than coal'. Indeed, 'Dirtier than coal?' was the title of a report published by three NGOs, designed to discredit biomass.

This research (in the graph on the right) shows different types of UK-based forest scenarios and resulting emissions.

Above the green line scenarios cause net carbon emissions. Below the line, they cause savings. The vast majority are highly beneficial to the environment, with a mixture of uses for forest materials.

Both DECC and the author of the original research clearly state that the above the line scenario is isolated, unrealistic and unrepresentative of real forestry practice. But that's not stated in 'Dirtier than Coal?'.

In a letter to the NGOs who wrote a report called 'Dirtier than coal?', a co-author of the research complained that the NGOs were 'distorting the debate':



"It is completely apparent that many scenarios, involving specific combinations of bioenergy and wood products, offer real reductions in greenhouse gas emissions."

"It is illogical to demonise all wood bioenergy production on the selective use of a limited number of easily-distinguishable and clearly unsuitable scenarios, on unrealistic forest management practices and on unregulated import activities."

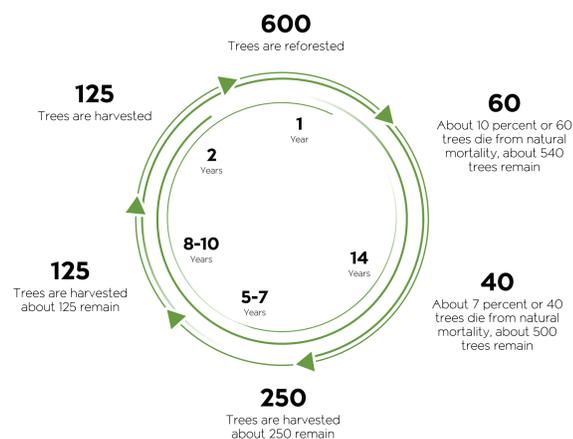
"I am deeply concerned that, despite our best efforts at openness and scientific objectivity, this debate is being distorted."

Dr Nigel Mortimer, North Energy Associates

Love Forests, Back Biomass

Managing forests sustainably only makes sense if the forest is economically viable. Forest owners need steady cashflow, achieved by harvesting and replanting certain sections of their forest at a time. This maintains a stable forest stock and ensures the carbon released is constantly balanced by new growth.

How does harvesting work?



Sustainable forestry means harvesting in small sections called 'stands'.

Each stand is harvested over a cyclical period, with different stands at different stages of growth at any one time.

This means stable rates of harvesting/growth and balanced carbon emissions.

Done properly, it means forests absorbing more than they release, creating 'carbon credit'.

Sustainable forestry means healthier forests

- **Monitoring biomass:** Dedicated satellites and other techniques monitor the amount of living material in a forest, even leaf cover
- **Harvesting in 'stands':** Forests are harvested and reforested cyclically, in small sections at a time
- **Harvesting at maturity:** Younger, growing trees absorb carbon faster. Harvesting trees when mature maximises economic output and the forest's carbon capture rate
- **Replanting a range of species:** To protect biodiversity, some landowners deliberately reforest a harvested stand with a number of tree species
- **Removal of dead material:** Foresters clear dead material left to rot in the forest canopy or on the forest floor to maximise light, avoid wildfires, limit infestations and prevent disease, all of which would cause the forest's carbon emissions to increase and productivity to drop.

What happens to forests with no income?

Forests with little or no financial income cannot afford investment in sustainable forest management, which can lead to:

- Landowners turning to alternative income from the land, such as converting it for agriculture or even clearing it for development.
- Poor light, meaning reduced growth and carbon capture rates
- Poor monitoring of tree health, such as the ash dieback disaster in the UK, where 48% of woodlands are unmanaged
- Dead matter in the canopy or on the forest floor, encouraging disease, wildfires and infestations.

Biomass provides additional income and regulatory frameworks to support good forest management.

The truth about 'Whole Trees'

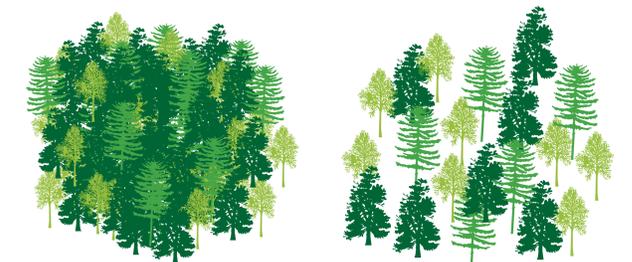
Some opponents claim the biomass industry damages forests and emits excess carbon because it cuts down 'whole trees'.

Actually, as any forester (including the UK's own Forestry Commission) will tell you, the process of thinning (cutting down small trees to help bigger ones grow) is good practice in any healthy forest.

How does it work? Trees are planted very close together, encouraging them to grow upwards, making straighter, taller trees for higher quality wood.

Smaller trees are removed allowing more nutrients and light to go to taller trees, maximising growth rates.

But that's not stated when opponents talk about 'whole trees'.



Room to thrive: Thinning smaller 'whole trees' from a forest stand to help it grow

Working with other wood industries

Biomass creates economic incentives for healthier, more productive forests without harming other forest industries

Biomass comes from a huge variety of sources, not all of them wood

Biomass feedstock can include:

- Thinnings - small trees removed from the forest to help it grow
- Offcuts of wood from sawmills
- Sawdust from sawmills
- Bark and twigs
- Miscanthus (elephant grass), which grows on marginal land
- Short rotation coppice (willow), which grows on marginal land
- Cashew nut shells
- Olive stones
- Straw
- Sunflower husks
- Coconut husks



A thriving biomass industry stimulates forest management and wood supply

There are concerns that rising demand for biomass energy could inflate wood prices, harming other wood product sectors. In fact, the biomass sector can't compete with the high prices paid for good quality wood by the construction and joinery industries - nor does it need these high quality materials.

Straight, long, high quality logs	££££££	construction	
High quality, shorter logs	£££££	furniture	
Smaller branches and bark	£££	wood panels	
Twigs, branches	££	paper	
All other unwanted woody materials	£	energy	

Biomass generally uses low-grade forest materials, creating an additional revenue stream for foresters. This is why as the biomass industry has grown, wood supply has increased, not decreased, and wood prices have fallen, not risen.

Wood supply is not a zero-sum game. By finding new revenues for the world's forests, coupled with sustainability criteria to ensure good forest management, we can increase overall wood supply.

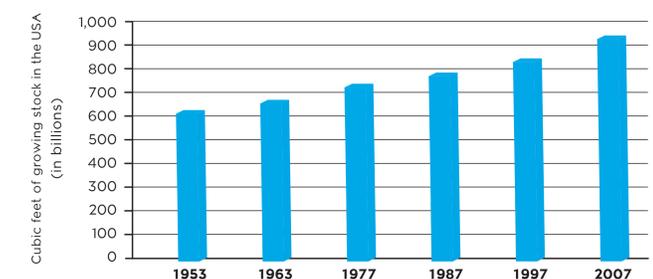
By increasing supply biomass energy helps to stabilise wood prices

Wood prices are 8.1% lower than five years ago and 41.8% lower than 20 years ago.

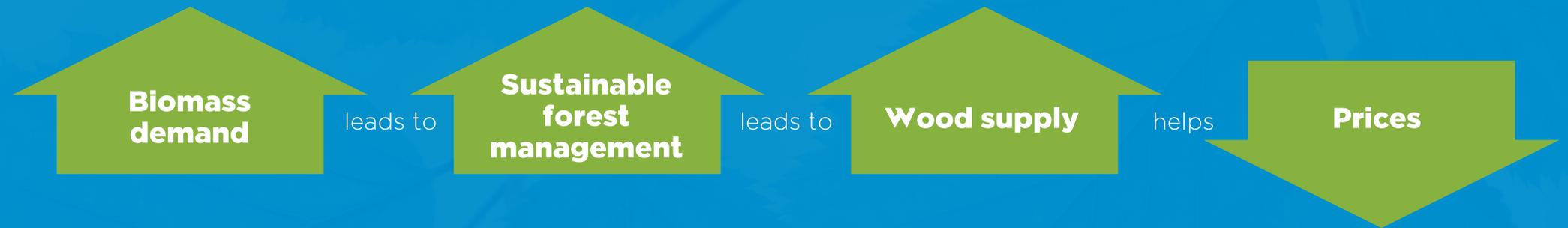
Softwood Sawlog prices are 7.2% lower than five years ago and 29.3% lower than 20 years ago.

Wood supplies rose by 7% between 2007 and 2010. According to evidence gathered for DECC's Bioenergy Strategy, this was the result of rising demand for wood fuel boosting supply.

AEA projections suggest the global price of biofeed will increase by no more than 10% between 2010 and 2020, after which it levels out and remains roughly unchanged.



Biomass and wood prices



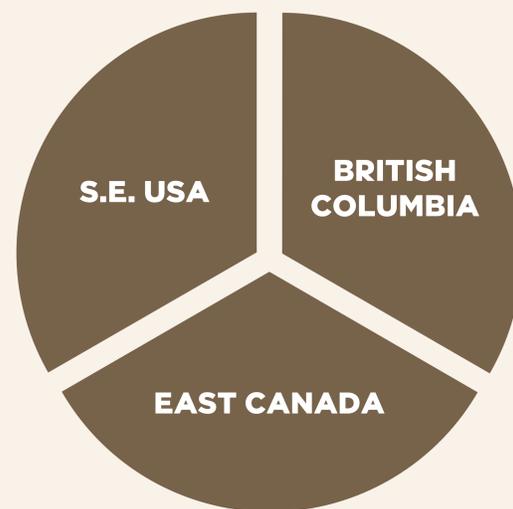
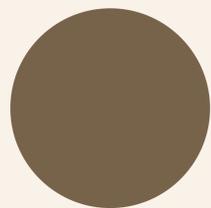
How does UK demand for biomass affect wood prices?

The UK will source most of its biomass from abroad, but even at full projected capacity, the UK biomass sector will not be large enough to influence wood prices. Actually, there's more than enough biomass to go around. Leading research institute UKERC (at Imperial College) believes bioenergy could service 20% of the world's energy needs without having a detrimental impact on food security or the environment.

For example, UK demand for biomass is expected to rise to a peak of up to 30m tonnes per annum.

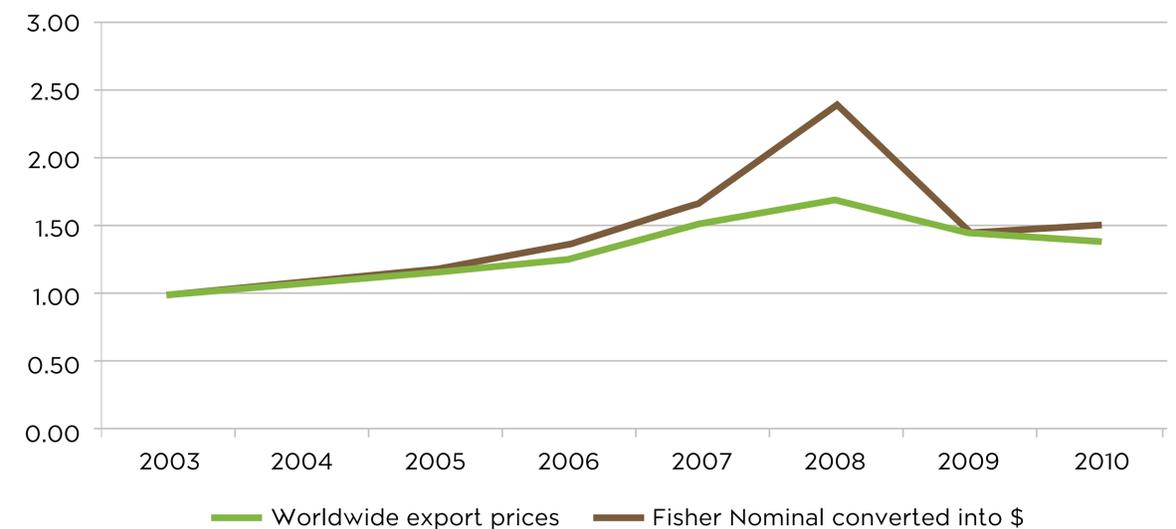
In just three regions of North America, it is estimated that an additional 150m tonnes per annum could be removed through sustainable management, with a range of extra benefits to the forest.

UK DEMAND



So what does influence the price of wood?

Prices paid for wood in the UK are primarily influenced by global forces. The impact of the global recession in 2008, for example, can be clearly seen as economic activity dropped off:



Global wood prices are largely unaffected by British demand for biomass. They are affected by much larger forces:

- Currency exchange rates
- The economic crisis of 2008
- Recession in the West's construction industries
- Ongoing decline in print media meaning a drop in demand for paper
- Global reforestation policies
- Greater use of recycled products meaning a drop in demand for virgin wood.

Benefits of biomass for UK PLC

The UK badly needs new, secure supplies of energy at affordable prices for customers. A thriving biomass industry offers the UK cost-effective, low carbon energy and major investment in shovel-ready UK infrastructure.

Biomass is highly cost-effective for UK consumers

The UK is undergoing a major shift to a more resilient, decarbonised energy system. Some routes to get there are better value than others. Less biomass would mean more reliance either on expensive, volatile fossil fuels, or on less cost-competitive low carbon alternatives.

An independent assessment done for DECC estimated that decarbonising the UK economy without bioenergy could cost British taxpayers an additional £44billion.

Biomass is a cost-effective fuel:

Draft Strike Price for 2014/15
(2012 prices)

Conversion biomass	£105/MWh
Wave	£305/MWh
Offshore wind	£155/MWh
Onshore wind	£100/MWh
Tidal	£305/MWh
Solar	£125/MWh

What makes biomass so cost-competitive?

- Mature, proven technology meaning biomass costs less than newer, higher risk technologies
- Predictable, stable, diverse sources of long-term supply mean less price volatility and more protection against price shocks in conventional energy markets e.g. gas
- Biomass conversion uses existing infrastructure in the form of coal-fired power plants
- Generating electricity and heat (Combined Heat and Power) from biomass in a single super-efficient process is one of the most cost-effective forms of renewable power.

Investing in UK infrastructure

“It has never been more important for Government to be focused on... delivering long term growth that is strong and sustainable, and an economy that is balanced across geographic regions and economic sectors. The role of infrastructure in delivering that goal cannot be underestimated.”

The Rt Hon Danny Alexander MP, Chief Secretary to HM Treasury, June 2013.

Gross value added	The Forestry Commission estimates that the woodfuel industry could generate £1 billion across the economy
Green jobs	The Renewable Energy Association estimates 58,000 jobs could exist across the biomass industry and its major suppliers by 2020 (including forestry, construction, processing, transport and generation)
New markets	The specialist energy consultancy NNFCC believes the biomass heat market could create between 22,500 and 30,000 jobs by 2020
Infrastructure investment	The biomass industry plans hundreds of millions of pounds of investment in new generating assets, as well as port and rail terminals and infrastructure around the country
Rural and forestry sector diversification	Biomass provides additional income to forest landowners, helping forests to be more economically viable and therefore more worthy of investment
Reducing business costs and vulnerability to global energy prices	For example, a biomass system generating 1,600MWh of heat (equivalent to a typical school) could save up to £50,000 per year relative to an existing oil-based heating system

A thriving UK biomass sector would pay dividends across the whole economy, not just in terms of cost-competitive energy but desperately needed jobs and growth.

Capacity crunch – Why we need to BACK BIOMASS NOW

Biomass is a rapidly deployable, highly cost-effective solution to the UK's looming capacity crunch.

It offers a stable, abundant source of energy to help keep Britain's lights on as demand increases and a large amount of existing generation capacity is retired in the next few years. The biomass industry is ready to deliver.

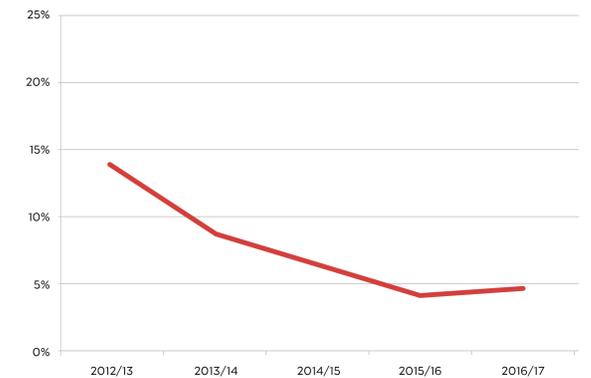
Capacity Crunch

We urgently need new sources of electricity and power. The UK's energy regulator, Ofgem, has warned that spare capacity on the electricity grid is likely to drop from 14% in 2012 to between 2 and 5% in 2015/16.

This is partly because European legislation is causing older and dirtier power plants to shut down. About a third of UK coal- and oil-fired electricity production, almost 12GW, will be lost.

The UK needs additional capacity on the electricity grid to protect against fluctuations from hour to hour. It also needs spare capacity to underpin economic growth.

Biomass is one of the few energy sectors that is 'shovel-ready' – it can start delivering solutions to the capacity crunch today.



Ofgem base case electricity generation projections

How does biomass bolster UK energy security?

FUTURE PROOF:

Fourth most abundant fuel on the planet after oil, coal and gas (IEA)

BASELOAD FUEL:

Complementing intermittent technologies such as solar and wind

STABLE:

Sourced in stable parts of the world, such as Europe and North America

AN INVESTMENT:

Investing now may help us combine with carbon capture and storage technology to create 'negative emissions technology' – energy that draws carbon from the atmosphere

Fast facts



- £44bn – the estimated cost of decarbonising without biomass
- 48% – percentage of UK woodlands left unmanaged and potentially vulnerable
- 58,000 – the number of jobs biomass could create across its supply chain by 2020
- Bottom of the costs list – depending on the cost measurements you use, biomass can be argued as either the most cost-effective or the second most cost-effective of all renewables
- 20% – the amount of global energy demand bioenergy could fill without damaging the environment or food security according to NNFCC
- Over 90% – the amount of large-scale biomass expected to be imported rather than sourced in the UK
- 30% of our 2020 renewables target could be contributed by biomass
- 30m tonnes / 150m tonnes – the peak prediction for UK biomass demand; and the amount just three regions of North America alone could comfortably produce through sustainable forestry in addition to current output
- Wood prices are 8.1% lower than five years ago and 41.8% lower than 20 years ago.
- 60% – the minimum emissions saving guaranteed by Government regulation
- 4% – the dangerously low electricity capacity margin Ofgem predicts by 2014/15
- 4th – biomass is the fourth most abundant fuel on the planet
- Conversions and other sustainable biomass could deliver 38-50 terawatt-hours (TWh) of UK electricity in 2020, making a significant contribution to the overall 223-230 TWh estimated demand – across electricity, heat and transport sectors – to meet the UK's 15% renewable energy target.