

Biomass: A critical part of the energy mix

The UK requires a balanced energy mix, but there is no one technology that provides a ‘silver bullet’ solution. Despite this, biomass is recognised as having a number of key advantages when compared with other renewables and methods of ‘traditional generation’ i.e. fossil fuels.

Biomass, helping deliver the UK’s renewable low carbon energy mix

- Investment in biomass would not preclude investment in other renewables; in fact biomass is a necessary and complementary part of the low carbon energy mix in terms of **‘balancing the grid’**.
- Biomass is the only renewable, low carbon energy source currently capable of both **baseload** and **peaking generation**, meaning it can run constantly, or be quickly mobilised to fill a gap in supply. It therefore provides a stable platform for **intermittent** and **inflexible** technologies, and is ideally suited to help fill the ‘energy gap’ created by the phasing out of fossil fuels.¹
- As well as being safe, reliable and clean, biomass benefits from a high degree of **operational flexibility**. This means that biomass plant infrastructure can be ramped up or down on demand with relative ease and efficiency in comparison to many other forms of power generation.
- Biomass is therefore ideally suited to complementing some of the more intermittent low carbon energy sources that will be coming online in the coming decades.
- The technology behind biomass is proven and safe, and the potential exists for further learning, innovation and perhaps even cost reduction.
- As a mature technology, proven at scale, capital costs involved in development of biomass plant are relatively low, in comparison to ‘first of a kind’ technologies, making biomass a cost competitive renewable to roll out.
- Biomass has a very low capital expenditure requirement, due to its ability to engage in **co-firing** with coal and, ultimately, full conversion of existing plants to biomass. The Government’s Renewable Energy Roadmap identified the significance of this, stating that “Conversion of coal plants to biomass is a major new development.”²

Long term potential to decarbonise the mix

- Of all the low carbon technologies, Biomass is unique in that, when combined with Carbon Capture Storage technology, it would result in negative net carbon emissions, actually *removing*

¹ DECC: UK Renewable Energy Roadmap, p67

<http://www.decc.gov.uk/assets/decc/11/meeting-energy-demand/renewable-energy/2167-uk-renewable-energy-roadmap.pdf>

² DECC: UK Renewable Energy Roadmap, p67

<http://www.decc.gov.uk/assets/decc/11/meeting-energy-demand/renewable-energy/2167-uk-renewable-energy-roadmap.pdf>

carbon from the atmosphere.

- Combined Heat and Power (**CHP**) approaches provide the opportunity to integrate the production of usable heat and power (in the form of electricity), into a single super-efficient process. Allowing high-energy users in core industrial sectors to produce low carbon heat and power together holds great potential for decarbonising our economy without damaging competition and economic growth.
- In contrast to many fossil fuels, biomass is sourced from comparatively stable regions, such as North America and across Europe. The result is a highly versatile and stable source of fuel, which, if developed into a more mature industry could be insulated in many respects from the price volatility affecting fossil fuel generation.

Support for biomass

- The Government's **Electricity Market Reform (EMR) White Paper**, in addition to reports from IEA, AEA and IPPC all advocate a significant role for biomass in helping to meet the UK's carbon reduction and renewables targets.
- The EMR White Paper sets out measures that will benefit a wide range of renewable energy providers, including a Carbon Price Floor, the introduction of long-term contracts for low carbon electricity generation (contracts for difference or '**CFDs**') and an Emissions Performance Standard (**EPS**).
- The reliability of biomass has been identified by the Government's **Renewable Energy Roadmap**, which describes it as "a predictable and non-intermittent technology".³
- According to the **IEA**, biomass is the fourth largest energy resource in the world after oil, coal and gas. It estimates that by 2050 sustainable sources of biomass could supply the world with 10% - 20% of its primary energy requirements.⁴

Biomass is currently the only renewable technology able to supply baseload renewable heat and power at scale. Its flexibility and stability, as well as its diversity of uses (including to balance the grid) make it an essential part of the low-carbon energy mix.

³ DECC: UK Renewable Energy Roadmap, p67

<http://www.decc.gov.uk/assets/decc/11/meeting-energy-demand/renewable-energy/2167-uk-renewable-energy-roadmap.pdf>

⁴ IEA Bioenergy: Bioenergy - a stable and reliable energy source

<http://www.task39.org/LinkClick.aspx?fileticket=8IsyplOAwXs%3D&tabid=4426&language=en-US>

Key Terms:

Balancing the Grid: The electricity grid is a complex system in which supply and demand for energy must be balanced at any given time. Balancing the electricity coming on and off our grid system can be extremely tricky, especially with more intermittent renewable technologies coming online which switch on or off depending on various environmental factors (wind, sunshine etc.). Baseload generation provide a constant supply of energy to support the stability of the grid, with peaking capacity available when required to meet spikes in demand.

Baseload Generation: Baseload is the minimum amount of power needed to satisfy continuing, steady user demand. Baseload power plants (including nuclear, coal and biomass) generate this energy at a stable, constant rate and are not intended to switch on and off regularly.

Combined Heat and Power (CHP): CHP is a method of power generation that combines the production of usable heat and power (electricity) into a single super-efficient process. As a result, CHP produces substantial savings on primary energy usage, resulting in considerable cost and environmental advantages compared to conventional electricity generation in which significant amounts of heat are wasted.

Contract for Difference (CFD): A CFD is type of feed in tariff, aimed at incentivising investment in low carbon generation. The CFD is a long term contract between Government and low carbon generators, resulting in a top up payment to generators if wholesale prices are low but clawing back money for consumers if prices become higher than the cost of low carbon generation.

Electricity Market Reform (EMR): Electricity Market Reform is a policy and legislative initiative undertaken by the UK Government. It is intended to review and reform our electricity market in order to attract investment in a range of electricity sources, including renewables. The [EMR White Paper](#) published by the Department of Energy and Climate Change in July 2011 sets out key measures to attract investment, reduce the impact on consumer bills, and create a secure mix of electricity sources including gas, new nuclear, renewables and carbon capture and storage.

Emission Performance Standard (EPS): The EPS is a back stop mechanism for controlling carbon emissions. The EPS limits how much CO₂ coal fired power stations are permitted to emit. The level of the EPS means that, in effect, no new coal power station can now be built without carbon capture and storage.

International Energy Agency (IEA): The IEA is a globally recognised independent intergovernmental organisation that seeks to promote the use of reliable, affordable and clean energy. The Agency has 28 members, including the UK and the United States and also works extensively with non-members such as China and India.



Biomass power and CHP

a sustainable part of the UK energy mix

Operational Flexibility: Operational flexibility describes the capacity of a power plant to be ramped up or down on demand with relative ease and efficiency. Perfect flexibility would mean shutting down or switching on instantaneously. Combined cycle gas power plants are considered to have a high level of flexibility, compared to a nuclear or coal plant for example.

Peaking and Intermittent Generation: Demand for electricity varies, meaning that different power sources are required when demand is high or peaking. Biomass is currently one of the few renewable energy sources capable of both peaking and intermittent generation. Peaks or spikes in customer power demand are handled by smaller and more responsive types of power plants called [peaking power plants](#), typically powered with [gas turbines](#).

Renewable Energy Roadmap: The [UK Renewable Energy Roadmap](#), published by DECC alongside the EMR White Paper, outlines a plan of action to accelerate renewable energy deployment to meet the target of 15% of all energy by 2020 while driving down costs.