

Growing renewable energy on the farm

Biomass crops are non-food crops where the whole aboveground plant material is harvested to produce bioenergy or other materials and chemicals. Typically, biomass crops grow quickly, and have a high calorific value, yet are low in nutrients and require little intervention. Growing biomass crops is an efficient way to remove carbon dioxide (CO₂) from the atmosphere.

Biomass crops can be used much like traditional fossil fuels to generate heat and power in. e.g.,

Large scale power generation – burning biomass to generate electricity re-releases contemporary carbon captured during photosynthesis and is carbon neutral. Capturing and storing this carbon makes the process carbon negative. The combustion of fossil fuels releases ancient carbon, resulting in net increases in CO₂.

Combined heat and power (CHP) – mostly used in large commercial/industrial applications, CHP produces electricity/power whilst capturing and using the associated thermal energy at/near the site of production (10 to 30 % more energy efficient than conventional technologies).

Domestic fuel – burning logs, chips, pellets, and briquettes in biomass boilers for domestic heat and hot water. **Anaerobic digestion** – microorganisms break down biomass in the absence of oxygen, producing biogas with a high methane content. Capturing and burning the biogas produces carbon neutral heat and/or electricity. Residual digestate (indigestible plant material and dead microbes) is nutrient rich and can be used as a fertiliser.

Anaerobic digestion on the farm:

Grass silage - Silage is grass that's been cut in late May or early June and then preserved by pickling, in much the same way as you might pickle vegetables in the kitchen. The perfect anaerobic conditions have to be created – by removing the oxygen the grass starts to ferment, converting natural sugars into acid.

An agricultural mower first cuts the grass in the field into lines (or swathes). These are then gathered by a forage harvester, fed into a chopper and blown into a trailer.

There are two ways to **ferment** the grass: the old way is to pile it into a heap known as a clamp and drive a tractor over it repeatedly to compress it. To keep it airtight,

it is covered with plastic sheeting that's weighed down, often with hundreds of old tyres.

The other is to wrap cut grass into bales covered in plastic, which are easy to stack.

Silage bales strategically placed within a field can provide a nutrient rich feed for cattle throughout the winter months. Careful positioning enables cattle to effectively mob graze the field, minimising movements, increasing feed inputs and improving soil fertility through concentrated grazing. An important aspect of Integrated Farm Management, ensuring high standards of animal husbandry, through careful planning and an emphasis on soil health.

Whilst grass silage is most commonly produced for feeding cattle, it is also a useful **biomass crop**. Other biofuel resources from the farm which are suitable for creating renewable energy with an Anaerobic Digester are:

- Slurry or manure
- Fruit and vegetable waste
- Harvest remains
- Energy crops such as maize silage, sorghum, wheat, clover, miscanthus
- Yard or garden waste (leaves, plants, branches)
- Industrial waste from food and beverage processing, such as dairy, starch and sugar industries, as well as slaughterhouse waste

Anaerobic Digestors:

Anaerobic digestion (AD) is the breakdown of organic materials, such as slurry and manure, by bacteria, to produce methane (biomethane or biogas). AD plants come in varying sizes, with large-scale commercial systems generating power that is sold into the national grid.

The benefits and uses of biomethane as a fuel

The most common use of the biomethane produced in AD systems is in CHP (Combined Heat and Power) systems. These produce electricity that is used directly on the farm and/or directed into the national grid. The input of electricity to the national grid is another route to realising a return on investment as inputs of electricity can provide an income for the farm.



The heat generated by the CHP system can be used to heat spaces such as calf housing, parlours and wash water, or other farm buildings. This heat can offset the cost of using gas or electricity to heat the same space or volume of water.

A more recent development in the use of biomethane is as a fuel source for tractors. There are commercially available tractors that run on a variety of fuels, including biomethane. These alternative fuel systems enable the production of feed with a lower carbon footprint as a part of a circular economy.

[Anaerobic digestion | AHDB](#)

