

# The case for digestate storage

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**Landowners' enthusiasm for digestion continues to grow, but the contribution to return on investment of good digestate management is often overlooked, says Anna Becvar**

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Anaerobic digestion (AD) continues to grow in the UK and is making an increasingly important contribution to organics recycling, according to the latest Annual survey of the organics recycling industry, published by the [Waste & Resources Action Programme \(WRAP\)](#). But although AD is proving attractive to investors, there are a number of factors that developers should consider, including questions about managing AD outputs, i.e. digestate.

Digestate is a valuable biofertiliser that can help farmers grow crops sustainably, but this benefit is lost unless good digestate storage is provided. Investing in storage can also help operators to avoid serious logistical difficulties, but this is often overlooked.

Recent results from the 4-year [Digestate and Compost in Agriculture \(DC-Agri\)](#) research project of field experiments, jointly funded by the [Department for Environment, Food and Rural Affairs](#) and WRAP, confirm that digestate should only be applied when crops are growing rapidly and can make full use of the available nutrients, particularly nitrogen. If digestate is applied at other times, the study found, it is likely to cause pollution, which suggests that AD operators will need to store digestate for longer than previously anticipated.

## Crucial timing

The DC-Agri programme is gathering data that will enable farmers to use quality digestate and compost more efficiently, helping to control their costs and improve production. There are more than 120 AD plants currently operating in the UK and many more at the feasibility, planning and commissioning stages. An understanding of how digestate should be used to maximise the fertiliser replacement value and limit pollution is crucial at the feasibility stage of AD plant development, particularly when estimating storage capacity.

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Project results show that digestate is a valuable substitute for 'bag' fertiliser. This is because it contains high levels of nitrogen in a form that can be readily taken up by crops, as well as useful amounts of other major nutrients such as phosphorus, potassium and sulphur. However, because the high nitrogen content poses a risk of nitrate pollution to ground and surface waters when digestate is spread at the wrong time of year, for most crops it should not be applied from early autumn through to early spring.

Farmers' decisions on when to use digestate will also be governed by the 'closed periods' for spreading to land under [Nitrate Vulnerable Zone \(NVZ\) rules](#) . Even in areas where NVZ rules do not apply, applying digestate over winter or at other times when there is no crop demand for nutrients is not good practice. But applied to the right crop, in the right amount, in the right way and at the right time, it can reduce potential losses of nitrogen and ensure that maximum benefit is derived from the 'crop available' nitrogen.

## Increasing value

According to calculations using the online farm nutrient management software [MANNER-NPK](#) , when 30m<sup>3</sup>/ha of whole food-based digestate is incorporated into the soil in early September to establish winter wheat, it is likely that only 9% of the total nitrogen will be taken up by the crop. This is worth around £60/ha to the farmer. However, by storing the digestate until the spring and then applying it to the same crop, 63% of the nitrogen could be used, increasing the value to the farmer to about £133/ha. The fertiliser replacement value of the digestate in this example increases from £2/m<sup>3</sup> to £4.43/m<sup>3</sup>.

Compared with most crops, grass has an extended growing season. In grassland areas in years when weather conditions are favourable, AD operators would require 6 or 7 months' digestate storage. In arable areas, the nitrogen needs of most crops will be met in the spring and therefore up to 9 or 10 months' storage may be required. Storage facilities for whole or liquid digestate should be constructed to meet [Water Resources \(Control of Pollution\) \(Silage, Slurry and Agricultural Fuel Oil\) \(England\) regulations 2010 \(SSAFO\)](#) and it is strongly recommended that they are covered, e.g. stored in covered tanks and lagoons or bags, to prevent rainwater ingress and to minimise ammonia emissions and the potential for odour nuisance.

While applications of digestate should be carefully planned in terms of crop available nitrogen supply, additional benefits can be gained from the other major nutrients that it provides, such as phosphate, potash and sulphur. The DC-Agri experiments have demonstrated that the enhanced supply of major nutrients delivered by a range of organic materials, including food-based digestate, resulted in increased crop yields in the range of 0.20-1.56t/ha, and greater economic returns worth £60-£380/ha generated by both the fertiliser replacement value of the nitrogen supplied by digestate and yield gains.

## Other considerations

The rules governing NVZs were updated in 2013 and land managers should be aware of the changes that affect the use of digestate from January this year:

- if the farm has medium or heavy land that was designated as an NVZ in 2008 or before, the closed period for the spreading of organic manures with high readily available nitrogen, such as digestate, has been extended by 2 weeks to 31 January
- when calculating the Nmax (maximum application rate), the land manager will need to include the crop available nitrogen contained in all organic manures (not just livestock manures)
- only 30m<sup>3</sup> per hectare of slurry, rather than 50m<sup>3</sup>/ha as before, can be applied at any one time every 3 weeks between the end of the closed period and the end of February.

The phosphorus content of digestate may also limit the application rate and land bank availability if the receiving soils are already high in phosphorus.

Contractors and farmers should check environmental stewardship agreement options prior to using digestate to ensure that agreement terms are upheld when applying such a rich source of nutrients.

Although improved storage facilities represent an additional cost for AD operators, the field experiments indicate that the value of digestate can be maximised if it is supplied to farmers at a time when they can make the most of its nutrient value.

### Share your views

Does storing digestate make good business sense to you? If so, WRAP would be interested to hear from you. Please email your views to William McManus at [WRAP](#) .

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### Further information

- More information on using digestate in agriculture is available from WRAP
- Further details about anaerobic digestion and waste management can be found by browsing the [RICS Library Catalogue](#)
- Related competencies include: [Agriculture](#) , [Management of the natural environment and landscape](#)