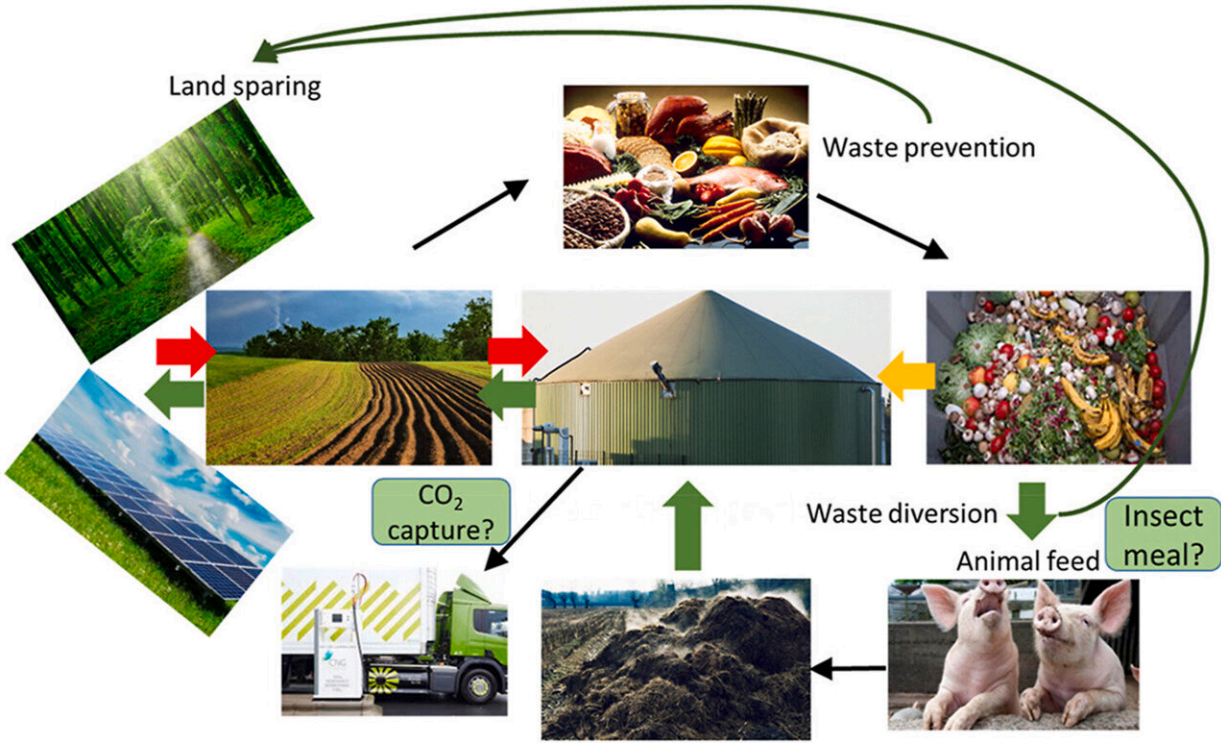


Converting organic waste to biogas is good for the climate, but waste prevention is much better

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Graphical abstract. Credit: DOI: 10.1016/j.jclepro.2022.130441

According to a new study by Bangor University, the University of Limerick and Feedback Global, published in the *Journal of Cleaner Production*, biogas use should be carefully constrained to prioritize more

effective climate solutions such as waste prevention, solar electricity generation and afforestation in order to meet the challenging "net zero" greenhouse gas (GHG) emission target set for 2050.

Dr. Prysor Williams, senior lecturer in [environmental management](#) at Bangor University and co-author on the study, noted: "Previous studies have benchmarked the environmental performance of anaerobic digestion against current dominant technologies. To provide a more robust evidence-base for strategic sustainable investment, we wanted to see how this widely promoted 'green' technology compares with the best available alternatives, both today and in future contexts where clean technologies are likely to predominate on the path towards net zero greenhouse gas emissions."

Whilst biogas is currently a much cleaner transport fuel than petrol or diesel, rapid electrification of transport and development of green hydrogen fuel offers greater emissions savings and could negate the climate benefit of using biogas as a transport fuel over the coming decades. Meanwhile, large-scale combustion of biogas for electricity or industrial heat generation could be the best use of biogas for GHG mitigation in future if bioenergy carbon capture and storage (BECCS) is deployed. The study models a potential "sustainable niche" for anaerobic digestion (AD) in a context where both [food](#) waste and meat and dairy consumption are halved, with AD facilities processing the remaining unavoidable food waste and manures. This "sustainable niche" precludes inefficient use of purpose-grown crops, and is predicated on ambitious policy action to prioritize food waste prevention.

Dr. David Styles, lecturer in environmental engineering at the University of Limerick and lead author, explains: "The climate benefits of anaerobic digestion will diminish as cleaner technologies predominate in the transition towards net zero greenhouse gas emissions. However, [anaerobic digestion](#) will remain a sustainable option to manage genuinely

unavoidable food wastes and animal manures, whilst offering the prospect of flexible, carbon-negative energy generation—if deployed judiciously alongside effective waste prevention."

Compared with maize- or grass- biogas transport fuel, solar electricity generation can avoid 16 times more fossil fuel energy, and afforestation can mitigate six times more GHG per hectare of land used—making maize or grass cultivation for biogas inefficient land use options for energy security and GHG mitigation. Meanwhile, food waste prevention results in nine times more emissions reduction than AD treatment, increasing to 40 times more net emissions reduction if trees are planted on land spared from food production. Prioritizing food waste prevention and diversion to animal feed (including via insect meal), instead of maximizing AD deployment in line with current industry ambition, could simultaneously: offset an additional 10 to 15 percent of national GHG emissions; meet an additional 2–4 percent of national energy demand; free enough arable land to provide 20 to 21 percent of national recommended protein and calorie intake.

Martin Bowman, Senior Policy and Campaigns Manager at Feedback Global and study co-author, added: "Halving food waste and a just transition to less and better meat production offer the food system's biggest potential for emissions reduction—far greater than through using AD for waste management. Previous policies have often narrowly focused on subsidy-fuelled expansion of the AD industry with sometimes perverse effects, like facilitating the expansion of industrial livestock systems, low costs for [food waste](#) disposal or the large-scale growing of crops specifically for AD. We need a radical policy re-think so AD supports rather than undermines our transition to a low-meat low-[waste](#) food system."

More information: David Styles et al, Climate mitigation efficacy of anaerobic digestion in a decarbonising economy, *Journal of Cleaner*

Production (2022). [DOI: 10.1016/j.jclepro.2022.130441](https://doi.org/10.1016/j.jclepro.2022.130441)

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