

**Introduction:**

The launch of Ecotricity's Green Gas campaign in November has stimulated interest and discussion from many sources: farmers, environmentalists, supporters of sustainable agriculture, pro-fracking advocates and biofuel campaigners.

The purpose of the report is to explore what may be possible ... and the potential opportunity for Britain. And to start a debate about how Britain gets its gas in the coming decades. We welcome all feedback on our report, as part of that debate.

Biofuelwatch have challenged some elements of our report, and we are happy to respond to those here.

**Biofuelwatch said:** "According to Government figures total domestic demand for natural gas across the UK amounted to 292.4TWh."

**Ecotricity response:** "That is the UK's **current annual** domestic gas demand. However, our projections for the potential of green gas are not based on replacing **current** domestic gas demand – partly because growth in Green Gas won't happen overnight and partly because our current consumption of gas has to change – we must be more efficient with it as with all forms of energy. We stated clearly in the report that we have used a level of domestic gas demand in 2035 – [of 219TWh](#). National Grid go even further in their [Future Energy Scenarios report](#), forecasting under their 'Gone Green' scenario that domestic gas demand could be reduced to 189TWh by 2030."

**Biofuelwatch comments:** "Our report highlights the fact that Ecotricity's figures rely on the assumption that future domestic gas use will significantly decline. We had realised this after studying Ecotricity's detailed "green gas" report, but we are concerned that this has not been made clear in much of the company's publicity. Thus, their "[Campaign for Green Gas](#)" webpage states: "*We can generate enough gas to power around 97% of Britain's homes in our Green Gasmills, using a resource that will never run out – grass*". It fails to say "...but only in several decades' time and only if future Government policies drastically cut domestic gas use first". Ecotricity's petition claims: "*We have a new option for making the gas we need, right here in Britain.*" – rather than "a small proportion of the gas burned in the UK", given that Ecotricity's figure only relate to domestic gas use, which accounts for less than 40% of all gas burned in the UK, and then only to an optimistic forecast of greatly reduced future domestic gas demand. Those claims appear misleading to us, and we hope that Ecotricity will update all their publicity materials, as well as their petition text. We would also point out that Ecotricity's 'optimistic' figure still relies on more UK land being used to grow grass for biomethane than is used to grow agricultural crops today."

**Biofuelwatch said:** "Ecotricity's forecast relies heavily on the assumption that domestic gas use will significantly decline between now and 2035."

**Ecotricity response:** "Our report is clear on this; our calculations are based on this projected figure. This forecast is based on a future scenario whereby Britain embraces wide-ranging energy efficiency measures in domestic homes. One of the main 'aims and purposes' of Biofuelwatch is to "prioritise energy conservation and efficiency". We share that aim. And while we agree that current government policies on energy efficiency are not good enough, we believe that Britain can deliver the energy efficiency needed if the political will (and economic reality) is there. We believe it to be a realistic scenario.

**Biofuelwatch comments:** "Yes, we believe that UK energy use can and must be reduced significantly, although the Government's energy policies are sadly moving us in the wrong direction. In the heating sector, Energy conservation and efficiency are by far the most effective ways of cutting greenhouse gas emissions – and they also address fuel poverty at the same time. Of course, there will always be a residual demand for heating. Biofuelwatch believes that there are far better ways for meeting this than converting more than the UK's total annual cropland area to biomethane."

**Biofuelwatch says:** "Ecotricity's planning application refers to a single peer-reviewed study, one which focuses on the potential for producing biomethane from grass in Ireland. According to that study, it would be possible to produce biomethane with an energy content of 103.7 Gigajoules (=28.81 MWh) from one hectare of Irish grassland per year."

**Ecotricity response:** "Actually our calculations are not based on this Irish study from 2009 but are based on the latest real-world experience of technology providers in 2016 with whom we are in discussions, which show that a standard Green Gas Mill will produce around 44MWh per hectare of grass. Even so, our calculations do fall within the parameters of this Irish study.

In paragraph 3.27 the study bases their dry solids yield from grassland on a 22% dry matter basis (220g/kg) while acknowledging that a dry matter content as high as 33% (330g/kg) would be feasible. Through much of our calculations we have assumed a dry matter content of 32%, so our findings operate within the studies range. For example, the report assumed 12 tDS/ha based on 22% dry matter; we are however working on 17.5 tDS/ha based on 32% dry matter. Every other assumption is the same, but the result is a much larger biomethane yield in MWh/ha.

**Biofuelwatch comments:** "We have now changed the briefing. It no longer says that Ecotricity relies on any peer-reviewed science. Thank you for clarifying that the company's figures rely entirely on unpublished industry statements."

**Biofuelwatch says:** "Based on the figure from the Irish grass-to-biomethane study, 10.2 million hectares of land would be needed to replace all of the natural gas used for domestic heating and hot water with biomethane."

**Ecotricity response:** "We have not used the Irish study to calculate the

amount of land it would take to meet domestic gas demand but calculated it based on the real world experience of the latest technology providers showing a Green Gas Mill could produce around 44MWh per hectare and the projected 2035 demand figure of 219TWh. This gives a figure of just over 6 million hectares of land to produce the amount of green gas needed for domestic demand by 2035, (or less if we used National Grid's 2030 figure of 189TWh)."

**Biofuelwatch comments:** "By comparison, the UK currently grows agricultural crops on 4.78 million hectares of land."

**Biofuelwatch says:** "Grassland accounts for 72% of agricultural land in the UK, and the 10.2 million hectares needed to realise Ecotricity's vision would require 92% of it."

"Growing enough grass to heat our homes would therefore make the UK almost completely dependent either on meat and dairy imports, or on factory farming inside the UK with virtually all of the animal feed imported from abroad."

**Ecotricity response:** "The 10.2 million hectare figure is wrong, and so of course using it in this calculation produces the wrong total for land required leading to the rather extreme scenario and asserted implications. When using the correct 6 million hectare figure, the amount of available grassland required is considerably lower at 54%, which of course would also lead to substantially different conclusions in regards impact on animal farming."

But we should beware of assuming that British farming currently maximises the use of all available grassland in raising livestock (as Biofuelwatch appears to do), because this is incorrect. [Defra data shows](#) that despite the amount of grassland in the UK growing since 1990, dairy cattle numbers have almost halved, overall cattle numbers are down almost a quarter and sheep numbers have fallen by over 20%." This industry is in decline and a long way from using all available grassland.

We should also not overlook the role of animal farming in climate change, [it is responsible for 14.5% of global greenhouse gas emissions](#) and is in fact an industry that has to decline if we are to meet our carbon emission targets – we have to reduce the amount of meat and dairy products on our diet – that is an incontrovertible fact. One of the benefits of a switch to green gas production is that it enables farmers to diversify from an industry that is in decline and one that needs to decline further – while at the same time producing a carbon neutral and indigenous source of gas.

**Biofuelwatch comments:** "Ecotricity's figure is based on unpublished industry statements and on a wishful prediction of a major decline in domestic gas use in future. Our figure, on the other hand, is based on findings in a peer-reviewed article and, as we have always made clear, on current UK domestic gas use. We therefore stand by our figure."

Ecotricity points out that cattle and sheep numbers in the UK have fallen

since 1990. This would be good news for the climate and environment if it was due to a change in diet, i.e. to people eating less meat and dairy products. Sadly, however, [per capita meat consumption is currently rising in the UK, as are the UK's net imports of food, including beef](#). Dairy yields in the UK are currently rising, as the US "zero grazing" system is increasingly pushed in the UK. This raises serious animal welfare concerns – and it means ever greater dependence on imported animal feed. In order to address the worst impacts of climate change, we need to move away from high-carbon industrial farming practices and towards agroecology, to produce food as locally as possible rather than transporting ever more of it around the planet, and we need large-scale ecosystem regeneration, which can remove and sequester some of the CO<sub>2</sub> previously emitted to the atmosphere from land use change. We believe that converting millions of hectares of land to biomethane production is incompatible with those requirements."

**Biofuelwatch says:** "This, however, is not the only climate-related concern: firstly, upgrading biogas to biomethane requires the CO<sub>2</sub> contained in the biogas (which comes from the carbon in the grass) – up to 45% of the total volume – to be emitted straight into the atmosphere, without burning."

**Ecotricity response:** "This CO<sub>2</sub> may be emitted into the atmosphere during the process, but that is exactly where it came from in the first place, in order for the grass to grow. Growing plant material is part of carbon cycle, all plants fix carbon during the day through photosynthesis and emit a proportion when they respire at night, the rest being laid down as plant material. This carbon will then either be eventually released when the plant material is naturally broken down or if eaten by cattle converted into methane and then release directly into atmosphere. What the Green Gas process does is intervene and take biomethane for human use, replacing fossil fuels and preventing methane release from cattle. This is not introducing entirely new CO<sub>2</sub> into the atmosphere like burning fossil fuels, simply recycling what is already there. Green Gas made this way is 'carbon neutral'."

**Biofuelwatch comments:** "CO<sub>2</sub> emissions from bioenergy are indeed ignored for the purpose of greenhouse gas accounting, both in the UK and across the EU (and internationally under the Kyoto Protocol). This assumption of 'carbon neutrality' has been exposed as deeply flawed in many scientific studies. Studies show that bioenergy is far from carbon neutral once the indirect as well as the direct impacts of converting land are accounted for. Displacing cattle at a time when UK imports of meat are rising will not be good news for the climate."

**Biofuelwatch says:** "Even a combined 1.5% methane leakage rate from biogas production and upgrading would make any claims of greenhouse gas savings from biomethane highly questionable. In a worst case scenario of up to 10% leakage from a faulty plant, biomethane would almost certainly have a worse climate impact than the fossil fuels it might replace."

**Ecotricity response:** "The various membrane system upgraders of different technology providers have a warranted maximum methane slip of between 0.1%–0.5% depending on the manufacturer. The seal systems have developed significantly in recent years and the sign off from suppliers includes a no leak guarantee. We are therefore confident that methane slip will be of little impact."

**Biofuelwatch comments:** "We are pleased to see that Ecotricity have started to look at the issue of methane leakage. We were concerned that the company had not acknowledged the need to minimize such leakage in the past. We hope that Ecotricity will commit to regular monitoring of any methane leakage from their biomethane plants, rather than relying on claims by technology providers."

**Biofuelwatch says:** "Grass would be cut two or three times a year. Such practices maximise yields – but are not better for wildlife than intensively grazed grasslands. As public guidelines for restoring species-rich grasslands in the UK highlight, ones that are not grazed would generally be cut just once a year, and not before mid-July, up to 10% of the area would be left uncut every year, and plants would need to be protected from fertilisation to avoid those that thrive with low nutrient levels to be outcompeted."

**Ecotricity response:** "The feedstock will come from a variety of sources. (1) Permanent grassland, where upon cutting, seed mixes would be used to help increase grass species diversity in order to maximise soil restoration through productivity but also to provide flowering for nectar. Yes, three cuts would not be as good as one cut (for wildlife), but even so, this type of management (three cuts a year) is better for wildlife than intensively grazed grasslands. (2) Species-rich herbal leys (containing grasses, clovers and herbs) grown as break crops on arable land to help rid land of blackgrass infestations and provide landowners with an income as soil fertility and condition is restored. (3) Natural or semi-natural grassland/sedge-beds/rush pasture and reed-beds which are cut by conservation bodies with no access to grazing, will likely be cut just once per year but depending on management regime occasionally two. These would be cut in line with the management prescription for the conservation outcomes required by the conservation body responsible for the grassland."

**Biofuelwatch comments:** "The vast majority of UK grassland is permanent grassland. Ecotricity proposes to have millions of hectares of permanent grassland cut three times a year for silage. According to the [RSPB](#): "*The switch from hay to silage has been one of the most significant changes in agriculture over the last century. While helping to ensure the availability of good quality winter forage for livestock, it has allowed changes in grassland management that have reduced wildlife interest.*" We believe that managing millions of hectares of UK grassland for silage for biomethane, with three cuts of grass a year, could only accelerate the loss of farm birds and other biodiversity."

**Biofuelwatch says:** "Clearly, Ecotricity cannot expect farmers to enter into supply contracts for a biomethane plant while at the same time foregoing higher yields, and thus higher income, to enhance biodiversity. There are no reasons to expect such grasslands to be any better for biodiversity than the vast majority of species poor permanent grasslands across the UK."

**Ecotricity response:** "This assumption doesn't take into account the real economics of farming. Higher yields don't necessarily mean higher profits when cost of inputs are taken into account. We are not aiming to recreate ancient species-rich grassland, this would take many decades of very careful management. We are using new species-rich seed mixes to improve biodiversity."

**Biofuelwatch comments:** "Of course, if grasslands were less intensively managed and not cut three times a year, then Ecotricity's proposal would require even more millions of hectares. Conservation organisations including the [RSPB](#) recommend ways of reducing the negative biodiversity impacts of silage production, and those focus primarily on when, how and how often grass is cut. We are not aware of any evidence that the harm caused by frequent grass harvesting for silage can be mitigated with the help of different grass seed mixes."

**Conclusion:**

As stated in the introduction, the purpose of the report ***Green Gas: An Opportunity for Britain*** was to set out what is possible and begin a debate. To mitigate the effects of climate change, massive changes in energy consumption, efficiency and generation must take place and this involves food production and the subsequent changes in food consumption. We've set out an approach to creating Green Gas from grass, which will help to restore soil fertility, increase biodiversity, help farmers and cut carbon emissions.

**Biofuelwatch comments:** "We fully agree with the challenges identified by Ecotricity. However, we believe that converting millions of hectares of UK land to silage production to replace a tiny proportion of this country's fossil fuel use is entirely the wrong approach."