

Food Harvest 2020 Submission

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Proposal to Mitigate the Environmental Impact of the increase in Livestock Numbers resulting from Food Harvest 2020 by the Co-Digestion of Slurry with Food Waste.

Summary.

If the increase in dairy production of 50% called for in Food Harvest 2020 is to have no net environmental impact the rollout of at least 1,000 rural Anaerobic Digesters is necessary to treat the extra slurry and other farm wastes generated to mitigate the greenhouse gas emissions and polluting run-off to waterbodies. In order for such farm-based digesters to be economically viable at current levels of government support it is necessary that they receive gate fees to co-digest food waste. Co-digestion of farm waste with food waste increases the energy content of the process and captures nutrients in the resulting digestate which reduces the need for artificial fertilisers. Developing large centralized scale Anaerobic Digesters (ADs) solely for food waste provides none of these environmental benefits. Without this integrated approach the impact of Harvest 2020 will be extremely damaging for the environment.

There are two alternative methods that could help fund farm based ADs to close the nutrient cycle and mitigate the environmental impacts of increased animal numbers that does not place a burden on the exchequer: A Quota system imposed on waste collectors through their Waste Collection Permit obliging them to divert a minimum amount of waste to rural ADs which co-digest with farm waste; or an Environmental Levy imposed on waste disposal and biowaste treatment technologies other than co-digestion with slurry. The levy would be collected by the waste facilities other than ADs co-digesting with slurry. The revenue could be used by Local Authorities to further mitigate the environmental impact of Harvest 2020.

Introduction

The government's proposed Food Harvest 2020 includes a specific target to increase milk production by 50%. This and other targets in the plan will greatly increase the amount of animal slurry requiring management and has the potential to cause very serious pollution through Nitrate and Phosphorous run off to groundwater, increase methane and CO2 emissions¹ as well as presenting a nuisance due to its odour. In order to mitigate these negative effects 1,000 distributed farm-based ADs will be needed to treat slurry prior to land spreading. The benefits for farmers and the wider rural community include job creation, energy security and diversification of income.

The maintenance of environmental services and of agricultural sustainability (and thus food security) is not possible without returning as much as possible of the produce of the land back to the land following human use; long term social sustainability requires that the economic benefits to the community of doing so is shared fairly with the farmers who both maintain the environmental services and produce the food.

¹ "A 12% rise in GHG emissions could result from the increased output envisaged in the national dairy herd." Food Harvest 2020 Draft Overview. DAFF 2010

solid wastes, and to provide beneficial end products, i.e., methane gas and fertilizer. Co-digestion of municipal waste with animal slurry has many advantages as the latter contains the necessary microorganisms for the digestion process; it provides buffering capacity to stabilize the process and balance the nutrient content of the end product. Waste collection companies pay Gate Fees to treatment plants, landfills, incinerators for the receipt and treatment of this waste. Revenue from gate fees provides the main income for these types of treatment technologies.

The Problem of Slurry

Ireland's 6.5 million cattle produce over 37⁵ million tonnes of collectable slurry over the winter housing period every year. The 1.1 million dairy cow herd will have to be increased to achieve the Food Harvest 2020 objective of 50% increase in milk production. Ireland's agriculture sector accounts for 29.1% of national greenhouse gas emissions Methane and Nitrous Oxide dominate these emissions with methane emissions from manure management contributing 14.5% of the agricultural sector's total. N₂O emissions arising as a result of chemical/organic fertilizer application and animal deposition represent a further 35.6%.

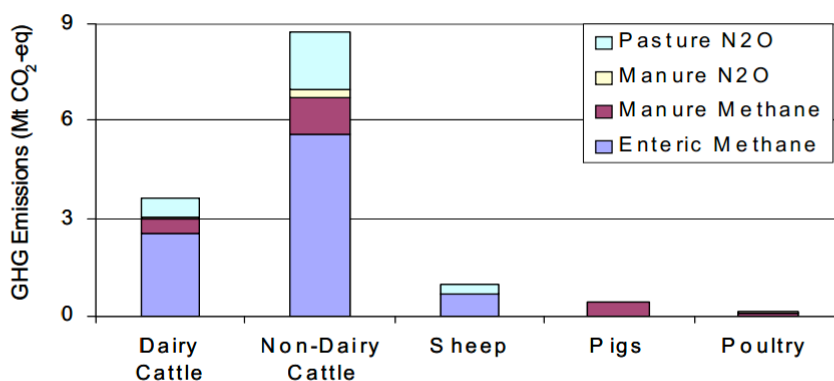


Figure 1: Sources of greenhouse gas emissions arising from livestock production in 2008 (McGettigan et al., 2010b).

An even more extreme cause of pollution from slurry is nutrient run-off from spreading slurry on agricultural land, particularly phosphates. The months during which slurry can be safely spread are limited and likely to be more limited with climate change effects. The land available for spreading is already limited simply cannot absorb the extra slurry likely to be generated if Food Harvest 2020 targets are met.

Anaerobic Digestion

The digestion of cattle slurry improves its fertilizer properties by making nutrients more available to crops. AD is especially effective in reducing phosphorous run-off from slurry spreading to waterbodies. Many studies have shown the ability of AD to reduce the volatility of Nitrogen and odour from slurry⁶. The final digestate can be separated into a dry fibre and a liquid. The fibre contains most of the Phosphorous while the liquid retains the majority of Nitrogen. Phosphorous, which is in excess of safe limits in the soils and rivers of many regions, can then be exported to areas which are in deficit.

5 Hyde & Carton Teagasc 2005

6 Effects of application technique and anaerobic digestion on gaseous nitrogen loss from animal slurry applied to ryegrass. G. H. Rubæk et al. The Journal of Agricultural Science. Crops & Soils 1995. Also, AFBI, Northern Ireland, Interim Technical Report, August 2010

Potential of Biomethane

It has also been proposed that farm based ADs using slurry and grass feedstock producing biomethane for use in transport could be economic. Upgraded biogas has many advantages over other renewable transport fuels not least because biofuels derived from residues will count for double in meeting the EU 2020 target of 10% renewable transport fuel. However, grass and silage have to be paid for and also the gas upgrading requires a minimum scale which precludes the environmental benefits that Food Harvest requires as explained above. On the upside the economic scale of the upgrade process is progressively reducing, it is now as low as 80 Nm³/hour, well under the proposed district scale mentioned by the Department.

There is no doubt that grass and biomethane will have an important role in the future especially as biowaste availability and value declines but it cannot kick start the kind of farm based ADs that are needed for Harvest 2020.

The Solutions

Levy

One solution to ensure that farm-based ADs receive necessary quantities of suitable waste is a levy. This would be imposed on biodegradable waste entering all treatment, disposal or recovery facilities that do not produce a digestate co-digested with slurry that is safe to spread on agricultural land. The levy would be collected by the operators of the facilities from waste collectors and given to Local Authorities.

There is already a levy on all waste entering landfills to encourage recycling. This rose from €50 to €60 on July 1st and will rise to €75 next July. The proceeds from this levy are used to support public sector composting projects. The levy makes more sustainable treatment options including AD more competitive. A similar levy on waste entering incinerators was proposed by the last government to help ensure that the waste hierarchy is adhered to but this was scrapped by the current government¹⁰.

Our proposed additional levy on suitable AD feedstock wastes would operate similar to these other levies. It could generate further revenue for Local Authorities which they could use to further mitigate the environmental impact of Harvest 2020; for the rehabilitation of land damaged by unsustainable waste disposal; or awareness campaigns on waste reduction and separation of biowaste at source. Legislation to bring about the levy would be relatively simple given the precedents.

The Quota Mechanism

An alternative solution is for all collectors of waste to be required to obtain certificates of the destination of the biowaste, provisionally called Certificates of Environmental Obligation or CEOs, to account for the required percentage of the biowaste processed on farm-based ADs. The operators of AD plants would issue a certificate to waste collectors on receipt of each ton of suitable biowaste. Waste collectors who found it uneconomic to supply biowaste to an AD, e.g., due to distance to a farm based AD, could purchase certificates from a company that has a surplus. A surplus of certificates would arise when a waste collector supplied more than the required minimum quota to farm based AD plants.

The quota would be established nationally and would represent a percentage of the total national biowaste collection. It would be low at first and would rise predictably

¹⁰ Environment (Miscellaneous Provisions) Bill 2011

hub generates electricity or upgrade the biogas to biomethane for injection to the grid or for sale as transport fuel, as it has the necessary scale for such a plant. The heat from the CHP plant is used in the pasteurization process, any spare heat can be used locally.

The satellite ADs are smaller and located on or near farms convenient for the collection of slurry and other farm wastes. Preprocessed food waste brought onto farms is pumped into sealed tanks and never exposed to the air. Gate fees received for the waste are shared between the Hub and the Satellite ADs.

Biogas produced by the satellite ADs is to generate electricity with the heat used in farm homes and buildings, in cleaning and sterilization for food enterprises, horticulture or refrigeration. A side benefit of the Hub & Satellite concept is that the expertise on nutrient management and record keeping necessary for this would be provided by the Hub operator to all the farmers receiving digestate.

An AD catering for a dairy farm of about 300-400 cows (or Farm Partnership, see below) receiving two tanker loads of pasteurised food waste per week will have no significant traffic impact. In this concept a Hub plant with a Waste Facility Permit treats biowaste for 4-5 Satellite ADs, each of which would receive food waste up to 50% of their treatment capacity.

Adequately treating the estimated increase in slurry to be produced by the FH2020 dairy target alone requires 200 Hub & Satellite clusters (1,000 AD plants). Although this number of ADs cannot be funded entirely by gate fees from biowaste as there is not a sufficient quantity to match the amount of slurry, it would finance the first few hundred and establish the industry until the biomethane from grass model reaches viability.

Farm Partnerships

The Hub could comprise a Farm Partnership of ten to fifteen farmers with approximately 1,000 animals. A group of farms increases the likelihood of an AD development being close to the 3-phase electricity grid. The Partnership structure is supported by the department of Agriculture as it facilitates inter-farm knowledge transfer and work sharing. The opportunity for further rationalising and modernising of dairy operations is facilitated by the Farm Partnership as is the nutrient management of the digestate for agriculture. Other advantages of the structure are that it would attract external investment and enterprising individuals with skills who are not landowners to contribute to Harvest 2020.

Finance

A payback periods of not more than five to seven years is required to finance a development of this level of risk. Pre-pasteurisation of imported food waste at a linked Hub is absolutely necessary to make on-farm ADs viable as it avoids the added cost of on-site pasteurizers and other biosecurity precautions, even if granted planning permission. For these reasons the Hub and Satellite model would be attractive to investors especially under the Employment and Investment Incentive (EII), formerly known as the BES scheme.

Another major barrier is the grid connection charge. This could be financed up front by ESB Networks and paid back in full by the operator as the business grows. If the connection charge was related to the Maximum Export Capacity this would be a big help to small scale developers.