Agriculture and Food Development Authority

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Teagasc submission to the Joint Oireachtas Committee on Agriculture, Food and the Marine concerning Solar Energy and the Agriculture Industry

Introduction

The Climate Action and Low Carbon Development (Amendment) Act 2021 sets out that Ireland must achieve an emissions reduction of 51% compared to 2018. As the agricultural industry is Ireland's largest contributor to greenhouse gas emissions, accounting for 37.5% of emissions in 2021, it is a key area of focus for reductions. The Climate Action Plan 2021 sets out a target to reduce emissions in the agricultural sector from 23 Mt (2018) to 16-18 Mt by 2030. It is also recognised that the agricultural sector will have a part to play regarding the decarbonisation of the energy generation sector. The AgClimatise report sets specific targets for energy use in agriculture in the nearer term, whereby a reduction in energy use of 20% along with an additional target of meeting 20% of agricultural energy use by renewables should be achieved by 2030. These goals are, in turn, adopted into the Food Vision 2030 strategy.

At a national level, the Food Vision 2030 report sets the goal to 'Develop a climate neutral agri-food system, so that by 2050, the climate impact of methane is reduced to zero and remaining agricultural emissions are balanced by removals; scale up renewable energy sources, especially anaerobic digestion, biorefining and biomass supply, and solar PV; focus on energy efficiency; and examine potential barriers to the roll-out of renewable energy at farm level, including necessary support for microgeneration and access to the grid'.

Current levels of solar deployment on farms are relatively low, however to encourage the uptake of renewable energy generation by farmers, a clean export tariff has been proposed which will guarantee payment to small generators of renewable energy for electricity exported to the national grid. The clean export premium further aims to bolster the development of new solar generation capacity on farms in the future. In addition to these generation incentives, the renewable electricity support schemes will facilitate the connection of large-scale solar power plants to the national grid, which represents a new and exciting business opportunity for farmers to diversify their income streams.

The role of Teagasc in Solar Energy and the Agricultural Industry

Teagasc is committed to facilitating farmers to make the transition away from fossil fuel consumption towards renewable energy generation through a unique combination of its research, education and advisory services.

Teagasc as an organisation is fully committed to embracing solar energy on its research facilities (including research farms) as well as its advisory and education facilities. This commitment is enshrined in the Teagasc Statement of Strategy, specifically strategic goal number five which aims 'To constantly improve organisational excellence and efficiency'. Deployment of a number of major solar photovoltaic installations (PV) has already been carried out within Teagasc as part of its 'Energy Action Plan', including the installation of a 250 kWp (kilowatt peak) system on the Moorepark pig research facility, a 49.6 kWp system on the Johnstown Castle beef farm along with several smaller systems on advisory buildings and research farms.

Teagasc has been very active in the area of energy in agriculture for many years and launched its first dedicated publication on energy use in Agriculture in 2011. Furthermore, Teagasc has compiled a suite of factsheets on energy use and renewable energy generation covering all farm enterprises, which were updated recently.

Teagasc has also dedicated considerable research resources to dairy energy efficiency and there is currently an active energy research programme at Teagasc Moorepark, which is evaluating the impacts of deploying micro and mini generation solar PV systems on dairy farms. This research is built on a foundation of energy auditing and energy modelling which has been on going for over ten years. Teagasc has developed a very high level of understanding of energy consumption trends, energy costs and associated electricity related carbon emissions of the dairy sector through this work, which has been disseminated extensively through webinars, the Dairy Infrastructure Workbook, Dairy Farm Infrastructure Handbook and Teagasc Open-Days and Farm Walks. Teagasc is seeking to expand its research capabilities in this area through building capabilities in the SFI (Science Foundation Ireland) VistaMilk 2 research centre (funding by SFI and DAFM) to include an energy research cluster.

Furthermore, Teagasc has collaborated with MTU (Munster Technological University) and the SEAI to deliver an on-line Dairy Energy Optimisation Platform to help farmers reduce their energy use and maximise use of solar energy. The optimisation platform automatically identifies the best blend of energy efficient and renewable technologies, based on either economic or environmental criteria, on a farm-specific basis. The user is also provided with a simple payback period and carbon emissions offset resulting from the technology upgrade. This tool can also advise farmers on micro-scale solar PV sizing while providing carbon offsets and payback times for such investments. Teagasc has always encouraged an 'Efficiency First' approach to farm energy, since renewable energy is not 'free energy' as it comes with considerable up-front costs. Therefore, farm businesses should always be

assessed for opportunities to improve efficiency before evaluating renewable options. This approach is also promoted in the AgClimatise plan and the Food Vision 2030 strategy, mentioned previously.

Opportunities for deployment of solar PV systems, that are economically beneficial for farmers, has been greatest where a significant part of the energy generated is consumed on the farm (for example dairy, pigs, poultry and horticulture), thereby offsetting expensive grid suppled electricity charges. In the absence of substantial on-farm demand for electricity or a significant export tariff, the payback periods can exceed 10 years resulting in low levels of interest in solar PV systems on some farms.

Case study Dairy

The average herd has increased in size from 58 dairy cows in 2010 to 90 dairy cows in 2021, the price of electricity has continuously fluctuated in recent years and an increase in electricity prices in the coming years is very likely. Hence, deployment of solar on dairy farms can be an attractive option from both an emissions and energy security perspective, as well as farm profitability.

To date the only viable option for deploying solar PV for dairy farmers has been to follow the self-consumption micro-generation route, as there has been an absence of an export tariff for electricity exported to the national grid, and additionally, planning permission has been required for PV arrays in excess of 50 m^2. These aspects have limited the appetite for the installation of larger systems among farmers to date.

A typical solar PV installation on a 100 cow dairy farm comprises the installation of an 11 kWp solar PV array on the dairy shed roof (this size has not required planning), which involves an investment of approx. €15,300. This size system will supply 30% of the farm's electricity needs from renewables and will pay for itself in around 7 years (at current electricity prices and without grant aid). This size system would offset 3 tonnes of CO_2 per annum.

Going forward, with recent announcements on the advent of a micro and mini generation solar PV export tariff and recent easing of planning requirements, there should be renewed interest among farmers in adopting solar PV by allowing for up to 50 kWp systems on farms. However, some anomalies exist, such as the inability of farmers to avail of the export tariff if they utilise their DAFM TAMS grant to part-fund their solar PV system.

The opportunities for solar deployment on farms is great, given that shed roofs are the ideal home for such systems and there is no shortage of space for these systems on a typical farm. Similarly, dairy farms that operate spring-calving systems produce the majority of their milk during the summer months, and hence consume the most electricity, during the months of highest solar electricity generation.

Development of solar energy generation in agriculture has the potential to have three major benefits for Ireland's Agriculture industry:

1) Enhanced energy security through the displacement of fossil fuels will bolster our national energy self-reliance through the consumption of locally generated renewable electricity in place of electricity generated from imported fossil fuels. For example, a conservative estimate of 200 gigawatt hours of electricity could be generated by dairy farms if they were to meet 50% of their demand from renewable sources. This would not require any land use change as it would be housed on existing roof space.
2) Farm diversification: income generated from exporting excess electricity will provide additional income streams for farm families in rural Ireland and encourage parallel income streams from the farm.
3) Renewable electricity generation is better for the environment and generation of electricity on farms will help contribute to our national efforts in the area. The potential of high level of adoption of solar PV on dairy farms alone could save 0.13 million tonnes of carbon emissions per year nationally, if every dairy farmer installed 26 kWp of solar PV panels, which would offset all on-farm dairy energy use nationally. This is based on 30% of dairy farms installing 50 kWp of solar panels and 70% installing a 17 kWp system. These are the maximum allowable system sizes for connection to the three phase and single phase grid respectively under the ESB networks mini-generation scheme. This level of adoption would generate 435 GWh of renewable electricity per annum (about 2% of the required level of decarbonisation in electricity by 2030). All of this could be accommodated easily on shed roofs.

Large scale solar

Given the scale of the targets set nationally for renewable energy generation, the proposal to increase renewable energy generation capacity under the renewable electricity support scheme (RESS) is an important development. The final results of the RESS 2 auction showed that 1,534 MW of solar developments were approved for delivery between 2023 and 2025. This solar component would require about 3,100 ha of land which is around 0.06% of agricultural area and would contribute about 7% of the required level of decarbonisation in electricity by 2030 by reducing annual electricity related carbon emissions by 0.43 million tonnes.

This scheme will represent a huge opportunity for farmers looking to diversity their income stream. Typically, a minimum entry point for solar farms is a 5 MW development encompassing a 25-acre site. The farmer enters a long term lease with a solar developer who develops and manages the project. This represents a business option for farmers through diversification and is an important decision for farmers since it represents a land use change away from traditional farming. This could have major impacts with respect to agri-relief, capital gains tax, income taxation, basic payment eligibility and farmer status (i.e. genuine/active farmer status). Supports to advise farmers on these issues are required to provide farmers with the best available advice in terms of legal, financial and agricultural business implications. Teagasc can offer advice to farmers on the basic payment scheme, active farmer and business planning aspects.

Recommendations

- A prerequisite to the successful deployment of solar energy in agriculture, is that it should be profitable and equitable across all farm types and stages of development regardless of farming system deployed. For example, allowing the consumption of PV generated electricity in the domestic house on sheep and beef farms while availing of TAMS grant aid would help boost the viability of PV systems on these enterprises.
- The vast majority of farms in Ireland are connected to single phase supplies. These farms will be limited to 17 kVA of an export capacity while farms connected to three phase electricity supplies can export more power to the grid (max 50 kVA connection). This will severely limit the ability of farms to contribute to the national renewable energy generation targets. Therefore, a rollout of a comprehensive network of three phase electricity lines to rural areas should be considered to maximise renewable energy generation capacity among rural farms.
- Grant aided solar systems should be eligible for available export tariffs and electricity generated from roof-mounted solar systems on grant aided PV systems on sheep and beef farms should be permitted for use in the farm dwelling house.
- The inclusion of energy efficiency and renewable energy generation and storage systems should be considered in future farm grant schemes.
- Both new farm buildings and existing farm buildings should be eligible for installation of rooftop solar PV systems.
- Resources should be put in place to advise farmers on implications of long term leasing of land for solar development from legal and taxation perspectives.