Evaluating on-farm energy projects

A new online tool will help farmers make decisions relating to energy use, technology investments, CO_2 mitigation and investment in renewable energy production

John Upton & Michael Breen,
Teagasc Animal and Grassland Research and Innovation Program,

Philip Shine & Michael Murphy,
Cork Institute of Technology

The electricity bill on Irish dairy farms varies from €2.60/1,000L, on the most energy efficient units, to as much as €8.70 per 1,000L. To put it another way, that's from €15 to €45 per cow per year.

The range is partly because no two farms are the same due to herd size, infrastructure specification, farmer age and eligibility for grant aid and availability of grant aid for specific technologies. The variety of circumstances has made it difficult to offer general advice on energy efficiency.

Now working with Cork Institute of Technology (CIT) and the Sustainable Energy Authority of Ireland (SEAI), Teagasc has developed the Dairy Energy Decision Support Tool (DEDST) to assist farmers in evaluating the cost/benefit of key energy efficiency and renewable technologies for their individual farms.

Dairy Energy Decision Support

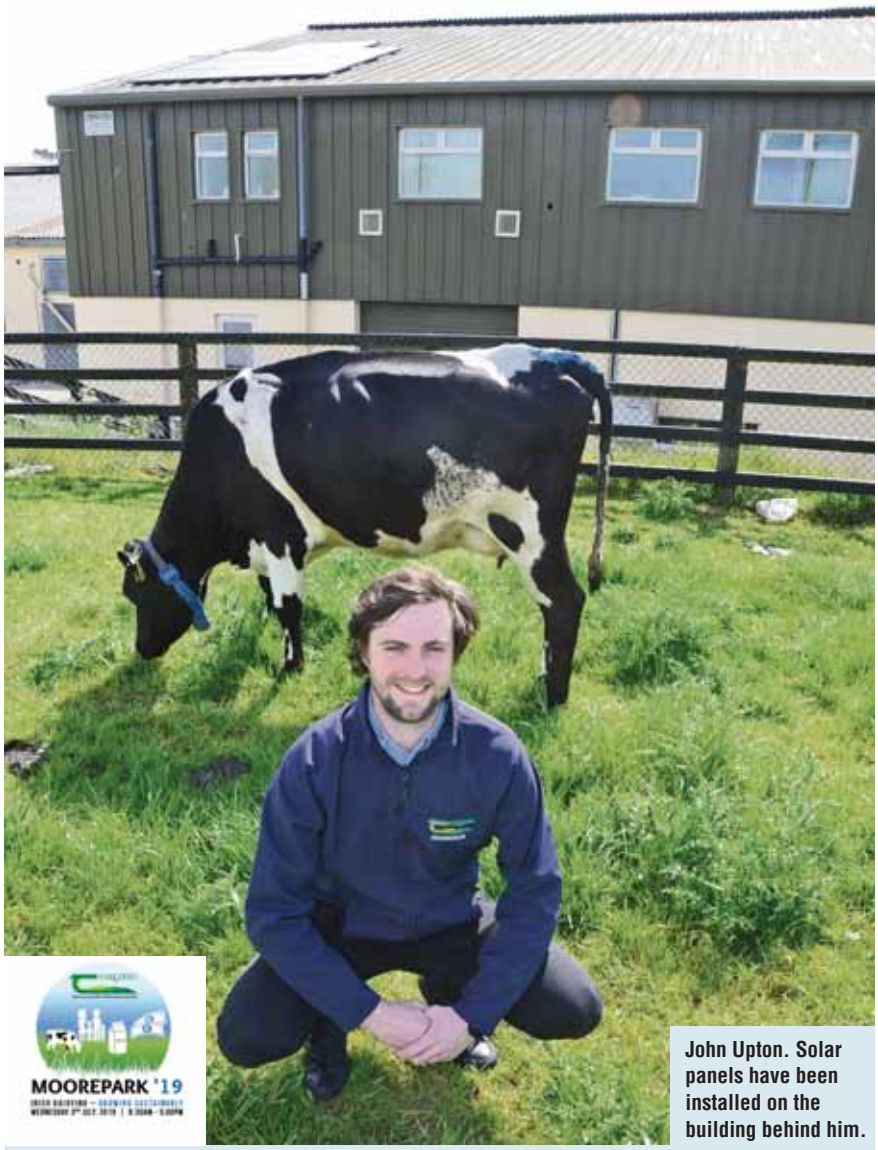
The DEDST is available to use for free at: http://messo.cit.ie/dairy.

This is an interactive and easy-to-use tool aimed at farmers, farm managers and farm advisers, which can be used to evaluate the likely impact of investment in certain technologies and changes in farm management practices.

It's worth noting that the main consumers of electricity on-farm are milk cooling (31%), the milking machine (20%) and water heating (23%).

Possible alternative technologies include plate coolers, variable speed drives, heat recovery systems, solar photovoltaic systems, wind turbines and solar thermal water heating systems.

The DEDST operates as a web-based platform. The user enters details of a specific farm, including farm size, milking times, number of milking units, milk cooling, water heating system type and electricity tariff. Details of an alternative technology to be evaluated on that farm can then be entered. The user may also enter economic details regarding potential future grant aid for technologies, as well as renewable energy feed-in tariffs and inflation. All energy and economic calculations are then computed, and displayed on an easy to interpret output screen.



John Upton. Solar panels have been installed on the building behind him.

Example – investment in a solar photovoltaic system

Solar photovoltaic (PV) cells generate electricity using energy from the sun. These systems can be stand-alone (i.e. the generated electricity is only used by the farm) or grid connected (where surplus electricity is fed into the national electricity grid).

Unfortunately, those in Ireland who export electricity to the grid from small scale PV systems do not currently receive payment.

Hence, the most logical solution would be a stand-alone system, sized so that all electricity generated is consumed by the farm.

For a 100 cow spring calving herd, the ideal PV system size falls at around 6kW of installed capacity, which would cost in the region of €7,500. In the absence of a capital investment grant, this system would pay back after 13 years. If a 40% grant were made available, the payback period would fall to eight years, while a 60% grant would make the payback period fall to five years. The inclusion of a 6kW PV system would result in 28% of the farm's electricity being provided by a renewable source and would offset more than 2.4 tonnes of CO_2 per year.

PV systems qualify for accelerated capital allowances (i.e. the entire cost of the installation can be written off against tax in the year of purchase), which would further reduce the payback period.