Making the most of on-site generation

Farming for a Better Climate

Practical Guide

On-site generation of renewable energy has become an element of many farming businesses. To encourage deployment of green technologies, incentive payments were paid at relatively high rates to early adopters making the prospect of producing electricity to feed directly to the grid an attractive one to those with reasonable resources and access to a grid connection.

As tariffs have reduced for new developments, financial viability for small scale projects now very often relies upon greater value being obtained for the energy produced than the wholesale rate available for exported energy. Electricity used on-site to offset import from the grid provides greater benefit than the export value. As the cost of battery storage drops this will increasingly be used to "time-shift" generation to match demand. However before investing in this kind of technology what can be done to maximize the offset of imported electricity?

This Practical Guide looks at how demand management can reduce the need to import electricity from the grid.

Top tips:

- Look at options for reducing on-site electricity demand by reviewing power hungry activities.
- Next look at options to meet demands from on-site generation by re-scheduling tasks to match renewable energy generation. In some cases it may be possible to automate this by upgrading controls.
- Investment in energy storage technology should be considered following the steps above.
- Benefits from battery storage installations should be calculated in p/kWh over the expected life of the specific batteries proposed.
- Calculate savings based on energy returned from the storage device, not from the input energy.

Our Practical Guides cover five useful topics:

1. Use energy and fuels efficiently
2. Renewable energy
3. Lock carbon into soils and vegetation
4. Making the best use of nutrients
5. Optimise livestock management

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Websites

www.farmingforabetterclimate.org
www.farmingfutures.org.uk
www.ipcc.ch
www.agrecalc.com
www.fas.scot/downloads/tn704-energy-storage-and-demand-management/

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SRDP Farm Advisory Service

The European Agricultural Fund for Rural Development
Europe investing in rural areas

The Scottish Government
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Moving demand

Some energy demands such as lighting and heating will need to be met, irrespective of available generation. Others however can be scheduled to match output from renewable resources. Feed milling can be carried out when the wind is blowing, as it would have been in the past where wind mills were used. Likewise pumping slurry to an above ground store can be carried out when renewable energy is available.

Forward planning is required to make this work and a level of buffer capacity needs to be maintained. Some functions can be automated to favour renewable energy. A daily water heater for example can be set using a modern controller to wait until on-site generation is available before switching on. Always use a fall back of mains power by a certain time to ensure that hot water is available when required.

Improving efficiency

Improving the efficiency of operations will make what renewable energy is available go further and will also reduce the requirement to import power from the grid. Examples of efficiency improvements include;

- Getting the most from a plate cooler in the dairy by maximizing the water flow through it to reduce the energy required to cool milk within the bulk tank.
- Installing a rapid action door on a cold store where frequent movements by lift truck are required.
- Upgrading old ventilation fans with more efficient modern versions.
- Installing variable speed controls on pumps/ compressors/fans with long run times where a variable output is required.

Energy Storage

Energy can be stored in many forms and the most appropriate will depend on the specific end use. Storage technologies all incur efficiency losses so that the energy they return will be less than the input energy. They also come at a cost, therefore the benefits need to be calculated carefully before any investment is committed.

- Heat storage - heating water with on-site generation and storing in a well insulated tank for later use can pay where the offset energy is mains electricity. If water is normally heated using oil or gas then the saving in purchased fuel may be little more than the lost export payment. (For small generators where export payments from FITs are deemed rather than metered there will be no loss of export tariff).
  "Heat batteries" using phase changing salts provide a more efficient storage medium.
- Cold storage - Ice builders can be used to store "cooling effect" for use at a later time. A similar effect can be achieved by pulling cold room temperatures down when on-site energy is available to reduce the energy demand at a later time.
- Battery storage - battery costs are falling, meaning that the situations where they can be financially viable is increasing. Batteries have a finite life and therefore the potential savings over their lifetime need to justify the capital cost. Full analysis of the energy demand pattern should be carried out to inform any investment decision.

Key Fact:
Benefits from storage technologies should be assessed following consideration of demand management and efficiency improvements.

Farming for a Better Climate (FFBC) provides practical ideas to benefit the farm and help reduce our impact on the climate.
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