

SITE GUIDE: ENERGY OPTIONS FOR FARMS AND AGRICULTURE

LOCAL
ENERGY
SCOTLAND

This guide outlines considerations for those in control of farm scale enterprises looking to make a change in their energy use and carbon emissions. It is applicable to a range of farm and estate buildings, agricultural operations and processes requiring energy for heating, drying, refrigeration, power, process, production or transport.

IDENTIFY AND PRIORITISE CHALLENGES

Where practical, solutions should always prioritise energy efficiency. The following issues are common to this type of site and are followed by brief notes on some typical or appropriate initial actions.

Significant heating and hot water requirements

Farms generally have a large amount of buildings or processes which require heating and hot water. Heating water accounts for around 23% of the energy costs on a typical dairy farm which means savings can quickly be made by operating the most efficient system.

Opportunities worth considering may be insulation upgrades, biomass heating, district heating, heat recovery to thermal store, solar thermal systems or heat from Anaerobic Digestion. For larger projects, support may be available through the [District Heating Loan Fund](#) (£1m plus projects).

A 20% cut in energy costs can represent the same bottom-line benefit as a 5% increase in a farm's sales.
([Food and Farming Futures 2020](#))



Lighting is likely to be responsible for around 5-15% of the electricity you use and is an area that can provide the quickest payback periods. ([Farm Energy 2019](#))

The [CARES Toolkit](#) provides detailed and useful information on technology options and business planning for renewable energy projects.

Significant electrical demand requirements

Electricity is one of the fastest rising costs in farm operations and upward pressure is likely to continue for the foreseeable future. Farm operations often have high electricity demand depending on farm business types, but can include activities such as cooling, heating, pumping, lighting and drying. You may wish to look at reducing the requirement for imported power through onsite renewable energy generation integrated into an innovative farm Local Energy System. Opportunities worth considering may be wind energy, solar photovoltaics, small scale hydropower or anaerobic digestion associated Combined Heat and Power.

Average figures suggest a dairy cow uses 350 kWh of electricity a year, 40% of which is for heating water. ([Farmers Weekly 2019](#))

Providing for a current or future energy need for transport

Here in the UK and worldwide there is growing evidence of possible future trends in vehicle technology for the agricultural sector; these include smaller driverless tractors, electric farmyard and other vehicles like telehandlers and all-terrain vehicles. Future farms may have opportunities where electric agricultural vehicles, some autonomous and some conventional, are connected to charging points in large solar PV equipped 'carport style' machinery sheds, earning additional income from so-called 'vehicle-to-grid' network balancing services while they are on charge.

You may wish to undertake a farm transport audit considering activities, routes, type of plant, a fuels assessment and a cost assessment to provide baseline data for your activities. This could be followed by a cost/benefit analysis of alternative solutions and development of a transport management plan.

Typical things to consider may be the age and efficiency of existing plant, the cost of new machinery and opportunities for onsite renewable, and alternative energy such as hydrogen or compressed biomethane energy to displace traditional fuels.

Other areas that may be worth investigating in a farm scale environment are:

- ✓ access to alternative fuels
- ✓ significant heat losses through the building fabric
- ✓ poor equipment efficiency
- ✓ lack of system controls and inability to manage time of use
- ✓ out of date distribution systems or processes
- ✓ availability of space in, on and around the building.

The National Farmers' Union (NFU) anticipates that diesel-electric hybrid and battery electric tractors will be widely available from 2020. Autonomous aerial and ground vehicles are expected to make a growing contribution to farm management. ([NFU online](#))

COMMON ACTIVITIES

Addressing many of the issues above can begin with the same initial steps. These include:

- ✓ **Data gathering exercise** – energy audit and energy flow analysis, onsite demand and variations, geography, dimensions, building type, existing plant, behavioural activities, an understanding of supply chains and transport logistics etc.
- ✓ **Resource assessment** – analysis of onsite resources (wind, solar irradiation, land resources, soil suitability for forestry, biomass, biofuel opportunities, energy recovery and storage) and potentially suitable technologies including energy efficiency measures.
- ✓ **Optioneering and economic analysis** – identification, categorisation and financial appraisal of appropriate opportunities, financial appraisal of opportunities (costs, potential revenues, payback period, carbon reduction).

BENEFITS OF TYPICAL SOLUTIONS

Improving energy efficiency

- Allows immediate action, using a loan that does not charge interest.
- Benefits begin immediately following installation.
- Insulation measures typically last for the life of the building.
- Equipment replacement typically lasts for 15 to 20 years.
- There can be a high level of confidence in the predicted savings.

Installing renewable energy generation

- Makes use of secure and local resources.
- Reduces your dependence on non-renewable energy, helping to reduce the production of carbon dioxide and other greenhouse gases.
- Reduces your energy bills.
- In some cases, you can generate income by selling your surplus energy back to your energy provider.



FUTURE DEVELOPMENTS FURTHER RESOURCES

Technologies and innovations

Example initiatives worth consideration could include:

- ✓ **New energy provision** – to or from local enterprises in the form of direct supply of renewable energy generation, or supply between partner energy generators and consumers.
- ✓ **Hydrogen generation** – from existing or new electrical generation and the development of a hydrogen fuel supply chain.
- ✓ **Energy storage** – opportunities for energy storage projects, peak demand supply or demand side to take advantage of renewable energy when it is available.

- ✓ If you're thinking of applying for a CARES Innovation Grant, be inspired by our [themes and examples](#) to support rural business innovation.
- ✓ **Energy Efficiency Business Support** provides interest-free loans from £1,000 up to £100,000 for the installation of energy efficient measures such as lighting and heating upgrades.
- ✓ **The Farm Advisory Service** provides useful resources on topics such as Energy Storage, Hydrogen from farm renewables, and anaerobic digestion.

HOW LOCAL ENERGY SCOTLAND CAN HELP

- ✓ **ADVICE** – We have a network of Local Development Officers across Scotland to provide regional advice and support, wherever you are.
- ✓ **RESOURCES** – Our free online resources, tools and good practice guides will help you along every step of your journey.
- ✓ **FUNDING** – we help you access the Scottish Government's Community and Renewable Energy Scheme (CARES) support and funding.

For more information, call Local Energy Scotland on **0808 808 2288**, email info@localenergy.scot or visit localenergy.scot

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