13 DEMONSTRATION FARM

NFUScotland

# Standhill Farm: Anaerobic Digestion Plant

*Standhill Farm,*
*Hawick,*
*TD9 8SF*

*Farmer – Jim Shanks*
*Date of Farm Visit – 22nd January 2015*

## Background

The Shanks family have farmed the Standhill landscape since 1951 producing milk, beef, lamb, arable crops and more recently, a range of distinct cheeses. After completing a Nuffield scholarship, Jim Shanks realised the need for farmers to diversify and use their natural resources to create other useful products, while still being able to complement the existing businesses. Standhill farm consists of 205 ha, growing 126 ha grass, 53 ha winter rye and 11 ha triticale.

## The Scheme

The Agri-komp (Mesophilic) Anaerobic Digestion (AD) facility is capable of producing 200kWe (electricity) and 200kWth (heat) from the combined heat and power (CHP) engine. Annual output from the plant is estimated at 1,550 MWh(e) pa, enough to support approximately 400 homes[1]. Approximately 50% of the heat is used for maintaining the digester at 38 to 42˚c. The rest is used for contract drying of woodchip through a LENZ dryer. The majority of the electricity is exported, although 15kW is used to run the digester and the average farm electricity load is also approximately 15kW. FIT pre-accreditation is being secured at 15.57 p/kWh (pre-accredited to 2013 rates) and RHI is being secured at 7.5 p/kWh.

The plant location is within the footprint of the existing farm steading allowing the slurry to be piped through to the slurry store and into the digester with minimum energy. Locating the AD plant adjacent to the existing silage clamps reduces daily handling of dry feedstock. The location is also convenient for exporting electricity and heat transport for on-site use.

Afterwood Ltd. delivers wet wood chip in containers which Jim then dries. He can dry three containers per week and is paid per wet tonne.

### RHI and FIT Metering

Jim Shanks was one of the first to claim RHI for heat produced from anaerobic digestion. One of the most important aspects of an application is the calibration of the meters and where they are located.

In this case the FIT meter is located in the switch room and the heat meters are located after the CHP engine and before the dryer.

## Grid Connection

An underground cable runs from the CHP unit to the farm buildings. When output from the CHP exceeds demand from the farm, excess electricity is fed into the utility company's 11kV grid via an upgraded pole transformer.

Jim received four different grid offers, the most expensive being £821,000. This offer would have been feasible if a wind turbine had been built in conjunction with the AD plant. A 153kW grid export capacity was achieved for £220,000. The capped export is expected to increase in late January 2015 to a 200kW capacity at no additional cost, partly due to Scottish powers ARC initiative.

### Accelerating Renewable Connections (ARC)

The ARC project is being piloted in the East Lothian and Border regions by Scottish Power. It aims to connect more renewable energy technologies to the local power grid. It works by asking generators to reduce or increase the amount of energy they produce to meet local electricity demand. For more information please visit **www.arc-project.com**

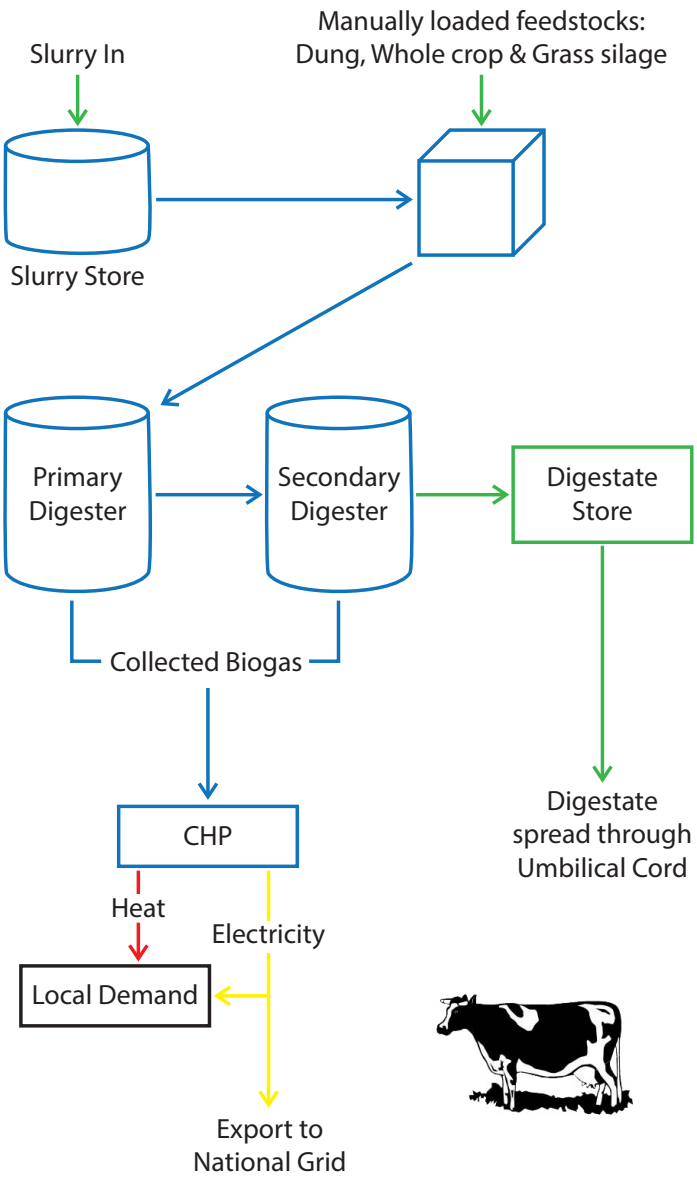
[1] *based on gov. standard figure of 3,800kWh per household.*

The Scottish Government

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

savills

## The Process




## Financial Figures

| Capacity | 200 kWe export scenario |
|---|---|
| Estimated Capital Costs | £1,040,000 |
| Tonnes of slurry p.a. | 7,000 |
| Tonnes of dung p.a. | 1,000 |
| Tonnes of silage p.a. | 2,600 |
| Tonnes of whole crop p.a. | 500 |
| Units of electricity produced (kWh) * | 1,542,000 |
| Units of Heat Produce (kWh)** | 771,000 |
| FIT income at 15.57p/kWh | £240,000 |
| RHI income at 7.5p/kWh** | £58,000 |
| Export*** @6.3p/kWh | £81,000 |
| Previous electricity costs | £15,000 |
| Value of heat**** | £38,000 |
| Annual income and surveys | £432,000 |
| Operation costs **** | £130,000 |

*Assumes 88% capacity factor
**Assumes 50% of heat is used for parasitic loads
***Includes export tariff and LECS and assumes an average 30kW demand onsite.
****Assuming a previous fuel cost of 5p/kWh

Please note that these assumptions are based on what Smiths Gore would expect an AD plant in this situation to produce and use, due to the plant being in the early stages of operation they may not accurately reflect the Standhill farm AD unit.

## Feedstocks

The grass and whole crop (Winter rye and Triticale) is grown on approximately 73 acres of the existing farmland. The whole crop is chopped but the grass is not to save harvesting costs. The Hopper is filled twice a day; six tonnes in the morning and three tonnes in the evening. This means that going through the digester each day is 22m$^3$ of slurry, five tonnes of whole crop and four tonnes of grass silage.

**Typical annual feedstocks:**

• 7,000t slurry • 1,000t dung • 2,600t silage • 500t whole crop

As the land was previously used to grow crops for the dairy herd Jim now buys in straw and cereals from a neighbour. Committing his land to the AD plant made it easier for Jim to secure finance for the project.

## Future Plans

Jim is currently in the planning process to build a four acre glasshouse for growing tomatoes. He expects to build this in the summer of 2015. If the project goes ahead the biogas would be ramped up to 250kWe.

To look at the planning application and supporting documents for this AD, search: 12/00375/FUL, in the Scottish Borders Council planning portal

> If you are a large producer of dung or slurry, and use green bedding, then AD does have the potential to succeed.
>
> *Jim Shanks, January 2015*