

Alternative Energy Options for Farmers

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- Targets for renewable energy production
 - 50% electricity in Scotland to be from renewable sources by 2020
- Climate Change Act
 - At least 80% reduction in the UK carbon account by 2050
- Fossil fuel energy prices generally rising
- Improved fuel security desirable

Why farms should produce power



- Farm land is often suitable
 - Remote
 - Exposed
 - Accessible
- Farm incomes need support
- Rural communities benefit from developments
- **Why SAC?**



What are the options?



- Wind power – Currently most popular
- Hydro power – Some interest
- Biomass – Demand growing
- Biofuel – Viability at farm scale questionable
- Biogas – Future potential
- Heat pumps – becoming more popular
- Combinations of the above

Wind Power Potential



- Wind speeds
- Choice of turbine
- Neighbours
- Cumulative impact
- Grid connection
- RADAR/ATC
- Natural heritage
- Cultural heritage



Wind speeds



- The wind speeds in Scotland are generally high compared to the UK average
- An average wind speed of more than 7 m/s (15 mph) is normally required for commercial development
<http://www.berr.gov.uk/energy/sources/renewables/explained/wind/windspeed-database/page27326.html>
- Local wind speed monitoring is normally required
- Data may be available from nearby masts/developments

Choice of Turbine



- Larger turbines are more productive
- Higher towers give a more consistent wind speed
- Larger blade diameters help catch the wind
- But local planners are more concerned when the tip height exceeds 80 m



Neighbours



- Sites without residences within 10 rotor diameters are ideal
- If a single turbine is more than about 350 m from houses noise is unlikely to breach guidelines
- For a multi-turbine site a large remote area is needed to prevent disturbance

Cumulative impact



- As the number of turbines increases planners are getting more concerned with the effect on the landscape
- All proposed turbines have to be considered in the assessment of visual impact
- If the renewable energy targets are to be met turbines will become a part of the landscape
- Turbines will have to be accepted as a necessary consequence of generating renewable energy

Grid Connection



- A site with a good grid connection, which has capacity to take all generated power is the ideal
- Upgrading is needed in many areas
- Grid connection is often the reason for installing multiple turbines
- There may be delays waiting for system upgrades but the more turbines in the area the more the connection cost can be shared

- Turbines can confuse the radar used for air traffic control and air defence
- In some areas this may restrict development
- The number of turbines planned for Aberdeenshire is causing concern
- Objections could restrict development of sites which are otherwise suitable

Natural and Cultural Heritage



- Assessment required for the environmental impact assessment
- Sites with protected bird species, archaeological remains, or certain mammals may not be suitable
- Studies counting geese, nesting birds, badgers, bats, otters, voles and a variety of other creatures are required
- The impact on heritage sites must also be assessed

Options



- Self Development
 - Big Investment
 - High risk
 - Potentially high reward if all successfully completed
- Shared Equity
- Community involvement
- Development Company
 - Almost no risk
 - Annual income

Hydro



- Many farms have streams that may have potential for small scale hydro
- Adequate year-round water flow is crucial
- Allowing for SEPA's min flow requirements
- Head is often a limiting factor
- Local usage of power produced ideal
- Grants and ROCs may be needed



Photo: Mann Consulting

Biomass



- Interest in biomass for heating is increasing
- There may be potential for farmers to produce wood fuel
- Drying wood fuel may be an option, but would have to be done using minimal energy



Biogas

- Still difficult to show viability using farm wastes or energy crops
- Double ROCs and grants help viability
- Food waste is usually needed
- Future potential



Heat Pumps



- Transfer heat from one place to another using electrical power
- Typically transferring from the ground, or outside air, to heating systems
- Efficiency of energy use high, 3 or 4 : 1, but electricity is an expensive fuel
- Heated space needs to be well insulated
- Works best when temperature difference is not too high

Combinations



- Background heating (heat pump) plus direct heating (wood fuel)
- Wind or hydro to power heat pumps
- Use of waste heat
 - From biogas plants
 - From biomass CHP systems
 - From fridge units
 - From ventilation systems

Conclusions



Farmers are well placed to gain from increased demand for renewable energy

- This may also reduce their GHG emissions
- The most suitable option depends greatly on the site location and local resources
- An options appraisal is the first step

Diversifying into energy production could be a major bonus for rural businesses, benefitting rural communities and the environment



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