Transition to a decarbonised energy system

Practical Guide

Over the coming decade the infrastructure connecting the nations electricity generators and consumers will undergo a major transition which will provide particular opportunities for rural electricity users to play an active part in ensuring its smooth and efficient operation.

The need for change in the way the network operates has arisen because of;

- A shift in the proportion of generation connected to the extremities of the network and a reduction in output from large centralised power stations.
- Greater reliance on renewable energy where much of the instantaneous output is reliant on prevailing weather conditions.
- Predicted shifts in the pattern of electricity demand created by the adoption of electric vehicles.
- An increasing use of heat pumps as efforts continue to de-carbonise the heat sector.
- The introduction of "smart grid" technology will allow energy flows to be monitored and controlled more accurately in real time to enable a much more efficient use of the transmission and distribution infrastructure.

Opportunities for farms and rural businesses

As changes in network management methodologies are rolled out, opportunities will arise for farms and rural businesses to benefit by:

- Reducing imported energy costs by managing demands to take advantage of more flexible tariffs i.e. by importing energy at advantageous rates at times of low demand on the grid.
- Increasing income by exporting renewable electricity at times of peak demand on the grid.
- By obtaining payments from the network operator for providing grid balancing services i.e. being available to adjust import or export of electricity temporarily as requested by the network operator, or incorporating energy storage options on farm.

Farming for a Better Climate

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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www.adaptationscotland.org.uk

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Advantages for the electricity network of adopting “smart grid” technologies

- More efficient use and greater reliability on low carbon energy sources.
- Ability to accommodate changing patterns of demand.
- Reduction in the need for back up generation capacity (often fossil fuelled) as cover for periods of low output from renewables.
- Less requirement to upgrade infrastructure to accommodate theoretical maximum energy flows.
- Greater ability to meet local demand from local generation.
- Potential to increase the quantity of renewable generation connections onto currently constrained networks.

When will these changes take place?

Some changes are already happening. Changes to electricity grid management are underway and power companies are developing commercial platforms that will make it easier for them to trade in “flexibility” with generators and consumers, even at very small scale. It will be an on-going process over the next few years to roll out more sophisticated metering and control systems and to introduce new commercial contracts. This will allow small generators and consumers to obtain financial benefit from managing their energy supply/demand in a way that will allow the grid to operate more efficiently.

What technology will be required to take full advantage of more flexible electricity markets?

Benefiting from variable pricing may not require any specific new equipment only a change in routine to use cheaper power when available. In some cases more sophisticated controls may enable water heating or ice-building for example to be carried out automatically when lower energy prices are available or to enable “flexibility” payments to be obtained from the network operator for reducing demand during their peak times. Energy storage technology is likely to be more financially viable once a fully flexible market is introduced either by enabling the import of low cost power for use at a time when the price is higher, by storing home generated renewables for export at a higher rate at peak demand times or by receiving “flexibility” payments for being available to supply services to the grid.

This guide is intended to encourage you to think about how and where you use and/or generate power and how you may be able to benefit from upcoming changes. Further detail on the specifics of these changes including potential financial benefits, are required before any investment decision is made in terms of installing technology such as energy storage equipment for the sole purpose of benefiting from the reformed energy market.

Upgrading equipment and planning for the future; things to consider

- Where and when do you use electricity and can you be flexible in respect to the time of day you use power?
- Can you be flexible with energy use to take full advantage of on-site generation, variable pricing and smart local markets?
- Could you manage import/export of electricity to minimise costs and maximise sales?
- Could you offer grid balancing services to the system operator? i.e. by curtailing demand or increasing export during times of peak demand on the network.
- Are you using energy as efficiently as possible?

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