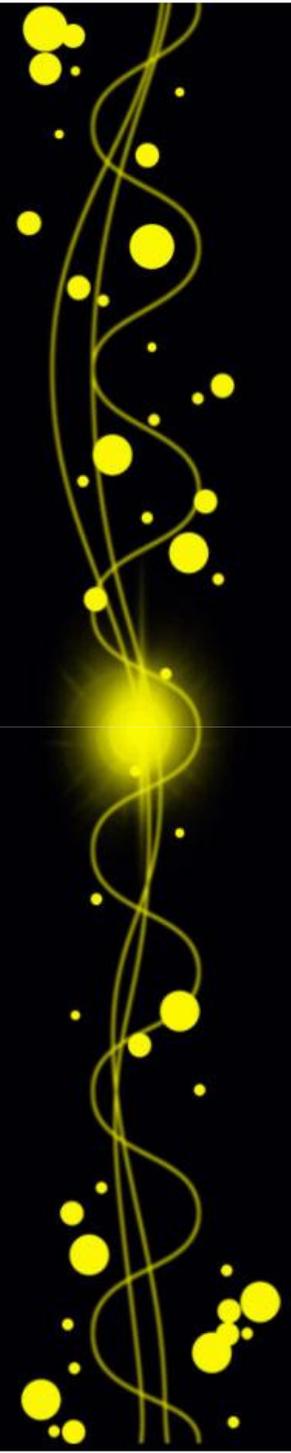
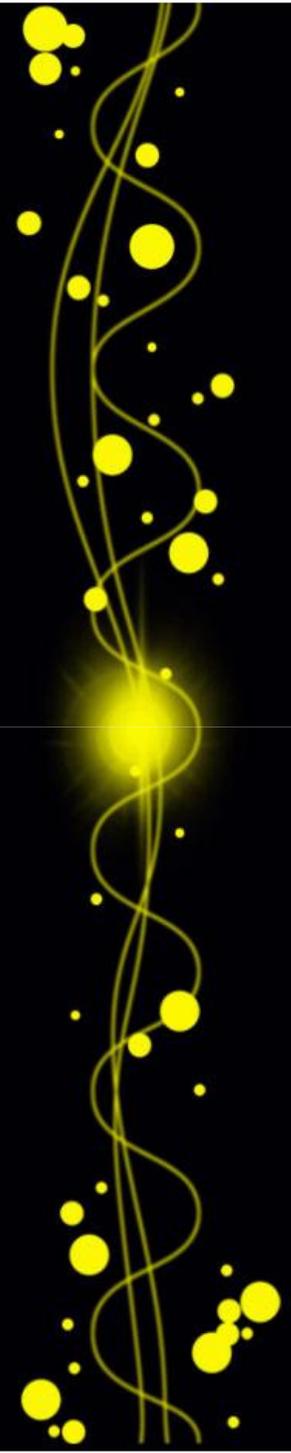


OCTES



Overview

The aim of the presentation is to explore issues facing individuals and communities generating their own energy, and explain how the energy value can be increased. We will also show how increasing awareness of energy generation and consumption can result in less energy being used overall.



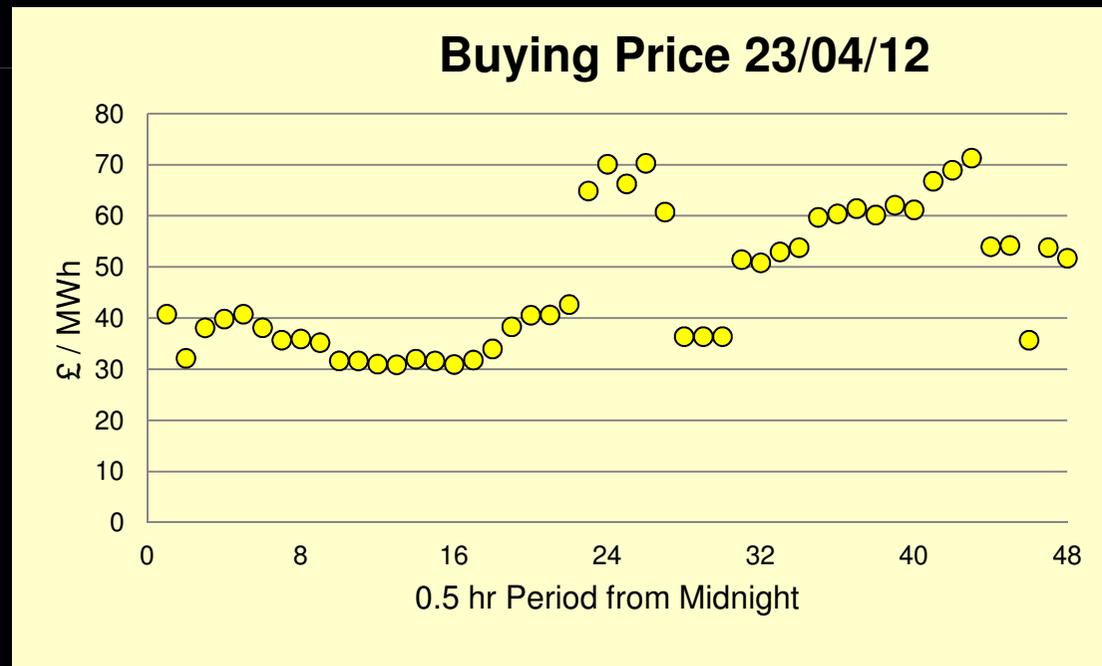
The way we produce clean energy from resources such as wind, marine and solar energy is certainly sustainable, but the way it is financed is not.

Renewable energy needs to be compete on open markets where price is determined by supply and demand.

Individuals and communities ultimately need to take control of their own energy and make money by developing and exploiting their energy resources.

UK Electricity Spot Price

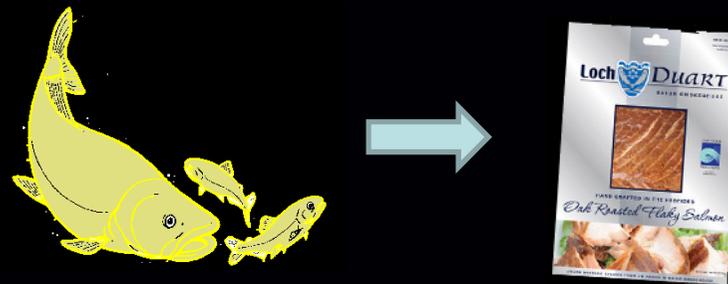
Renewable electricity is expensive to generate, but this is not necessarily a problem:

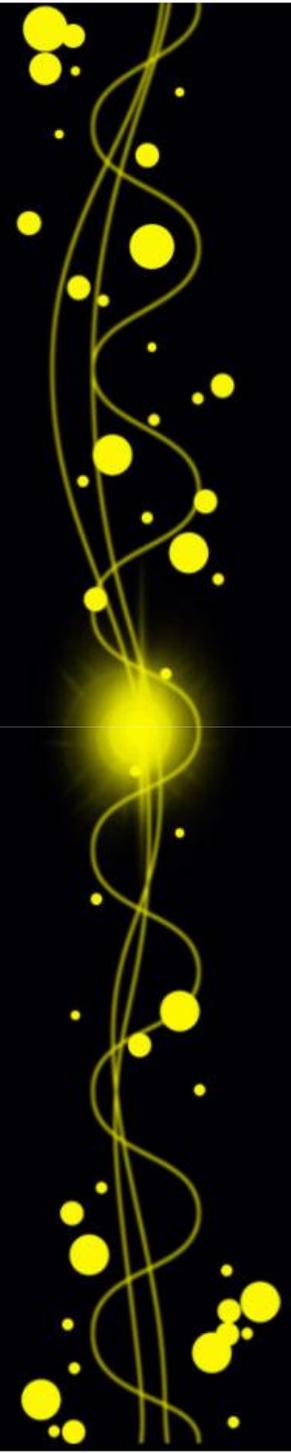


To work on the spot markets energy must be guaranteed for a 30 minute period.

Intermittent energy sources cannot do this and therefore have little commercial value.

What can be done? Process the raw energy.





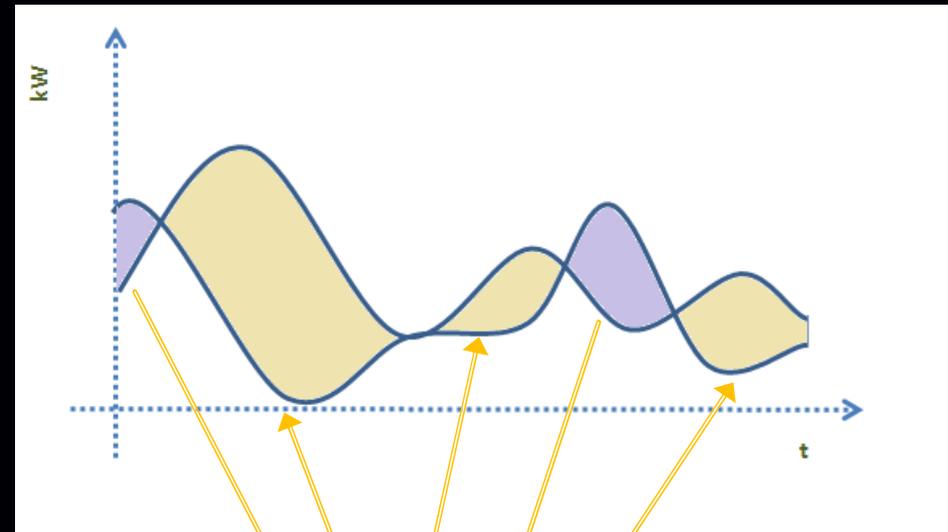
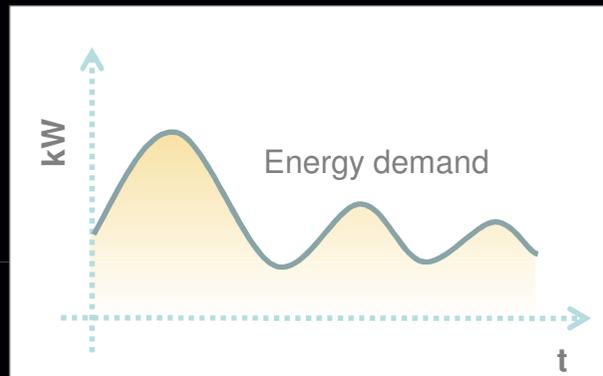
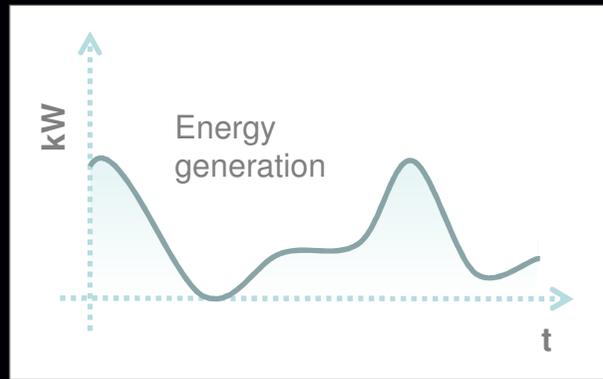
Using Storage

The concept is simple – store electricity when more is produced than is consumed. Use the stored electricity when demand exceeds generation, or when the spot price is high.

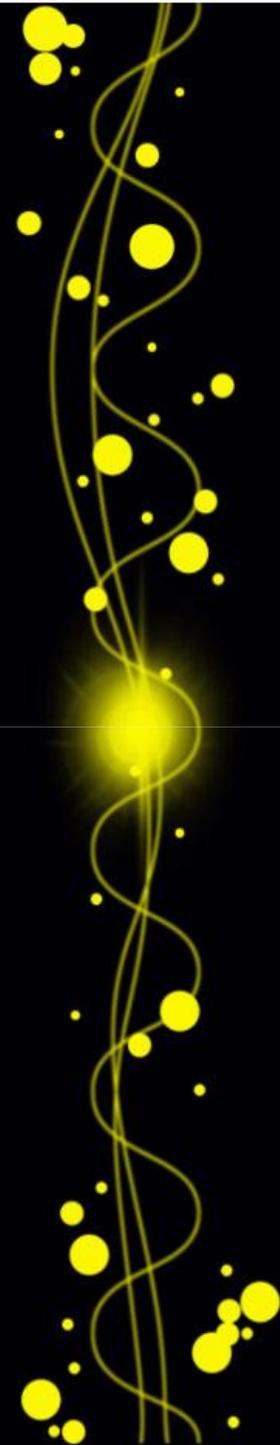
The options are lead acid batteries, lithium ion batteries, hydrogen, hydro pumped storage, and, as a last resort, heat.

Storage Cost

A rough figure is £50,000 per MWh. A day of storage for a 1 MW wind turbine on full output would cost around £1,200,000, about the same as a turbine. This is fine for selling electricity, but discouraging if the aim is just to balance the load and use your own electricity (as in individual or a community).



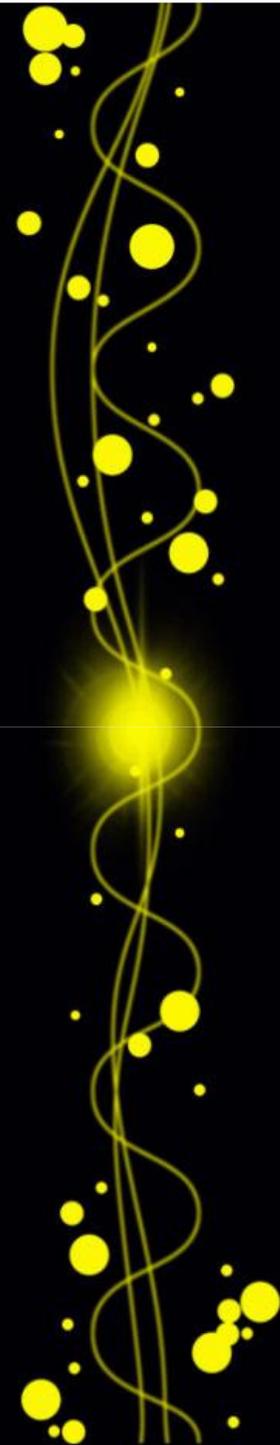
By overlaying the curves we can see when energy has to be put into and taken out of storage. Shifting the demand curve towards the generation curve will reduce the storage requirement.



How do we do make storage viable?

- Take control – the smart grid idea
- Use electric vehicles for charging
- District heating
- Provide information and rely on people to comply
- Apply rewards and penalties

Will people really modify their energy consumption habits?



Variable pricing

A community group should be able to price its own electricity, and variable pricing set hourly or half-hourly for 24 hours in advance will allow people to plan their energy usage. The unit price may range from free to £1.00, depending on the weather.

But it is not known if these measures will work – must be tried out with willing participants in a trial. Which brings us to OCTES ...



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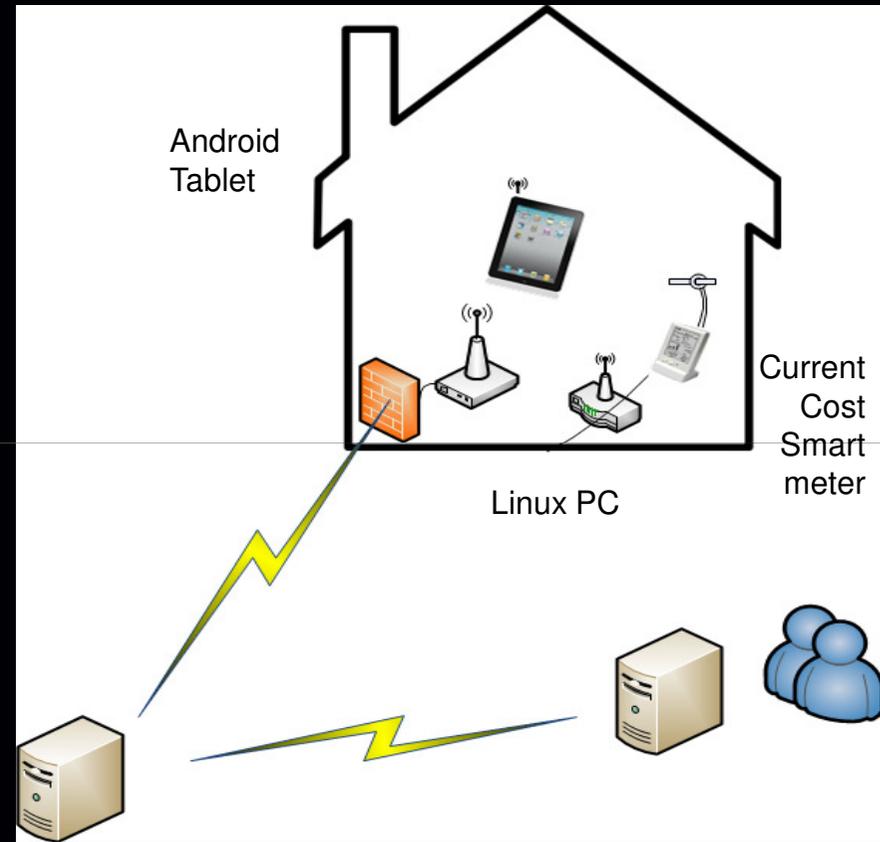


University of the
Highlands and Islands
Lews Castle College

Oilthigh na Gàidhealtachd
agus nan Eilean
Colaisde a' Chaisteil

The OCTES trials

OCTES will prepare communities for energy storage schemes by monitoring electricity use and determining the sort of pricing strategies that encourage a shift in energy consumption. The project also considers how the response differs across the northern region. Energy use in a number of homes is monitored using a modified smart meter and is data relayed back in real time to servers in Oulu and Belfast.



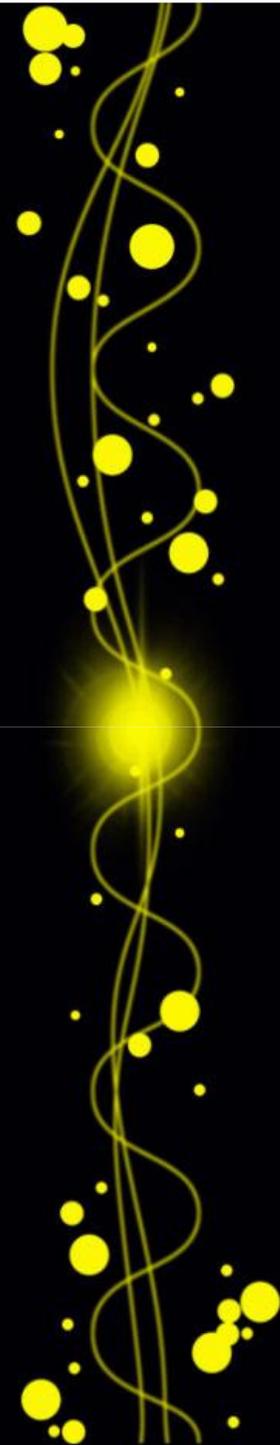
OULU:
Data
communication
and
management

BELFAST:
Setting pricing
policies and
analysing the
response

Android Tablet User Interface



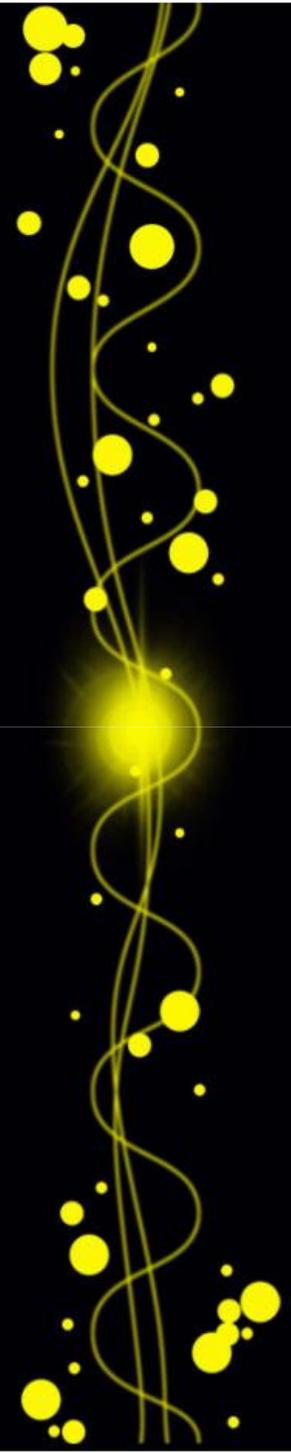
To assess the effect of electricity pricing on electricity use, the householder will be presented with the price for the next 24 hours (based on the forecasted output from, perhaps, a wind turbine as the intermittent energy source). They will then plan their energy usage on that basis.



User Interface

Another very important issue is how the information should be presented so that people of all ages can respond and use the information. We will test with a control group what kind of presentation results in the most reduction in energy use.

Plans over the 10 month trial include automatically identifying devices in the home and display annual cost by category.



Direct Benefits

The trials are just simulations of course – are there any real benefits for the participants? In fact, yes, and the plan is to explore these for the rest of the day.

We would also like the thoughts you have on having these these devices in the home, what information should be displayed and how it should be displayed.

And what about the cost of the system (and power consumption) – how is this justified?

Some ideas

In addition to the pricing which will eventually support community energy developments in all the NPP region, shorter scale benefits of gathering electricity consumption data include the selection of the optimal tariff, suitability of CHP (night heating circuits can be monitored separately), and the possibility of electricity storage in the home.

And a thanks to project funders ...



Highlands and Islands Enterprise
Iomairt na Gàidhealtachd 's nan Eilean



European Union
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Northern
Periphery
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