Energy Local

Energy Local Carbon Savings

The majority of the carbon savings that can be achieved via Energy Local are due to more renewable energy project becoming viable due to the additional income. Without additional renewable installations, matching renewable power local simply means that other uses will use more carbon intensive power.

A second more subtle saving will come from, participants becoming more energy aware and therefore using electricity more efficiently, reducing use or buying more energy efficient appliances. The trial was not long enough to ascertain these benefits however the survey results indicated that the trial raised awareness of electricity use, efficient appliances and how to reduce use.

The carbon savings are then estimated by calculating the average annual output using an average capacity factor and carbon intensity for the average fuel mix for electricity in the UK. As the amount of renewable power increases the carbon intensity of the average fuel mix decreases. However, the maximum timeframe considered is 5 years over which timescale the variation will not be great.
With more projects being viable, the costs are likely to reduce as the industry scales and therefore these savings are likely to be an underestimate.

1. Carbon Savings with 2p/kWh uplift

The carbon savings benefits will only become apparent when extrapolating the impact if Energy Local were used across the country to estimate the capacity of renewables that could be installed that are at present unviable. With an uplift of income of 2p/kWh, estimates were made of the potential new capacity that could be installed (using a number of different sources).

Hydro in Wales

The estimations for hydro in Wales were made on the follwing basis.It is assumed that each 100kW of hydro capacity has a 40% capacity factor[1] and the CO2e of the current UK electricity carbon intensity is ~0.412[5]kg/kWh. For small scale hydro (40-200kW) in Wales, Communtiy Energy Wlaes estimate that ~13.4MW would be viable with the additional income from EL in 2-3 years. This ~47GWh/year of renewable power would displace ~19 000 tonnes of CO2e per year. Approximately double this would be possible in 5 years.

Solar across the England and Wales

Domestic Roof top solar struggles to be viable with the current FIT rate. It is estimated that the cost oifinstalaltions can be reduced considerably by mass installation of 1000s. Ih this scenario a 2p/kWh increase income would enable 100 000 of domestic installations to be installed in 2-3 years[2]. These could use registered social landlords(RSLs) housings as the nucleus for projects. RSLs have 4 million properties in the UK and therefore with private housing, installing 100 000 in a mass installation programme.

With a capacity factor if 12.1%[3] and and the CO2e of the current UK electricity carbon intensity is ~0.412kg/kWh[5]. This 105GWh/year of renewable power would displace ~43000 tonnes of CO2e per year. Approximately double this would be possible in 5 years.

Wind in Scotland

Community Energy Scotland estimated that ~50MW of wind capacity with a 35% capacity factor would be viable with a 2p/kWh increase in income. The CO2e of the current UK electricity carbon intensity is ~0.412kg/kWh[5]. This is ~150GWh/year of renewable power that would displace ~63000 tonnes of CO2e per year. Approximately double this would be possible in 5 years.

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[1] Information from installers, compare to information from the British Hydro Association and Energy Trends 2016 Department of Energy and Climate Change p51
[2] An example is Empower Community www.empowercommunity.com
[3] Energy Trends 2016 Department of Energy and Climate Change p51

Hydro in Scotland

Community Energy Scotland estimated that ~1MW of hydro capacity with a 45% capacity factor would be viable with a 2p/kWh increase in income. The CO2e of the current UK electricity carbon intensity is ~0.412kg/kWh[5]. This is ~3.9GWh/year of renewable power that would displace ~1600 tonnes of CO2e per year. Approximately double this would be possible in 5 years.

Solar in Scotland

Community Energy Scotland estimated that ~2MW of solar capacity with a 12% capacity factor would be viable with a 2p/kWh increase in income. The CO2e of the current UK electricity carbon intensity is ~0.4kg/kWh. This is ~2.1GWh/year of renewable power that would displace ~841 tonnes of CO2e per year. Approximately double this would be possible in 5 years.

2. Viability with an income of 9-10p/kWh

There is a significant number of projects that would only be viable with an income of 9-10p/kWh. This may become an acceptable rate as domestic electricity prices rise. Furthermore, given this will be reinvested within the community, many householders will be prepared to pay this even with marginal benefit to themselves. On this basis,over 5 years there are additional projects

Hydro in England

Extrapolating from data from the Micro Hydro association[4] information on project over the last few years and from experts in the north of England, it is estimated that ~5MW of hydro capacity with a 35% capacity factor would be viable with at 9-10p/kWh. The CO2e of the current UK electricity carbon intensity is ~0.412kg/kWh[5]. This is ~15GWh/year of renewable power that would displace ~6300 tonnes of CO2e per year.

[4] http://www.microhydroassociation.org/
[5] DECC 2016 conversion factor for domestic electricity

Additional Capacity in Scotland

Community Energy Scotland estimated that an ~100MW of renewable capacity with an average 20% capacity factor would be viable with at 9-10p/kWh. The CO2e of the current UK electricity carbon intensity is ~0.4kg/kWh. This is ~175GWh/year of renewable power that would displace ~72000 tonnes of CO2e per year.

3. Savings from Awareness

If a modest 5% reduction in electricity use is achieved on average. For an average domestic usage of around 3100kWh/year[6]. This is around 165kWh. The CO2e of the current UK electricity carbon intensity is ~0.412kg/kWh. With 250000 users, this would save 1600 tonnes annually.

4. Summary

The following tables summarise the carbon savings possible from the additional renewable projects that could become viable. This is the equivalent to over 200 000 households supplied with renewable power ~ 0.6 million people.

[6] https://www.ofgem.gov.uk/publications-and-updates/typical-domestic-consumption-values-2015-decision-letter

Type. Locations 2p/kWh uplift	capacity (MW)	Annual output (MWh)	Carbon displaced (tonnes)
Wales, Hydro	13	47000	19000
solar England/Wales	100	110000	43000
wind to 2018 in Sctoland	50	150000	63000
hydro Scotland	1	3900	1600
solar Scotland	2	2100	870
Total in 2-3 years	**170**	**310000**	**130000**
Total in 5 years	**3300**	**620000**	**260000**
with 9-10p/kWh next 5 years	**capacity (MW)**	**annual output (MWh)**	**carbon displaced tonnes**
Scotland	100	180000	72000
England	5	15000	6300
Total in 5 years	**110**	**190000**	**78000**
Maximum in 5 years	3400	810000	340000
Equivalent households supplied with zero carbon power		260000	

The streamline of supply chains is likely to reduce costs further that will enable more projects to become viable.

The additional awareness raising and resulting reduction in electricity use will further reduce carbon emissions should save at least 100 tonnes of kgCO2e a year