# Energy Local

# Middleton Modelling Report

## Contents

# Introduction

This report assesses the feasibility of establishing Energy Local Clubs based around proposed school rooftop solar arrays. The solar arrays would supply electricity to the schools as a first priority and then supply the surplus solar energy generated to the other schools within the groups and potentially also to local residents and businesses. The rooftop space of the schools will be leased by Greater Manchester Community Renewables (GMCR) who aim to benefit local schools and the community, and increase the income from generation in order to support local eco-friendly projects.

We will assess the likely benefits to:

- Greater Manchester Community Renewables (GMCR) who will be installing the arrays
- The schools involved in the project
- The local community

with reference to potential innovative solutions that could further benefit all parties.

Guidance and fees on setting up an Energy Local Club will be provided, with recommendations regarding participating schools, suppliers and consumers.

# Energy Local Overview

Energy Local allows a local group of households, businesses and generators to form themselves into an Energy Local Club (ELC – legally a co-operative), with the demand consumers and the generators as members to enable local balancing. Everyone in the Club must switch to the same supplier. The supplier provides all the billing and licensing responsibilities. All members have half-hourly metering through smart meters. Each half hour, local generation is shared out to the members using power. The Club decides how much to charge per kWh for the locally generated power, this tariff is called the 'match tariff'. By agreeing an internal price for power used locally, the generator can earn a higher amount and demand customers receive cheaper power.

GMCR is the generator owner and the power that the schools use behind the meter will be charged per kWh in a private contract. We are investigating:

- Where the identified schools lie geographically and how they would be grouped together in Energy Local Clubs
- How much power will be generated in each Club

- How much surplus there will be after the schools have used what they need from the array on their rooftop
- Potential consumer members and their benefits
- Benefits to GMCR.

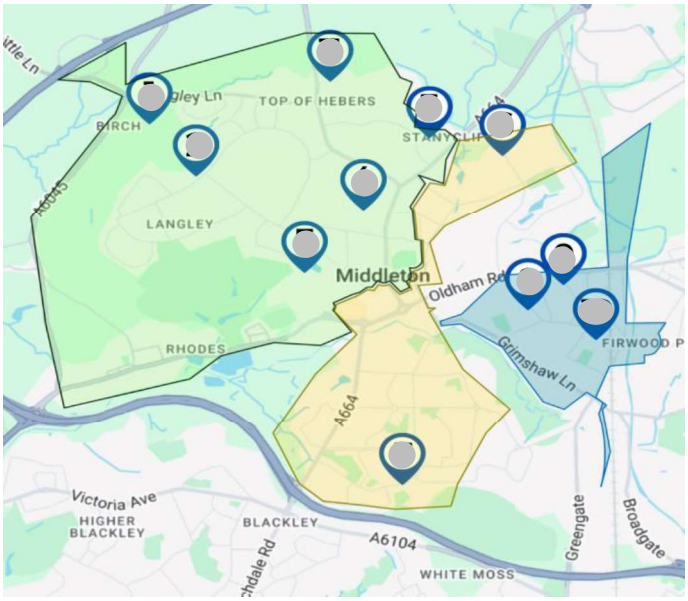
# Mapping

The area for each Energy Local Club is based around the primary substation (usually 33kV/11kV) that the local generator(s) feeds into. Anyone connected to the grid in this area at low voltage can theoretically join the Club, dependent on who the Club opens up to and whether they are able and willing to have a smart meter fitted.

Note that currently the generators and consumers within the Club must be connected at the same voltage. We expect this to change in the coming months so that larger generators connected at 11kV could also join a Club serving households/businesses that are connected at low voltage.

The image below shows the 3 primary substation areas for the schools included in this report.

Image 1: Map showing grouping of schools into Energy Local Clubs




Key

| | |
|---|---|
| 1 | [redacted] |
| 2 | [redacted] |
| 3 | [redacted] |
| 4 | [redacted] |
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| 7 | [redacted] |
| 8 | [redacted] |
| 9 | [redacted] |
| 10 | [redacted] |
| 11 | [redacted] |

Please note that the mapping process for this area is very complex and the map includes each school given. The areas are not all complete and may extend beyond the given boundary. If other schools are of interest we will check whether they fall into one of these areas.

The Energy Local model is able to provide the mechanism for selling power locally at a locally decided price due to the fact that the power does not go beyond the local power station. As power cannot be sold to premises in different substation areas to the generator, we will assess the four different Club areas shown in *image 1* to find which area is likely to provide the highest benefits all round.

*Table 1: Schools grouped together by potential Energy Local Club areas.*

| Club A | Club B | Club C |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

# Load, generation and export data

Half-hourly and hourly load data was provided for five of the schools. For the remaining sites, we projected their load consumption using the known annual kWh consumption and by comparing their size to the schools in Middleton for which load data was available. This gives us a good impression of what load for each site would look like.

Projections for all sites are based on the size, orientation and geographical area of the arrays.

*Table 2: Type of data used for each site.*

| Site | Load Data Used | Generation Data Used |
|---|---|---|
| | Actual HH Data | Projection |
| | Actual HH Data | Projection |
| | Projection | Projection |

| | | |
|---|---|---|
| | Hourly Data | Projection |
| | Actual HH Data | Projection |
| | Projection | Projection |
| | Projection | Projection |
| | Projection | Projection |
| | Projection | Projection |
| | Hourly Data | Projection |
| | Projection | Projection |
| | - | No PV Estimate |
| | - | No PV Estimate |
| | - | No PV Estimate |

, and have not been included in our modelling because there was no PV estimate available.

In order to calculate the amount of export from each school and how and when they would need to import power, we calculated the amount of power used by each school from its own potential rooftop array, how much extra power it could provide to the Club, and how much import it would need from the supplier.

Please note, the figures in the following table represent the values we modelled with. There is some minor variation between the numbers we use in our modelling and the actual usage and generation estimates; this is because we made half hourly projections for sites from hourly estimates where data was not available.

*Table 3. Overview of import, export, and impact of solar panel installation on onsite energy consumption at each site*

| Site | Club | Generation kWh | Load kWh | Exported kWh | Exported % | Used by school kWh | Used by school % | Import required kWh | Import required % |
|---|---|---|---|---|---|---|---|---|---|
| | A | 14,059 | 58,016 | 3,009 | 21% | 11,050 | 19% | 46,965 | 81% |
| | A | 169,209 | 213,034 | 80,054 | 47% | 89,155 | 42% | 123,879 | 58% |
| | A | 216,905 | 223,686 | 118,924 | 55% | 97,981 | 44% | 125,705 | 56% |
| | A | 148,582 | 277,714 | 54,035 | 36% | 94,548 | 34% | 183,166 | 66% |
| | A | 104,564 | 71,678 | 68,819 | 66% | 35,745 | 50% | 35,933 | 50% |
| | A | 276,291 | 213,034 | 172,318 | 62% | 103,973 | 49% | 109,061 | 51% |
| | B | 159,676 | 104,292 | 104,436 | 65% | 55,240 | 53% | 49,051 | 47% |
| | B | 54,226 | 58,016 | 28,951 | 53% | 25,275 | 44% | 32,741 | 56% |
| | C | 140,762 | 1,491,239 | 866 | 1% | 139,897 | 9% | 1,351,342.15 | 91% |
| | C | 28,118 | 65,824 | 10,195 | 36% | 17,924 | 27% | 47,900 | 73% |
| | C | 54,226 | 62,077 | 27,951 | 52% | 26,275 | 42% | 35,802 | 58% |

Glossary for table 1:

**Generation:** How much electricity is generated by the rooftop solar array.

**Load:** How much electricity the school uses in total.

**Exported:** How much electricity is exported or estimated to export once the school has used what it needs from the solar array.

**Used by school:** How much of the electricity generated on site is used by the school.

**Import required:** How much electricity the school needs to import after it has used the electricity generated on site.

# Energy Local Clubs

The largest benefit to the community will be found where there is the most amount of exported power available. This power can then be sold at the match tariff, so benefitting the local households as well as GMCR.

Since not all schools listed will be able to have the solar arrays installed, we recommend starting this project with the Clubs that will give the best overall benefit whilst also ensuring the selected schools will benefit significantly from their rooftop array. The extra income from these first generators could be used to assist the business case for developing further Clubs and/or adding more generation to potential Clubs in the other areas.

*Table 4: Overview of available export per Club*

| Club | Number of schools | Total on site power used by schools kWh | Average on site power used by school % | Total export kWh |
|---|---|---|---|---|
| A | 6* | 432,452 | 39.7 | 497,159 |
| B | 2 | 80,515 | 48.5 | 133,387 |
| C | 3 | 184,096 | 26 | 39,012 |
| D | 1 | 103,973 | 49 | 172,318 |

* For the purpose of this report have been grouped together.

GMCR have stated that they are not in a position to install solar arrays at all of the schools listed and have requested recommendations on which would be most

beneficial to install. By installing solar arrays and creating an Energy Local Club with the schools in group A there will be a significant amount of exported power to use in the Club to benefit local households, meaning a most likely benefit to GMCR of having the solar installed. As Club A will also benefit most schools and local households we will investigate the benefits of this Club.

# Club A modelling

## Modelling assumptions

When calculating benefits within an Energy Local Club model, we used these assumptions.

We used a household flat tariff of 24.5p/kWh and a standing charge of 61p/kWh to compare being in the Club to being on a standard flat tariff. We have assumed standard average annual consumption of 2,700 kWh per household.

For school business tariffs, we also used a flat tariff of 24.5p/kWh as an estimate provided by an independent energy consultant.

Standing charges are not included for schools in scenario 1 and are the same as the households beyond this. This is a limitation of the model so the cost of the standing charge should be added to calculations when known before going ahead with a Club. Standing charges could vary considerably between schools. For households the standing charge for the Deep Green supplier is 65p per day, and the Standard supplier is 61p per day.

Since the exact number of properties on Economy 7 tariffs is unknown, we estimated it to be 12% based on mapping at https://www.nongasmap.org.uk. We used an annual consumption of 8,900 kWh for those on Economy 7 tariff, with an overnight tariff of 13p/kWh and daytime of 27p/kWh.

The generator owner will have a Power Purchase Agreement (PPA) which pays for the exported electricity that is not used by the Club consumers. We have used 8.5p/kWh for comparison to a standard PPA and 8p/kWh as the exported PPA rate with an Energy Local Club.

In all scenarios we assume that each school will buy the power from the solar panels on their roof from GMCR behind the meter at 18.4p/kWh

The Match Tariff is the unit rate agreed in the Club for the electricity used when it is generated locally. This is the price to the Club members, and also the price that GMCR would receive.

Note that this modelling assumes no behaviour change so gives a worst-case scenario. With access to the Energy Local dashboard and local support, people are likely to adapt their consumption in order to access the lower tariffs, which will also result in a higher return for the generator.

## Suppliers

Energy Local works with licensed suppliers who provide all billing and licensing responsibilities. The supplier provides extra power – at a higher price - when the generation within the Club is less than the demand. We are currently working with one supplier which is a deep green supplier so guarantees that all power it buys is renewable. This also means that they charge a slightly higher price than more mainstream suppliers. We anticipate launching Clubs with 2-3 more suppliers with more mainstream tariffs in the next year. Due to the anticipated installation and preparation time of the generation and Clubs in this report, we have provided modelling and benefits using both the deep green tariffs and more mainstream tariffs.

## Scenario 1A: Schools as consumer members

All schools at some point are likely to have higher demand than generation, so we first investigated whether it would be beneficial to add schools as consumer members into the Club.

The export into the Club is the amount of power that is exported from all generation sites once the school below has taken what it needs behind the meter. Adding all schools into a Club as both consumers and generators led to 11.2% of the export into the Club being used within the school group which offered an 8.92% coverage of total demand.

We used a flat match tariff of 18.4p/kWh – the same as the behind the meter tariff - to ensure that the schools weren't better off by importing power from other generators within the Club rather than using the power available on their own rooftops. We could lower the match tariff to provide a higher benefit to schools.

Income to GMCR includes the income of selling power behind the meter to each host school at 18.4p/kWh, exporting what is needed into the Club at 18.4p/kWh and selling any further export through the PPA at 8p/kWh.

Costs to the schools include buying the power from the solar on their rooftop at 18.4p/kWh, buying what it can from power exported by other schools at 18.4p/kWh, and importing any further power required at 24.5p/kWh

*Table 5: Electricity costs for schools and income to GMCR with and without an EL Club*

| | **Cost to schools** | **Income to GMCR** |
|---|---|---|
| **No school use of rooftop solar, no EL** | £259,005 | £79017 |
| **Solar used on site, no EL Club** | £232625 | £121830 |
| **Solar used on site plus EL Club** | £229168 | £125141 |

With only schools included in the Energy Local Club, there is a small overall benefit to the schools of £3467 as compared to the benefits of just having a lower cost of power behind the meter. There is also a small benefit of an Energy Local Club of £3311 to GMCR. The low benefit is due to the fact that the power exported to the Club is only available to other schools, which all have a similar demand profile, meaning that a large proportion (89%) of the exported power is sold through the 8p/kWh PPA.

Although the coverage of total demand when export is shared around the schools is not substantial, we recommend that it is worth including schools as consumers if they are willing and able to switch their import supplier to the Club supplier, as it won't take significantly more resources to set the Club up in this way. Further modelling would be required once Club consumers are confirmed if savings specific to each school is needed.

In order to find a more beneficial scenario for GMCR we next added households to the model.

## Scenario 1B: Schools and local households on a Deep Green tariff

In scenario 1, 89% of generation is being sold through a Power Purchase Agreement (PPA) and not being used within the Club. Adding households may use up some of this excess power and provide a financial benefit to local residents.

Adding 300 households to the Club leads to an increase to 46% of the total generation being used locally, covering a total of 14% of demand.

A flat household match tariff was found to be most beneficial with the Deep Green Club modelling as there is little room for manoeuvre from PPA price when the time of use peak tariff is high. Other Match Tariffs can be considered should a Club go ahead.

*Table 6: Tariffs used in modelling benefits for this scenario*

| Time | TOUT p/kWh | Match households p/kWh | Match schools p/kWh |
|---|---|---|---|
| **7am-4pm** | 23.8 | 11 | 18.4 |
| **4pm-8pm*** | 36.2 | 11 | 18.4 |
| **8pm-12am** | 23.8 | 11 | 18.4 |
| **12am-7am** | 15.7 | 11 | 18.4 |

* There is no peak tariff on weekends, the day tariff runs from 7am-12am.

*Table 7: Benefits to generator, schools and households for this scenario.*

| | No ELC | With ELC | Benefit/£ | Benefit/% |
|---|---|---|---|---|
| **Generator Income*** | £121830 | £126277 | £4447 | 3.7% |
| **Schools** | £232625 | £230215 | £2410 | 1% |
| **Households E7** | £2043 | £2095 | -£52 | -2.5% |
| **Households** | £885 | £824 | £61 | 6.9% |

* Generator income includes sale of power behind the meter to schools, exporting to the Club and exporting the excess through a PPA.

Although a loss is shown for E7 households, note that the model assumes that behaviour doesn't change, when in fact people can be supported to heat their storage heaters when the most power is available in the middle of the day, which would increase the benefit to the generators as well as the E7 households. It is also an option to open the Club to non-E7 households in the first instance, and complete further modelling once launched to ascertain benefits of adding E7 households.

There is less than our recommended minimum of 10% benefit to the generator and households in this scenario. The model assumes no behaviour change and in

fact people usually change their demand behaviour to access cheaper electricity, however it is clear here that the demand profile for households do not match up well to the generation available when considering these tariffs. This is due to the generation being available during the day when generally people use most of their power during the evening peak time of 4-8pm, which is high with the deep green tariff.

## Scenario 2: Schools and local households on a Standard Tariff

Business tariffs with the deep green company are competitive, so there is no need to repeat scenario 1A with a standard tariff as outcomes will be the same. We have kept the number of households at 300.

Here we have replicated a time of use tariff from a mainstream supplier. In order to increase benefits to the generator, we have created a match rate that is in line with the time of use tariff. This serves two purposes:

1. Provides more flexibility in pricing, allowing for a higher match rate when the time of use tariff rises, increasing benefits to the generator
2. Encourages members to move their consumption away from the peak time period, when there is the most strain on the electricity network.

Here we consider a match rate which is 60%, 70% and 80% of the time of use tariff across the time periods.

*Table 8: Tariffs used in modelling benefits for this scenario*

| | | Match p/kWh | | |
|---|---|---|---|---|
| **Time** | **TOUT p/kWh** | **60% TOUT** | **70% TOUT** | **80% TOUT** |
| **7am-4pm** | 17 | 10.2 | 11.9 | 13.6 |
| **4pm-8pm** | 28 | 16.8 | 19.6 | 22.4 |
| **8pm-7am** | 16 | 9.6 | 11.2 | 12.8 |

| | | 60% Match Tariff | | | 70% Match Tariff | | | 80% Match Tariff | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **No ELC** | **With ELC** | **Benefit/£** | **Benefit/%** | **With ELC** | **Benefit/£** | **Benefit/%** | **With ELC** | **Benefit/£** | **Benefit/%** |
| **Generator income*** | £121830 | £129054 | £7224 | 5.9% | £131122 | £9292 | 7.6% | £135443 | £13613 | 11.2% |
| **Households E7** | £2043 | £1784 | £259 | 12.7% | £1793 | £250 | 12.2% | £1821 | £222 | 10.9% |
| **Households** | £885 | £702 | £182 | 20.6% | £708 | £176 | 19.9% | £718 | £166 | 18.8% |

*Table 9: Benefits to generator and consumers for this scenario*

*Generator income includes the sale of power behind the meter to schools at a tariff of 18.4p/kWh, export within the Club at the match rates, and export through the PPA at 8p/kWh. Note that the income will differ slightly if the match rate to schools is different to the match rate to households.

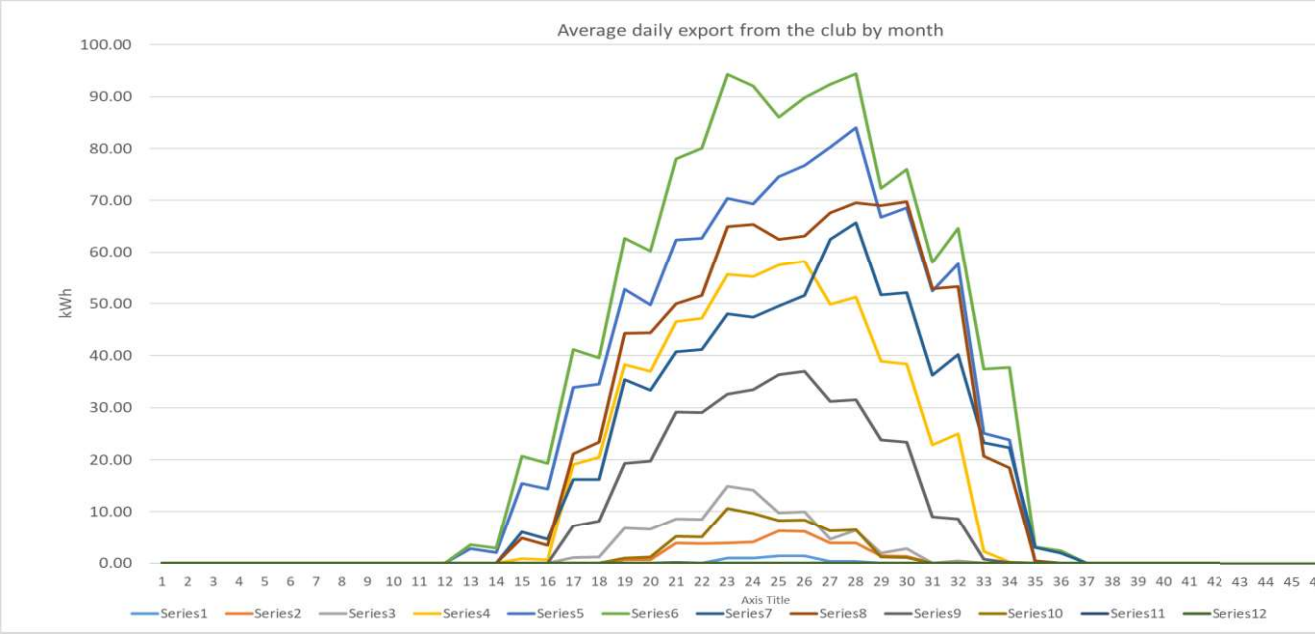
There will be substantial benefits all round of launching a standard Club with the schools and local households as consumers when a standard supplier tariff is available.

Adding more households to the model does not significantly increase the benefits to GMCR due to the demand curve of domestic consumption. In order to increase benefits to GMCR by increasing the amount of power being exported into the Club we will need to consider adding other demand customers.

# Increasing Club benefits

Due to the generation profile of the Club and the demand profile of the average household, there is significant export being sold through the PPA in the scenarios above, thus not providing as good an income for GMCR as could potentially be achieved.

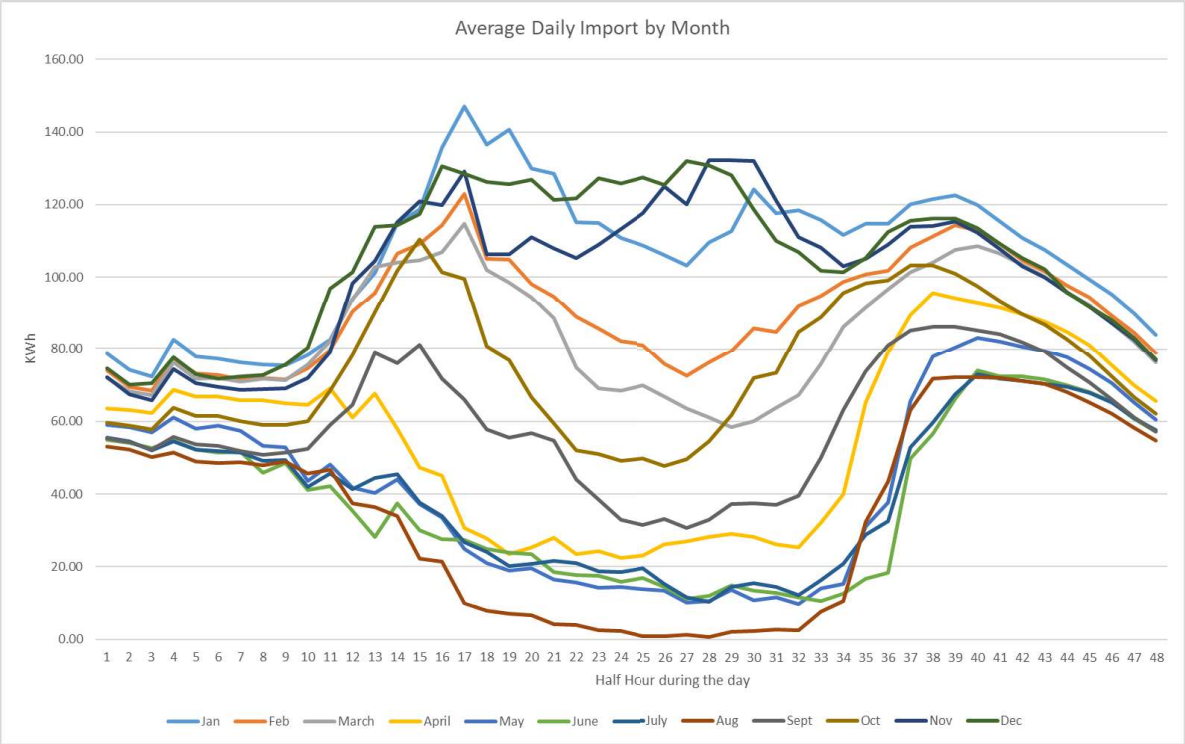
Graph 1: Average daily export from the Club by month. X-axis shows half hours across the day. Series 1-12 are months January-December.




Graph 1 shows that primarily the export is during the middle of the day. Note the average does not distinguish between weekdays and weekends, and that the average daily curve of export will be different during the week for months when schools are operating.

The average daily import is given in Graph 2. This shows that even in the middle of summer there will be some days when import is required, which could be partially covered through installation of battery storage.

*Graph 2: Average daily import to the Club.* X-axis shows half hours across the day.




There are 4 approaches we can consider to increase the proportion of locally produced power that is used within the Club:

1. Community engagement and education
2. Adding business consumers into the Club that will match the exported generation profile well
3. Including electric vehicle (EV) chargers in the Club
4. Adding storage to the Club.

## 1: Community engagement and education

Since the model and outcomes assume no behavioural change from the consumer members, there is plenty of scope for increasing the benefits to both GMCR and the local community through energy matching. Workshops, drop-ins, mail drops and visits can all help local residents to understand how they can access more cheap energy. By helping people to understand their costs and behaviours, supplying smart plugs, and providing help to access the Energy Local dashboard, it not only increases opportunities to save money but also creates a

sense of community empowerment, engagement and active participation in the Club, which would be community owned and managed.

Energy Local provides community engagement resources and support as part of the process of setting up an Energy Local Club.

## 2: Adding business consumers to the Club

The other way to increase benefits to the generator without – or before - paying for expensive new infrastructure would be to invite local businesses that use more power over the weekend and during school holidays to join as consumers. As can be seen by the high export of power out of the Club, household demand does not fit particularly well with when the power is available. This can be increased somewhat through education and engagement around demand shifting, but there is likely to always be a significant export during the summer holidays and weekends with only households as consumers.

In order to add businesses to the Club we would need access to their half hourly import data to ascertain whether they are a good fit for the available generation. Businesses to consider could include:

- Youth centres
- Play centres
- Escape rooms
- Indoor (weekend) markets
- Pop up shops/event spaces
- Pottery painting workshops – able to shift their primary load via their kilns
- Performance venues
- Ice cream/dessert shops

GMCR has stressed the importance of benefiting the local community and would prefer to focus on this before looking into providing power for larger businesses and corporations in the area. It is very likely that there will be local small businesses who fit the demand requirements for the Club and could benefit significantly. Work in approaching, engaging and modelling for businesses can be supported by Energy Local.

## 3: Electric vehicle (EV) charging

Providing EV charging for teachers and local businesses could provide a useful means to use power in a manner that can be scheduled, using up excess power during the middle of the day.

For example, if there were 3 x 7kW chargers near each of the schools that were used for 3 hours a day in the middle of the day, they would use around 50kWh per half hour which would use up much of the additional power. Where

charging is required in winter, the chargers would require import from the supplier, meaning that the cheaper match rate would not be available. Understanding the appetite and charging requirements of potential users is very important to installing the right number of chargers. Community engagement to help people to understand how the Club and availability of cheap power works will enable GMCR to maximise their benefits.

Chargers can either be installed 'behind the meter' – meaning that they take power from the solar array before being metered – or elsewhere within the Club boundary. Installing chargers 'behind the meter' would mean that they could still be used for charging from the local solar even if there was an unexpected regulatory change, however this may not be the best location for users other than teachers during school hours. Unless conveniently located it would also mean that when there is peak export during the summer holidays and weekends, the chargers would not be used.

## 4: Adding storage to the generation sites

| | Jan | Feb | March | April | May | June | July | Aug | Sept | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Average daily import (kWh)** | 5087 | 4354 | 4049 | 2654 | 2039 | 1826 | 1931 | 1646 | 2835 | 3599 | 4842 | 5032 |
| **Average daily export that could be stored (kWh)** | -5 | -40 | -97 | -665 | -1080 | -1308 | -749 | -920 | -380 | -64 | 0 | 0 |
| **Balance (kWh)** | 5082 | 4314 | 3951 | 1989 | 959 | 518 | 1182 | 725 | 2454 | 3535 | 4842 | 5032 |

*Table 10: Club import, export, and overall import (balance) if storage was available*

Including storage in the Club means that excess power generated during the day could be stored and discharged during the expensive peak time, where there usually won't be sufficient power at the match price to meet demand. A more consistent source of cheaper power will be highly beneficial to consumer members whilst simultaneously increasing the income potential for the generator.

The balance between import and export per day on average is given in table 10.

This shows that on average the power stored in the battery during the day could be used during peak time and overnight. Note that there will be days when the battery is insufficient to store all the power generated or it will not all be used. On average, batteries capable of storing 1-3MWh with a charge rate of around 200kW would be sufficient to store the 'spare' power for the majority of the time. This could provide the added benefit of being able to provide power when the TOUT is most expensive, which would be most beneficial if the Deep Green tariffs are used.

The total stored and used power is around 160MWh a year. With a flat rate of 11p/kWh this gives an additional income of around £17600/year to the generators. However, storage increases the potential for a variable match rate (higher at peak times) for the currently available deep green tariff as well as a standard tariff, which would increase the benefits to GMCR. In winter, when there is little solar to store, the battery could be charged from the grid during the night at the lowest tariff available and provided to the Club at a tariff higher than the charging tariff, but lower than a standard import tariff. The income of £17600/year is therefore very much a worst case in terms of additional income. The cost of a 1MWh battery is around £0.4-0.5million and a higher tariff for export, charging at off peak times or ancillary services would need to be provided to make this viable.

Note that one large battery would be more cost effective that a number of small batteries but this does rely on the regulatory regime staying constant to gain the income from a local energy market. Currently GMCR could charge zero as a match tariff for filling the battery as long as it was placed somewhere within the Club boundary. Multiple smaller batteries on different sites could be used without a local energy market (but with less value) but would be more expensive to install.

# Developing an Energy Local Club

The development of this Club would follow the standard set up process of Energy Local Clubs and we would supply a formal proposal once all requirements were confirmed.

Task 1: Modelling

Once we have confirmed which schools and local businesses would be included and the PPA and tariffs for those involved, we would re-visit the modelling and produce a modelling report.

Task 2: Advisor training

Energy Local Clubs are community owned and managed co-operatives. We train a local Advisor(s) who initiate community engagement, approach relevant organisations and individuals to support the Club creation and management. Energy Local provides all of the resources and templates required for the local energy market to reach launch.

Task 3: Supplier management and technical requirements

Every consumer must switch to the partner supplier, and each generator must agree a PPA with the same supplier. Consumer members simply complete a form on the relevant page of the Energy Local website and agree to switch their supplier. Energy Local then works with the supplier to set up the Club under the relevant regulatory requirements and switch members onto the Club tariffs. Energy Local can support with PPA agreements and any connection issues. GMCR would not need to undertake any technical discussions outside of the PPA agreement.

Task 4: Club management

Energy Local Clubs must be registered as co-operatives. Energy Local can support with this application and provides all the necessary templates and documentation. The co-operative is usually registered with Founder Members, with Directors needing to be assigned within one year, and preferably before Club launch.

The Club will need to arrange an AGM each year and generators will need to agree a PPA with the supplier annually. It is the Club's responsibility to ensure the Club is run successfully which includes, but is not limited to:

- Organising AGMs
- Agreeing match tariffs
- Ensuring the Club's page on the Energy Local website is regularly checked and updated where necessary
- Answering member enquiries
- Checking the Club email inbox regularly and answering enquiries, with the support of Energy Local staff where required
- Recruiting members
- Communicating with members
- Progressing new members through the Energy Local portal up to becoming active members
- Engagement and education with potential, new and active members to ensure they are getting as much benefit as possible from the Club.

# Estimated set up costs

| Task | Fee |
|---|---|
| Mapping the area of the Club | PAID |
| Further modelling with confirmed generators, homes and selected local businesses. Up to 6 generators and 4 local businesses. | £900 |
| Training a local advisor(s)<br><br>2 days initial training<br><br>(does not include travel and accommodation) | £600 |
| Ongoing support to launch, access to all resources and materials | £7500 |
| Supplier switch management and complex site development | £900 |
| ESTIMATED TOTAL<br><br>Excluding VAT | £9900 |

# Ongoing costs

Energy Local charges a household fee of £6 which is charged directly on member bills.

The Club charges a Club fee to cover ongoing costs such as AGM hall hire and community engagement resources. This is decided by the Club and is usually £3-£10 per year, again this is charged on the bill and invoiced by the Club.

Each generator is charged annually, the cost is based on the size of the generation and for small scale generation ranges from £15 - £60 per year. We may be able to offer some discount on this as all generators are owned by the same company and profits are used to benefit the community.

There is a fee payable when more generation needs to be added to the Club to cover new modelling and administrations costs. This is usually £175-£500 depending on the size of the generation.

Energy Local can provide consultation regarding connections, metering, regulations and community engagement, which at the time of writing this report is charged at £300 per day for community groups and non-profit organisations. Note that we assume a few days within the standard set up cost to support with these issues.

## Regulatory considerations

Energy Local works under the complex site model and has been developed with approval from Elexon. This type of complex site allows a local group of energy consumers and generators connected under the same primary substation and at the same voltage level to net off the generation and demand that is used in the same half hour. That is, the generation may not be behind the same meter as the demand that is using it. This enables a 'local market' within this area thus facilitating lower cost power when power is used locally but more income to the generator. Generators and demand users can then agree their own price for the power used locally with their group.

Creating a complex site through Energy Local requires involvement from:

- Energy Local
- The partner supplier
- Data Central Collector (DCC): collects data from smart meters.
- Data Collector(DC): collects data from meters themselves or from the DCC and validates it.
- Data Aggregator (DA): aggregates data to send to settlement and other parties.
- Meter Operator (MOP): installs and maintains meters.

A local energy market via a complex site operates by grouping all the demand customers and generation customers together. The import and export electricity is aggregated and enters settlement under one import MPAN and one export MPAN (these are identifier codes assigned to meters for export or import). Note that a collection of MPANs could be owned by one organisation. These could be the generator's import and export MPANs, or it could be one of the demand customers' MPAN (if three phase).

All of the above is managed between the parties outlined above. The Club members, directors and facilitators do not need to understand these processes in any depth and are not required to participate in setting up the complex site.

# Legal and administrative requirements

There are administrative requirements in the set up and running of an Energy Local Club. These are outlined above, will be specified in any proposal and investigated further when training local Advisors/facilitators.

The Club will need to agree to Energy Local terms and conditions regarding Club progression and payment of fees.

Generator(s) will need to agree the Power Purchase Agreement with the supplier.

Schools often procure their power with agreed suppliers. In the case of Energy Local the generators involved will need to agree their export contract with the Club's partner supplier. If the schools want to benefit from the match rate as well as receive available power "behind the meter", they will need to switch their import contract to the same supplier.

The set up of the complex site requires that there is at least one 3 phase import and one 3 phase export meter within the Club. If the generators do not have their own grid connection, and are fed through the meter of the school below, but none of the schools are willing or able to switch import supplier then the Club will need to ensure that there is another three phase import meter elsewhere in the Club. This could be a community building, church, pub or other local business.

# Associated risks

Energy Local is an innovative approach to enabling local energy markets. It is reliant on current regulations and legislation, and although it has been supported by Elexon, it is not without risk. Regulatory movement is in the favour of this local energy model and others in the sector, but it is reliant on the relevant regulations being maintained. Any Club that is set up should be financially viable without Energy Local, with Energy Local providing an opportunity to optimise the potential of the local market.

The generator would have a legally binding export contract with the supplier, providing protection for the length of the contract. Domestic consumer members are able to leave the Club and the partner supplier at any point with no exit fees. Commercial consumer members will have an import contract and will need to ensure the terms are agreeable at the time of signing.

Energy Local fees are stage-gated so that each task or related tasks are paid for before being delivered. We have terms and conditions regarding payments

and refunds which can be shown on request beforehand, or will be shared at the time of sending the formal proposal.

# Recommendations and next steps

Given that the area in question has a high proportion of households in fuel poverty and the highest benefits all round would be seen with a supplier providing a lower time of use tariff, we recommend monitoring the availability of new supplier tariffs with Energy Local while installing the solar arrays. If arrays are installed and the deep green tariff is still the only option, we can re-model the scenarios using the precise tariffs and PPAs offered. With outreach and good community engagement, we expect that significant benefits will still be found for the local community with the deep green tariffs, more so if storage is included, but it will require careful planning and local budgeting and energy monitoring support. The deep green tariff provides the guarantee that all power bought and sold is renewable, which may help with carbon accounting and contributing to the area's Net Zero goals.

It is possible to launch a smaller Club with whichever schools have the generation installed first. Although we have concentrated on Club A here, if other areas are deemed to be more viable for generation installation in the near term we can work on any other primary substation area. However, it would be most beneficial to concentrate installations within one area initially in order to develop a successful Club.

We recommend launching the Club with households and schools as consumer members if the schools are able to switch their import contract to the Club's partner supplier. Due to the high cost of installing batteries we recommend finding one or two local businesses that could benefit from joining the Club and optimise the benefits to GMCR. Once this is set up, we can remodel using real data and establish whether adding more households or businesses would be beneficial or if storage is the best next step.

There are two reasons to install batteries; firstly, if there is significant export even with local businesses included in the Club, the storage will enable the local power to be spread to whenever it is most required. The second reason would be if GMCR wants to considerably increase the benefits to local households, potentially without local businesses being involved. Storage will allow for the match rate to be available to households throughout the day and evening more often, and limiting business consumers will increase the amount of power available to households, although there will be times where there is more exported power than can be stored. Careful consideration will need to be given to the costs of storage and whether the benefits given to households plus the increased income to GMCR will balance the costs of the storage.

If storage is desired, suitable sites will need to be identified and quotes provided for different sizes of batteries. Energy Local can provide data for this.

We recommend considering EV charging after a Club is launched and after considering local businesses who can shift demand to use the available export. If EV charging is desired possible locations for charging points will need to be identified with consideration to demand profiles and whether the chargers are wanted behind the meter or not. Considerable market research will be needed to ascertain the potential desire and market for EV charging.

We were recently informed that potential for solar installations at Hopwood Hall College and Edgar Wood were looking promising. We can provide modelling based on these two schools at no extra cost to find whether they could benefit local households from the outset, or if it would be more beneficial to recruit more schools in the area before considering a Club.

It is clear that an Energy Local Club has potential to provide benefits to the local community and to GMCR. We would welcome the opportunity to further work together in order to develop a local energy market in Middleton.

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