Local supply: Options for selling your energy locally

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3rd Edition

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Stephens Scown's renewable energy team is one of the largest dedicated to renewables in the South West and is recognised by Chambers, independent legal guide and Legal 500, which highlights the expertise of the team's head, Sonya Bedford. The firm has worked with major developers like IB Vogt, ReneSola, Anesco, SunEdison, British Solar Renewables, Sun Farming and Bath and West Community Energy and has considerable experience in local supply through advising a number of suppliers and community energy groups, including Mongoose Energy.

Cornwall Council has set out ambitious plans for a new energy future for Cornwall that will see lower energy bills, greener and more affordable homes and 100% of Cornwall's electricity demand to come from low carbon sources. The Council has been exploring local supply models as a means of achieving lower energy bills, greater local ownership of generation and retention of energy 'spend' in the local economy.

Contents

1 Introduction

Our energy system is changing. Communities across the UK are no longer satisfied with a centralised, carbon intensive energy market. Instead, many have a desire to have a stake in local, low carbon energy generation and management projects.

Our energy system is also getting smarter. The roll-out of smart meters and the growth in smart technologies and services is changing the way households and businesses interact with the energy they use. The way that energy is generated, transmitted and balanced is changing with better data, new generation technologies and more active management systems.

There is a growing interest in local supply options that enable:

- Locally-owned generators to sell their power directly to the local community
- Greater control over energy bills and the ability to pass on savings to customers
- The creation of social enterprises that customers trust
- A greater connection with and support for local renewable energy projects
- Access to new sources of value through providing local balancing and flexibility services.

The third edition of this paper focusses on the most recent innovations and thinking in local supply models. It looks at where there are sources of value from a more local approach, which can then be reflected in lower tariffs for demand customers and a better price for local generation.

The purpose of this paper is to help community organisations and suppliers understand how the electricity supply market is changing, what the emerging local supply models are and the key considerations and challenges to making them work.

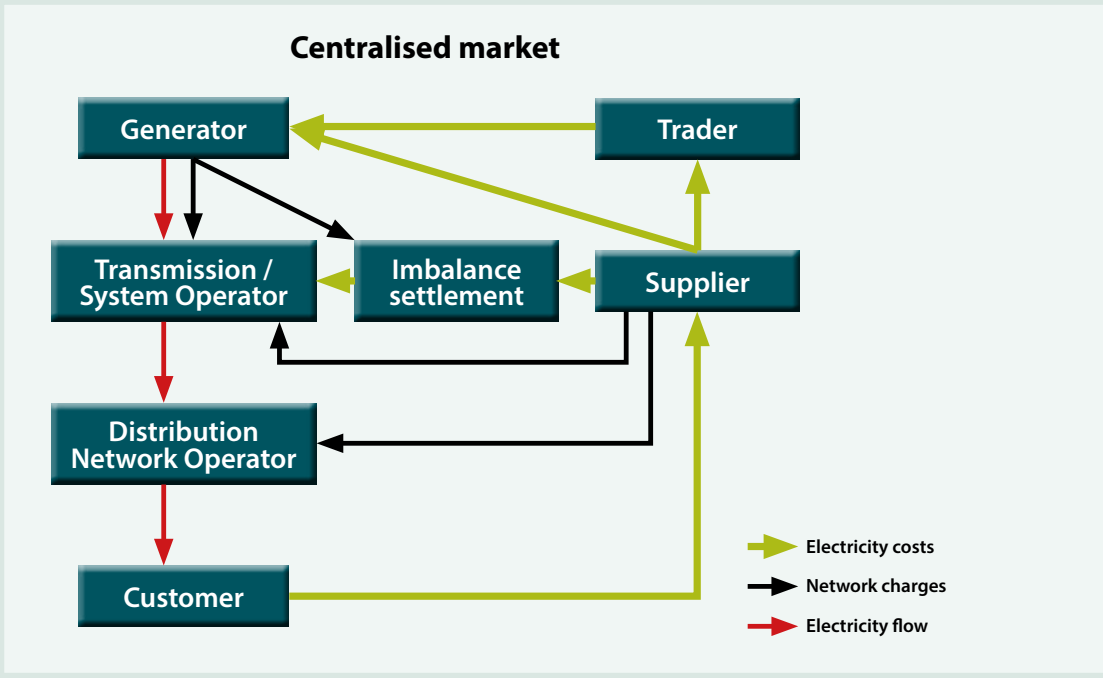
Previous editions of the paper provide more information on more established local supply models, such as white labels, sleeving and energy service companies.

2 Introduction to current electricity supply markets

2.1 Centralised market

Our electricity system was designed around a centralised market, where large power stations generate energy, national suppliers buy and sell this energy and the whole system is balanced on a national scale.

The market is complex and involves a number of parties, which are set out in the diagram on the right.



2.2 Licensing

In order to supply electricity in the UK using the public network, you must have a supply licence and comply with a number of industry codes and regulatory obligations to ensure that the system is safe and we avoid blackouts. Suppliers have various options for buying electricity, including a contract with a generator, through a trader over an energy exchange or within their own company if they are vertically integrated.

2.3 Balancing and settlement

A key part of the supplier's role is to ensure that electricity supply matches demand as closely as possible. This is because electricity is generated, transported and used in real-time and cannot easily be stored. If the supplier does not get this balancing act right, it can be very costly.

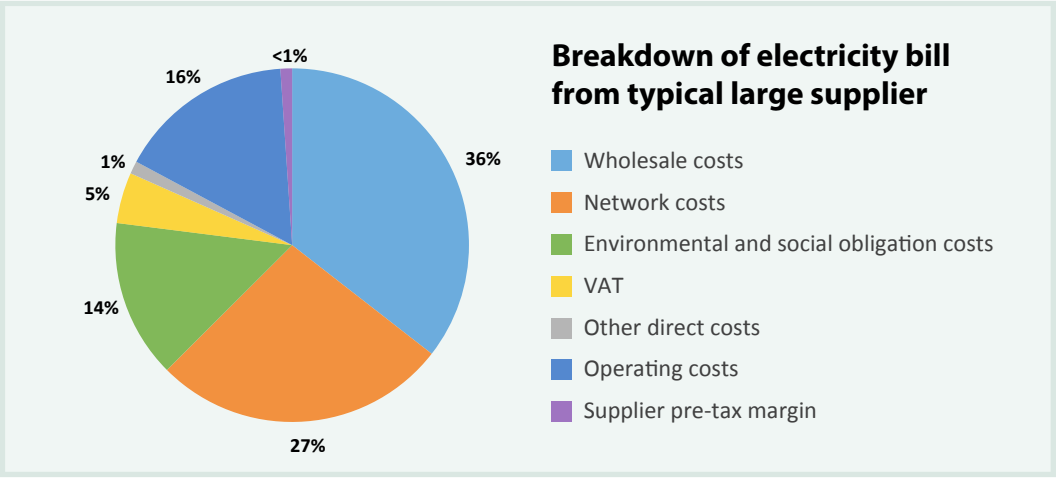
Trading and balancing of electricity happens in half hour chunks, called settlement periods. The supplier estimates how much their customers are going to need and buys enough generation to match this amount. The Transmission System Operator (TSO) monitors real-time demand and supply and has the ability to pay generators to switch off or on to help balance the system.

Afterwards, actual metered data is collected from suppliers and generators and compared with the amounts contracted. When a generator has generated more, or a supplier has used less than expected, they need to sell the electricity to the grid, and when a generator has a shortfall in generation or a supplier's customers use more than expected, they must purchase additional electricity. The process of imbalance settlement is carried out by an organisation called Elexon and follows the rules set out in the Balancing and Settlement Code (BSC).

2.4 Typical electricity bill

A typical domestic electricity bill can be broken into different costs. Only 36 per cent is the wholesale cost of electricity, which is paid to the generators. Over a quarter of our bill is paid to the transmission and distribution network operators to deliver energy into our homes and businesses, 19 per cent is paid to the government in tax and for environmental schemes, and 16 per cent goes to the supplier for billing, metering and their margin.

The chart on the right shows Ofgem's estimate of a typical larger supplier's annual costs and pre-tax margin in 2017.[1]



2.5 A changing electricity market

The electricity supply market has long been dominated by the 'big six' energy companies (possibly shortly to be the 'big five' following the news of the proposed merger of SSE and Npower). But there has been a wave of new entrants, with independent suppliers increasing their market share from just 2 percent in 2012 to 17 percent at the beginning of 2017.[2]

We have also seen a growing interest in more local approaches and the announcement of new suppliers with an explicit focus on local benefit, such as Robin Hood Energy, Bristol Energy and Our Power. There have also been trials that link generation and supply in a local area using virtual aggregation or local tariffs. The regulator, Ofgem, has welcomed these developments and the opportunity to increase consumer engagement and choice, as long as it is not at the expense of customers who aren't included in a local scheme and that appropriate customer protections are provided.[3]

Another significant change in the electricity market is the requirement on all suppliers to roll-out smart meters to all domestic and smaller non-domestic consumers by 2020. In January 2017, Smart Energy GB reported that almost 5 million smart meters had been installed to date[4] and the government forecasted that much of the roll-out would take place towards the end of the 2016-2020 period.[5]

Linked to the smart meter roll-out is the move towards half-hourly (HH) settlement for all customers. Half-hourly settlement provides an incentive for suppliers to encourage customers to move their consumption into periods when electricity is cheaper. It can enable suppliers to better reflect wholesale prices and use of system charges in the tariffs they offer, for example through a time of use tariff.

Elective HH settlement for domestic customers is already available, but is only being used in a very small number of cases. Ofgem has been working since May 2016 on removing barriers to elective HH settlement, but expects to mandate all suppliers to settle their customers on a HH basis to realise the full benefits. We expect a decision on implementing mandatory HH settlement by the second half of 2019.[6]

1 https://www.ofgem.gov.uk/data-portal/breakdown-electricity-bill
2 https://www.ofgem.gov.uk/data-portal/electricity-supply-market-shares-company-domestic-gb
3 Ofgem's Future Insights Series Local Energy in a Transforming Energy System, 2017. https://www.ofgem.gov.uk/system/files/docs/2017/01/ofgem_future_insights_series_3_local_energy_final_300117.pdf
4 Smart Energy GB, Smart energy outlook 2017. https://www.smartenergygb.org/en/resources/press-centre/press-releases-folder/smart-energy-outlook-august-2017
5 BEIS, Smart meter roll-out cost benefit analysis, 2016. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/567167/OFFSEN_2016_smart_meters_cost-benefit-update_Part_I_FINAL_VERSION.PDF
6 https://www.ofgem.gov.uk/system/files/docs/2017/07/electricity_settlement_reform_significant_code_review_launch_statement.pdf

3 Accessing value from local supply

It is possible for local supply models to change the breakdown of costs and redistribute value between the network operators, supplier, generators and end users. This paper identifies two ways in which local supply models can access value through: local balancing and community-led approaches.

3.1 Accessing value from local balancing

Local balancing is 'matching' generation with demand at a local level to minimise the amount of electricity exported out of and imported into a local area. There is no agreed scale for what people mean when they talk about local balancing. We have identified four different scales here:

1. **Grid Supply Point (GSP):** The British electricity market is split into 14 regional zones called GSP groups for settlement purposes. Settlement is the process of calculating the volumes of imbalance – either too much or too little generation – and the price to be paid for these imbalances. Suppliers are required to provide their energy volume per GSP group by adding up the metered volumes for each HH settlement period. This will include the total demand for all their customers in the GSP group minus the generation.

   There is currently no incentive for suppliers to balance at the GSP level, as their energy volumes from each GSP are combined for settlement, so they only need to balance at the national level.

2. **Network level:** The voltage is reduced in the distribution network from 132 kV down to 230 V to be able to supply demand customers. Transformers are housed in substations that reduce or increase the voltage. A local area could be categorised by its primary (33 kV to 11 kV) or secondary (11 kV to 400/230 V) substation and include all the users connected to the network below that substation.

3. **Network constraints:** Much of the distribution network is now constrained or at capacity due to the amount of distributed generation that has been connected. This means that the network requires reinforcement to connect new generation or demand in many areas. The location of a constraint, or bottleneck, could be used to determine a 'local' area for the purposes of local balancing.

   Furthermore, it is likely that future Distribution System Operators (DSOs) will commission flexibility services to relieve network constraints in the future, and provision of these services may be limited to those connected below the constraint.

4. **Community:** A local area can also be defined by the geography or sense of community, such as a village, town or county. Generation could be closely located to the demand customers to enable a sense of connection, even if not electrically connected.

   The Piclo trial, which tested an electricity trading platform that enabled customers to choose where their power came from, showed that demand customers had a preference for locally generated power. It may also be easier to incentivise customers to shift their consumption to times when the local generator is generating if they can see it or are experiencing the same weather.

   Matching generation and consumption in a local area has the potential to access some value from the supplier or network operators. The following sections explain how.

3.1.1 DNO saving from avoided network reinforcement

Local balancing can provide value to the DNOs by enabling them to defer or avoid investing in network reinforcement. The generator or demand customer can be rewarded by the DNO for local balancing through a payment or reduced use of system or connection charge. Potential sources of value are set out below.

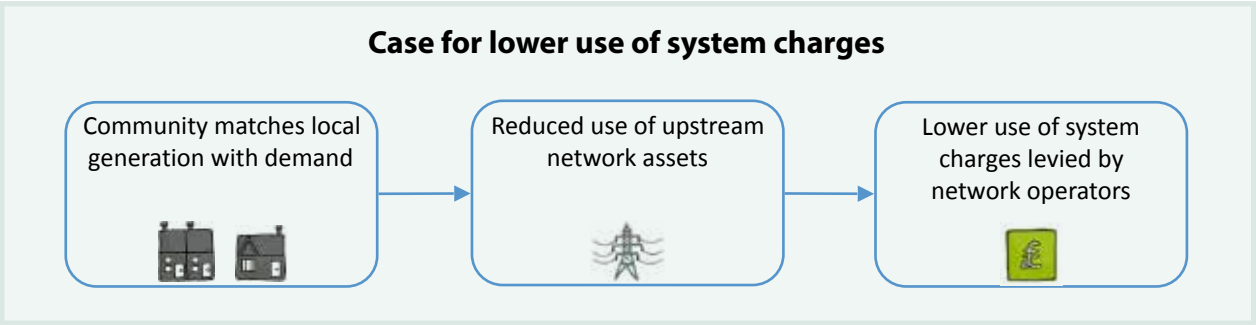
Using less of the network

Many organisations balance their own electricity demand with power generated 'behind the meter'. This can include both onsite generation and generation connected by a private wire. For the electricity used that is generated behind the meter there are no use of system or other charges.

There is a case that if you balance local generation and demand 'in front of the meter', but below the same substation, lower use of system charges should also apply. In October 2016, the DNO Electricity North West applied to Ofgem for a derogation to reduce its use of system charges to local energy schemes to reflect that upstream network assets were not being used when the energy was supplied locally. However, the application was denied as it did not fully justify how the proposed changes would benefit all customers and not just those connected to the scheme.

Ofgem has recently published its Targeted Charging Review consultation which outlines different potential models for charging for use of the network. The review states that it is considering what changes may be needed to 'forward-looking' network charges to incentivise efficient use of the entire electricity system.[7] The forward-looking element of charges are intended to reflect the costs that a user imposes on the distribution network. Regen has argued that where local models reduce the costs for the network operator, this should lower network charges.

The results of Ofgem's charging review will have a significant impact on local supply models.



7 https://www.ofgem.gov.uk/system/files/docs/2017/03/tcr-consultation-final-13-march-2017.pdf

Providing flexibility services to network operators

Flexibility is the turning up or down of either generation or demand to help balance the electricity system. This type of flexibility tends to be contracted by the System Operator and provides an income stream for either a generator, supplier or aggregator, which can then be reflected in the bills paid by consumers.

Flexibility contracts are currently only widely available to large-scale demand or generation. However, it is likely that smaller scale flexibility markets will develop with the move from DNOs to Distribution System Operators (DSOs). The Department for Business, Energy and Industrial Strategy (BEIS) and Ofgem suggest the following as an example:

> *DSOs or independent local market platform operator(s) could collect bids and offers for flexibility actions from distribution-connected providers in local areas (including from third parties such as aggregators or community energy providers). These bids and offers would then be used at a local level to manage constraint and system requirements within the distribution zone.*[8]

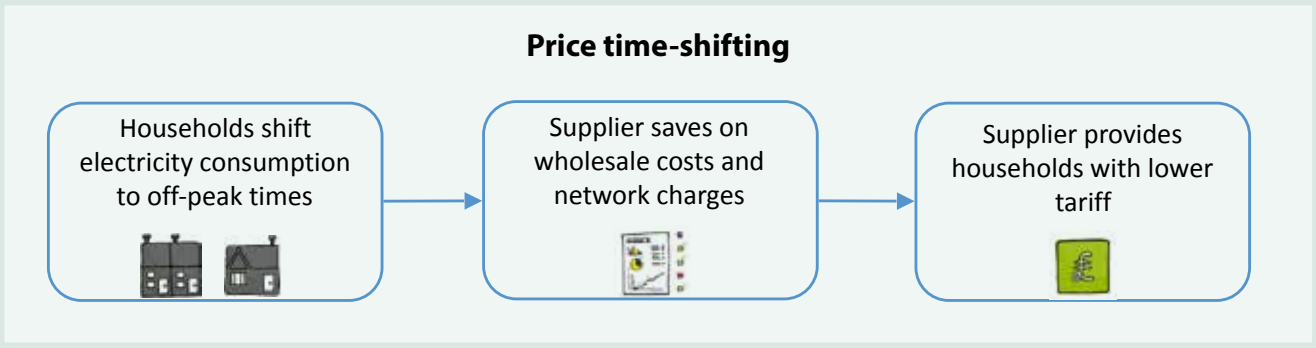
Bids and offers may be provided by local suppliers through aggregating Demand Side Response (DSR) request(s) from their customers. DSR may be incentivised by a Time of Use Tariff (ToUT) or automated by the supplier or third party. This could provide an income stream to the supplier or aggregator, which could be reflected in lower bills for the customer.

8 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/576367/Smart_Flexibility_Energy_-_Call_for_Evidence1.pdf

3.1.2 Price time shifting

Local balancing has the potential to access some value from the supplier and network operators through price time shifting, as a result of matching local demand with local generation. This is when customers shift the time that they consume power according to market prices. For example, customers can be offered a ToUT that reflects actual wholesale costs the supplier pays for energy at different times of day. This requires the customer to have a smart meter that measures their real-time use of power.

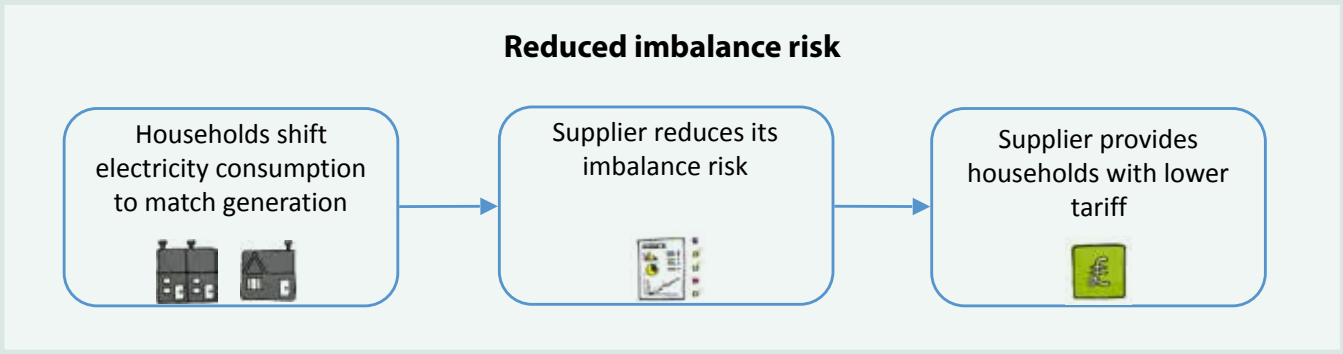
If the supplier is also willing to enter its domestic customers into half hourly (HH) settlement (see section 2.5 for more information), different use of system charges apply. There are three time periods into which the rates are split – Red, Amber and Green – which incentivises customers to use power at off-peak times to help relieve pressure on the networks.



3.1.3 Supplier saving from reduced imbalance risk

Matching local generation with demand can also help a supplier reduce its imbalance risk. If a supplier misjudges how much power its customers are going to use in a half hour period, it can be very costly (see section 2.3 for more information). This can be challenging with variable renewable generation, such as solar PV and wind, as they are harder to predict than baseload generation.

However, if customers shift their consumption to enable greater matching with local generation, this can help reduce the supplier's imbalance risk and create a saving. This saving can then be passed onto customers through lower tariffs.



3.2 Accessing value from community-led approaches

We have seen a considerable increase in interest and activity in local approaches to electricity supply in recent years. Local authorities, housing associations and community groups have been integral to local supply trials and have begun rolling out new models. We have seen local authorities setting up fully licensed suppliers, the creation of white labels and local tariffs for community-owned generation. There is value in these community-led approaches, which we set out on the next page.

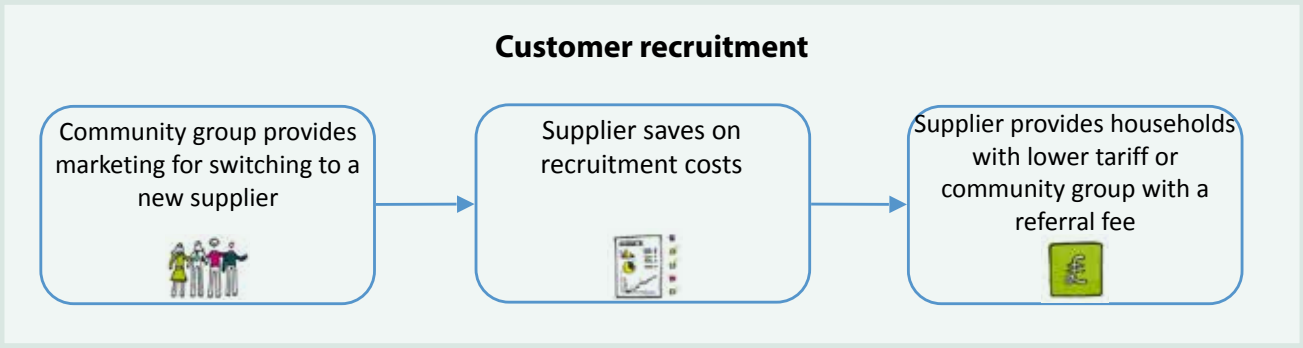
3.2.1 Supplier saving from customer recruitment and retention

Energy supply companies have offered very low (unprofitable) introductory fixed tariffs for the first year and then hoped that the majority of customers are retained and automatically put onto a higher variable or standard tariff.

One way to break this cycle is for suppliers to forge a new and different relationship with customers. This can be achieved with the support of trusted local organisations, who can provide information and persuade households to switch to a better tariff. Their role as a trusted intermediary gives the community power to negotiate a better deal with the supplier.

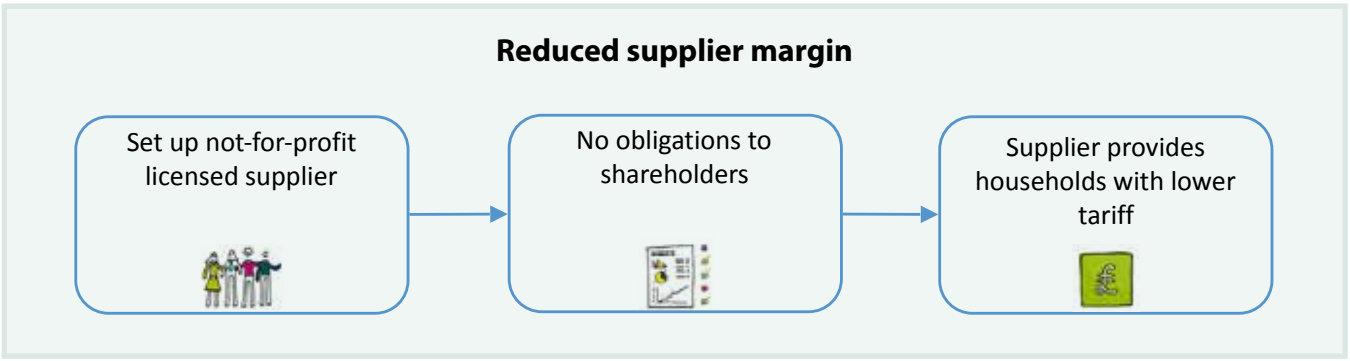
Evidence suggests that a partnership between a supplier and a community does have value to a supplier. For example, fairerpower, which was set up by East Cheshire Council in partnership with OVO Communities, was recruiting customers 19 times faster in 2015 than the standard OVO business model. At that time, OVO Energy valued customer recruitment at £50 per household.

This value can either be passed onto the third-party intermediary, for example, as a referral fee, or onto the customers through lower tariffs.



3.2.2 Supplier profit

It could be possible to decrease the supplier margin in bills through non-traditional business models of supply. There is scope to reduce this margin if the company does not have obligations to its shareholders. Our Power, for example, is set up as a not-for-profit Community Benefit Society. It should be noted that many independent suppliers in the UK currently operate at a loss and so reducing margins may be challenging.



4 Emerging models

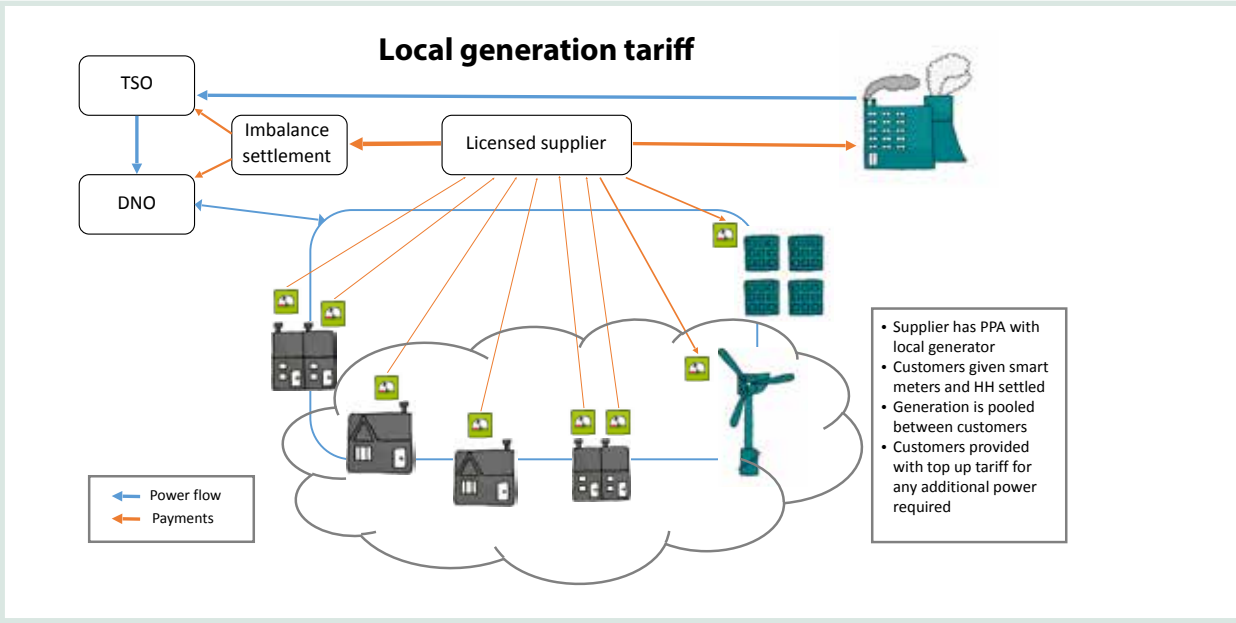
This section focusses on the most recent innovations and thinking in local supply models. It looks at four emerging models that are accessing sources of value from a more local approach and feeding these through to customers and generators via better prices.

4.1 Local generation tariffs

Local generation tariffs provide a virtual link between local generation and consumption. They tend to be based on a sleeving arrangement set up by a fully licensed supplier, which is a variant of a standard Power Purchase Agreement (PPA) between the supplier and generator and serves the purpose of linking the generator with the customers.

The supplier provides customers with smart meters to measure their real-time use of power and virtually pools and shares the local generation between all customers using power at the time of generation. The supplier provides a local generation tariff, often set lower than the going rate, to incentivise customers to match their consumption to times of local generation.

The local generation tariff can be a flat rate throughout the day or a static ToUT, such as the Sunshine Tariff trial which was cheaper between 10:00-16:00 during the summer months to match solar PV generation. However, more accurate matching requires a dynamic ToUT that responds to when both the generation and demand customers are active. A dynamic ToUT tariff will have both a generation and 'top up' tariff for the import of additional power.



4.1.1 Benefits

- Creates a direct link between local generation and local energy use, and can help people feel more connected to and accepting of renewable generation in their area. Evidence from trials, such as SoLa Bristol and the Sunshine Tariff, suggests that many people require a number of reasons to engage in a new supply offer. The monetary incentive is important but is often not the sole factor. The 'story' of being part of a wider community project can be important.
- Enables access to sources of value to help reduce bills for customers:
  - Price time shifting by the customers allows them to maximise the amount of power used when the local generation is generating and lower their bills
  - The supplier gives up some of its profit margin in return for the opportunity to recruit and retain more customers, as well as the potential additional value of retaining customers who are half hourly metered and could offer greater demand side response (DSR) flexibility
  - Potential to access lower use of system charges through HH settlement and avoiding the peak charging times (the red band). Also, potential for future use of system charges to reward local balancing schemes
- The model has the potential to increase revenue for the generator, depending on the terms set in the sleeving arrangement and the willingness of the supplier to give up some value. This may be more likely if the generation is community owned and further value can be kept in the local economy.
- It uses smart meters and elective domestic HH settlement, which aligns with government's stated direction of travel.

4.1.2 Challenges

- The model relies on a partnership with a fully licensed supplier that is willing to change its PPA, metering and billing arrangements, as well as offer an attractive tariff
- There will be geographical restrictions on who can sign up to such a scheme, due to its local nature. This means customers on either side of a boundary will have access to different tariffs
- The customers with flexible load will benefit more from a time of use tariff than those with less flexible load. Therefore, the tariff may not be beneficial to all
- The right balance needs to be achieved between the generation capacity and number of customers. When there is more generation than demand, the margin reduces for the generator and supplier, and when there is more demand than generation, the cost saving is reduced for the customers.

Case study: Energy Local[9]

The Energy Local model allows a local group of domestic customers and a generator to form themselves into new type of organisation – an Energy Local Club (ELC) – partnering with a licensed supplier. The power from local generators can be pooled and shared across the energy club demand members. If members use the power when it is generated, they agree a price that the generator receives. This provides a better income for the generator and lower bills for households.

The ELC forms a partnership with a fully licensed supplier, the generator member sets up a PPA with the supplier and the supplier provides a ToUT to the customers for any power that is not generated and matched locally. The supplier also provides a half hourly settlement meter to each customer.

The model is currently being trialled in Bethesda, Wales, in a partnership that includes a hydro generator, a local energy group and The Co-operative Energy. The local hydro plant is receiving 7p/kWh for the power it sells to local consumers via the ELC and 5p/kWh for any excess. The community is buying the hydro for 7p/kWh and has a top-up ToUT ranging between 7.25p and 14p/kWh.

Energy Local estimates that customers will be able to reduce their electricity bills in Bethesda by 24% and the generator will increase its income by 32%.

This model is being rolled out in a further 10 sites, including a community-owned solar PV site in Brixton being set up and run by 10:10 and Repowering London.

Case study: Smart Fintry[10]

The Smart Fintry project provides the residents of Fintry, in Scotland, with a local flat rate tariff that virtually links them with local renewable energy generation. The project aims to assess the potential for reducing network charges where local consumption and generation are matched and peak demand on the energy network is reduced.

Customers have been provided with smart meters to measure their HH consumption. This data is fed into a central database and matched with the local electricity generation. PPAs have been set up with local renewable generators and Consumer Contracts with local households. The Fintry Development Trust is not a licensed energy supplier, so it has partnered with Good Energy to provide the local electricity tariff and PPAs.

Case study: Cornwall generation tariff

The concept of a Cornwall generation tariff is to incentivise the use of local generation on a county scale. There would be a set price for local generation from multiple generators across Cornwall, which would be shared between all customers, along with a price for any top up power required.

This type of arrangement would be similar to sleeving or the use of a trading platform, such as Selectricity, when the customer knows where their power is coming from and pays a set price for that generation. However, the power will be from multiple generators rather than one.

A licensed supplier would be required to set up PPAs with Cornish generators and provide the tariff to Cornish residents. All customers would require smart meters and be HH settled to enable the supplier to reflect use of system charges and the cost of its PPAs.

This concept has been considered by Cornwall Council, but not yet tried or tested.

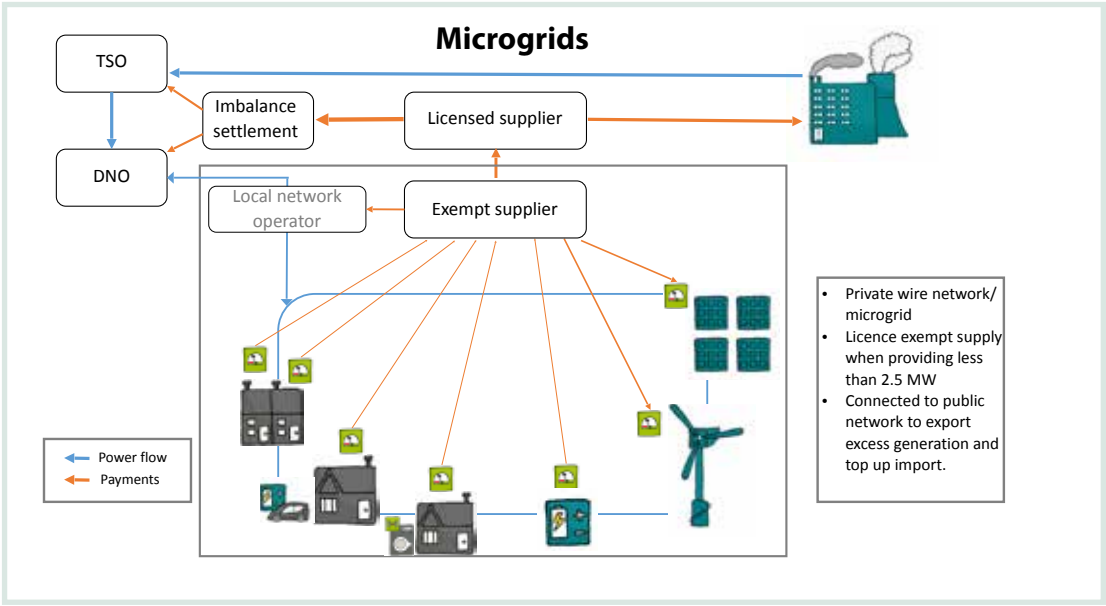
9 http://www.energylocal.co.uk
10 http://smartfintry.org.uk/

4.2 Microgrids

Private wire networks, or microgrids, enable a direct connection between generators and consumers, and if the distributor is providing less than 2.5 MW of power to domestic customers (roughly corresponding to 500 households), it can be classed as licence exempt supply. This makes it possible to cut out the standard use of system charges and other obligations that apply to licensed suppliers.

Private networks can either operate in parallel to or independent of the public network. Most remain connected to the public network to enable the export of excess generation or to top up when generation is low.

It is necessary to set up a separate entity from the exempt supplier to own and operate the private wires. This local network operator sets its own use of system charges, which are passed onto the customers via the exempt supplier. The supplier sets its tariffs based on the cost of local generation, use of the private wires, balancing and import from the public network via a licensed supplier. There is potential to incentivise local matching through a ToUT or automation of demand to keep the tariffs low.



4.2.1 Benefits

- This model has had interest from community land trusts and other housing developers that want to minimise the carbon emissions from a new development by including renewable generation
- It enables the generator to get a better price for the generation than through export to the grid with a standard short-term PPA
- This model can access sources of value from:
  - Avoiding/reducing use of the public network and therefore the use of system charges. The local network operator would set use of system charges based on the cost of building and maintaining the private network, which is likely to be lower than charges for the public network
  - If generation and demand are well matched (potentially through a time of use tariff, automated demand or storage) the amount of power imported and exported can be minimised, therefore reducing the cost to consumers and maintaining a good price for the generators
  - The supplier margin could be removed and savings passed onto the customer if the exempt supplier was a not-for-profit organisation.

4.2.2 Challenges

- This model relies on the consumers remaining with the licence exempt supplier. If they switch away, for example to a more competitive licensed supplier, the business model no longer stacks up
- Arrangements would need to be made with third parties, such as licensed suppliers, to provide access to the private network and use of system charges recouped for the local network operator if customers choose to switch away from the exempt supplier. This process may be costly and burdensome and would need to be explored further
- This model tends to work best with new build developments rather than retrofitting in areas where there is an existing electricity network, to avoid duplicating assets. This limits the replicability of the model.
- There is a cost to building a private wire network and setting up metering and billing systems. The exempt supplier must also meet a number of regulatory requirements, such as building regulations, which also have a cost.
- Ofgem stated in its Future Insight paper on Local Energy that if there were to be substantial growth of exempt supply, this may raise concerns as the protections available to consumers are not as comprehensive as those available under the licensed regime.[11] However they do not see this as a pressing issue, not least as consumers in exempt arrangements can exercise their right to switch to licensed supply.

Case study: Thameswey Energy[12]

Thameswey Energy is an unregulated public/private joint venture Energy Service Company set up by Woking Borough Council in 1999.

It has nearly 10 MW of gas fired combined heat and power (CHP) units and 2 MW of solar PV. It supplies hot water to its customers through its own pipe network and electricity through a private wire network. The CHP unit is local to the development that it supplies, so there are less of the losses associated with electricity transmission from large power stations, which helps keeps the costs low.

Thameswey generates and supplies low carbon and renewable energy to a wide range of public and private sector customers in Woking and Milton Keynes, including over 1,250 domestic customers, Network Rail, Sainsburys, Holiday Inn and Woking Borough Council.

Case study: Battens Lane[13]

AEOB acquired a site on Battens Lane in Bristol and turned it into a housing project made up of six flats. The building has a 14 kW solar PV array connected to a microgrid, which feeds the flats and communal areas. The management company, AEOB House People Ltd, qualifies for an exemption to supply the homes.

Power is also imported from the public network through an advanced HH meter and a commercial supply contract with a licensed supplier, which is resold by the exempt supplier. Both the solar array and supply to the flats are HH metered and billing is completed using the Simtricity microgrid platform.

There are plans to fit a common battery to help increase the use of solar PV onsite and reduce the amount of power required to import.

11 https://www.ofgem.gov.uk/system/files/docs/2017/01/ofgem_future_insights_series_3_local_energy_final_300117.pdf
12 http://www.thamesweyenergy.co.uk/
13 https://www.aeobhousepeople.org.uk/projects/

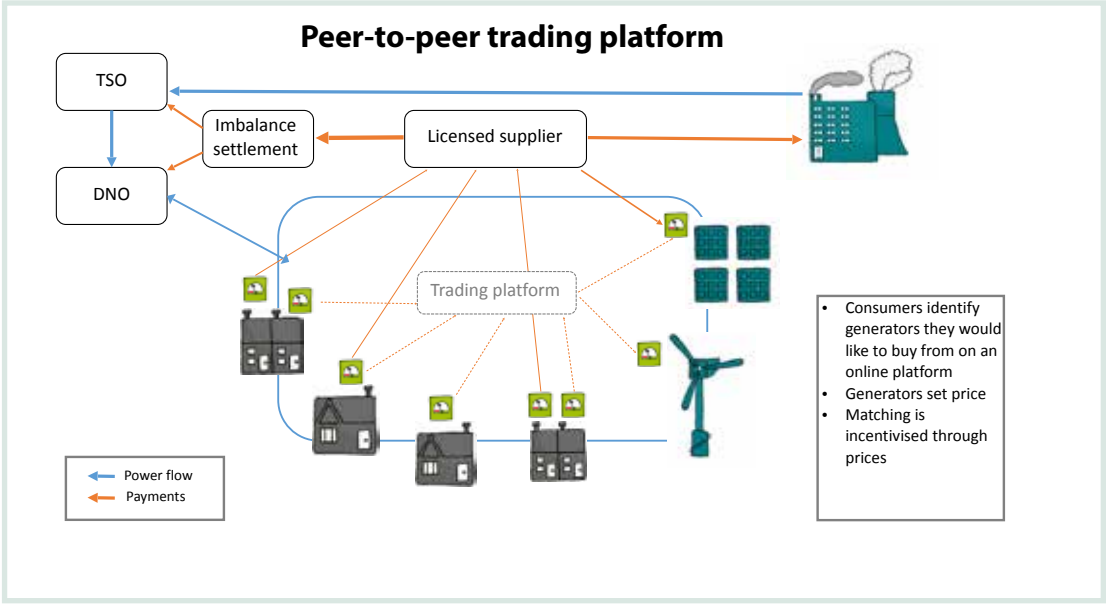
4.3 Peer-to-peer trading

Peer-to-peer (P2P) energy trading is the buying and selling of power directly between generators and end users. Transactions can take place over trading platforms that are either supported by licensed suppliers or blockchain technology. Anyone with Distributed Energy Resources (DERs), such as generation, storage or other forms of flexibility, could sell these services, including households.

P2P trading platforms run by licensed suppliers enable generators to set the price for their power and consumers to identify the generators that they would like to buy from. This is a form of 'sleeving', but takes place over a platform where there is greater visibility and range of generators to choose from. The better the price and/or the greater the support for a particular generator, the more matching is likely to take place. But the consumers do not necessarily save money as they still have to pay the use of system charges and for the top up service provided by the licensed supplier.

An alternative model removes the licensed supplier from the transaction, which instead happens over a platform supported by blockchain technology or a third-party intermediary. Blockchain technology has the potential to hold a register of DERs, data on their trading preferences, provide access to trading platforms and verify transactions.

Currently in the UK, it is not possible to sell power over the public network without a licence, and you are also only allowed to have one supplier. This makes the alternative P2P models impossible, unless you are trading over a private wire or microgrid. However, Ofgem recently announced that it is supporting trials for three P2P propositions without incurring the usual regulatory requirements.[14] It is not yet clear what the trials will look like, but the chief executive of Ofgem, Dermot Nolan, has suggested that the regulatory framework may need to change to enable "one of the most exciting new business models" to emerge.



14 https://www.ofgem.gov.uk/system/files/docs/2017/07/update_on_regulatory_sandbox.pdf

4.3.1 Benefits

- Creates a direct link between the producer and consumer and enables the consumer to choose where their power comes from
- Can increase competition and choice for consumers. Customers may even be able to purchase power from their electric vehicle (EV) manufacturer in the future
- There are a number of ways that this model can help access sources of value:
  - Price time shifting is possible if consumers have visibility of when they are buying power from their chosen generators and when they are relying on supplier top up. It is likely that the price of the top up power will be more expensive, especially if at peak times
  - Greater matching of generation and demand can help reduce pressure on the networks and could help network operators avoid reinforcement works. This ultimately has a financial benefit for all customers, but could also be rewarded through future flexibility markets or reduced use of system charges
  - Can enable generators to sell power at a better price.

4.3.2 Challenges

- It is difficult to access sources of value from local supply when using the public network. The licenced supplier is required to mitigate the imbalance risk, to pay the relevant use of system charges and meet the social and environmental obligations. All of these have a cost that cannot be taken out of the equation without a derogation.
- Current switching rates in the UK suggest that the majority of the population are not engaged in where their power comes from or how much they pay for it. A cultural shift would be required to enable P2P trading to become mainstream.

Case study: SonnenCommunity[15]

The sonnenCommunity is a community of sonnenBatterie owners in Germany who can share self-produced energy from solar PV.

When someone has a surplus of power, instead of it being fed into the grid and bought by a licensed supplier, it goes into a virtual energy pool that serves other members.

A central software platform links up and monitors all sonnenCommunity members and serves the purpose of balancing energy supply and demand. As a result, there is no need for a conventional energy supplier.

Case study: The Brooklyn Microgrid[16]

The Brooklyn Microgrid operates in parallel to the public network and gives participants more choice in where they buy their power from. It provides a P2P energy market, made up of a combination of software and hardware that enables members to buy and sell energy from each other using smart contracts and the blockchain.

The P2P market currently uses credit sales, conducted over PayPal, as it cannot legally buy and sell electricity until the regulator determines its market status. Once this has been determined, participants will be able to trade power directly, but will still pay the utility for use of the network infrastructure.

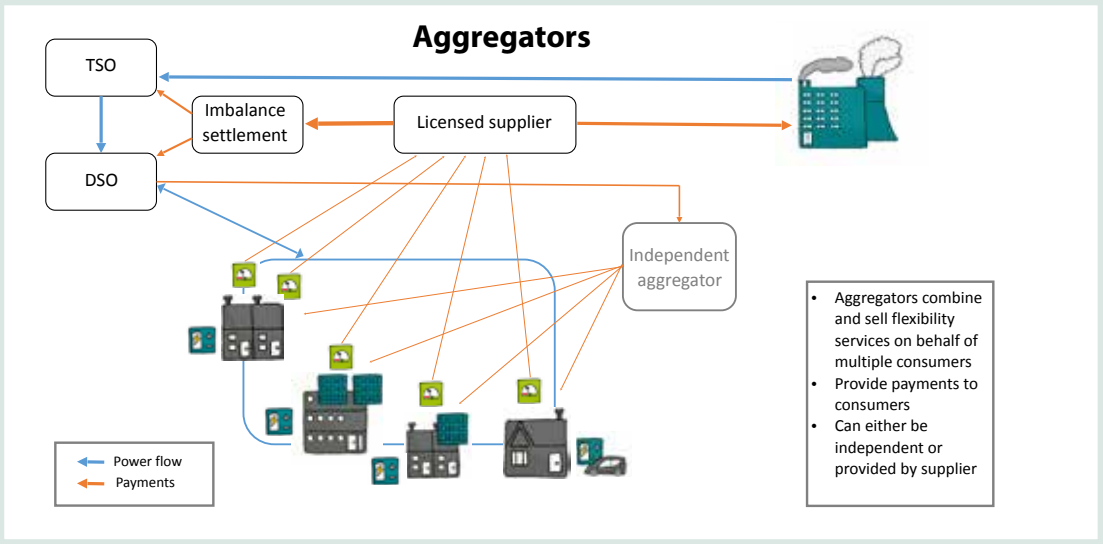
15 https://www.sonnenbatterie.de/en/sonnenCommunity
16 https://www.brooklyn.energy

4.4 Aggregators

Aggregators combine and sell flexibility services on behalf of multiple consumers. These flexibility services can include demand side response, storage and turning up/down onsite generation. Aggregators exist because current flexibility markets are only open to large players.

Some aggregators are licensed suppliers, but independent aggregators are not required to be licensed if they provide only aggregation services. Therefore, independent aggregators provide payments for flexibility services separately from the supply and billing for power.

The aggregation market for domestic customers is still very small. But this is likely to change as local flexibility markets emerge and DSOs (the future DNOs, with a more proactive role in managing the distribution networks) start to commission smaller scale, localised flexibility.



4.4.1 Benefits

- Potential to enable households and communities to engage in flexibility markets and to support a smarter, more flexible energy system
- Can provide a source of income for those with flexible load or generation, which would support the growth of DERs, such as batteries, by reducing their payback period.

4.4.2 Challenges

- There is still limited access to the aggregation market for small and domestic customers. This is likely to change as local flexibility markets develop. However, there is uncertainty about when these markets will emerge
- Aggregators currently find it difficult to access certain markets, such as the Balancing Mechanism. Ofgem is currently addressing this issue
- There may be consequences for a supplier's ability to predict their customers' demand when they are providing flexibility to an independent aggregator, which will affect their imbalance risk. Ofgem will review whether action is required as the market develops.

Case study: Moixa GridShare[17]

The battery company, Moixa, has developed an aggregation scheme for its customers called GridShare. Members of the scheme receive an annual payment in return for allowing Moixa to remotely charge and discharge their domestic battery to support balancing of the electricity networks.

Moixa aims to be paid by the National Grid for providing these services and to share this income with participating customers.

Case study: Carbon Coop

Carbon Co-op is working to develop a community-based aggregator model to deliver small scale domestic flexibility for DNOs/DSOs in local areas of congestion.

The model relies on the creation of a local flexibility market for the procurement of flexibility by the DNO, and will involve identifying and aggregating flexibility assets in homes and businesses, such as batteries, electrical heating and smart EV chargers. The platform relies on the deployment of SMETS2 smart meters and consumer access devices (CADs), which can provide the real-time data required for flexibility provision.

Though operated at a regional scale, the model seeks to take advantage of trusted community energy groups operating at a local scale. This scale of activity is ideal for flexibility provision, often operating at a similar town or locality scale as DNO areas of congestion.

Income streams are expected to come from DNOs and ancillary energy services, such as energy efficiency and smart EV charger installations.

The project is at the R&D stage with demonstrator projects planned for 2018.

17 http://www.moixa.com/ufaqs/what-is-gridshare/

5 Challenges and considerations

There are regulatory, technical, commercial, acceptability and viability challenges to developing innovative supply models. A high-level assessment of these challenges and considerations is provided here.

5.1 Regulatory

New, innovative models of electricity supply have policy traction, but are in the early stages of development. Inevitably, there will be a lag between policy commitments and actual regulatory change. For example:

- Smart meters are essential for new supply models that have a time of use element to them. They are being rolled-out with the goal of every property having a smart meter installed by the end of 2020. However, as of 31 March 2017, 3.46 million smart electricity meters had been installed in domestic properties (out of 26 million households)[18]
- HH settlement enables a supplier to reflect its wholesale and use of system charges in its tariffs. Elective HH settlement of domestic customers is not yet widespread. However, suppliers have been encouraged by government to move towards HH settlement and Ofgem is considering whether to mandate this approach if suppliers do not adopt it voluntarily
- Local flexibility markets could provide a revenue stream for community DSR. Government is encouraging the development of these markets. However, it is not yet clear what form they will take or how accessible they will be. See section 5.3.1 for more information.
- There is uncertainty around how the use of system charges for the networks will change in the future. Ofgem is carrying out a Targeted Charging Review which they describe as "…a vehicle for Ofgem to initiate wide-ranging and holistic change".[19] This is part of a wider ranging charging review. Changes to network charging will impact on the tariffs that suppliers charge and local supply business models.

5.2 Technical

There are still some technical issues with smart meters, especially around connectivity and interoperability. Several trials have identified connectivity problems that have resulted in data not being received by the supplier, for example, the Sunshine Tariff and EMPower trials. This may be particularly relevant for rural areas and where there are mobile network black spots.

Concerns have also been expressed that the earlier smart meters (e.g. SMETS1) will carry interoperability issues for customers, meaning they cannot be easily switched between suppliers while maintaining smart functionality. Government forecasted that around 8 million SMETS1 meters will be installed before SMETS2 is rolled out.

18 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/615057/2017_Q1_Smart_Meters_Report_final.pdf
19 https://www.ofgem.gov.uk/ofgem-publications/112590

5.3 Commercial

5.3.1 Flexibility markets

Flexibility markets have existed for some time at the transmission network level with National Grid commissioning reserve and response services to balance generation and supply. BEIS and Ofgem have stated that DNOs will also become more active in managing their networks as a system—implementing innovative techniques and exploring market-based solutions as alternatives to network reinforcement.[20] This is likely to lead to the development of local flexibility markets, which could create a potential revenue stream for flexible local supply models. However, they have not specified what mechanisms or commercial models will be used and have asked industry to test different approaches.

5.3.2 Technology costs

Trials strongly suggest that demand customers are more able to provide a DSR if they have both some flexible load, such as a battery, or electric vehicle (EV), and some automation, such as smart switches or appliances.[21] The cost of these technologies is still high and may prevent communities from accessing value through price time-shifting or flexibility contracts. However, the costs are reducing, and we expect to see an exponential increase in take-up in the next decade.

5.4 Acceptability

5.4.1 Customer recruitment

Recruiting customers to switch to a new supply offer is essential to its success. However, Ofgem research found that 45 percent of customers do not recall switching energy supplier.[22] This is even though consumers who have never switched could save around £200 per year on their energy bills.

The Competition and Markets Authority suggested that one of the contributing factors to lower than optimal levels of market engagement through switching is the lack of trust in the energy sector. Regen's experience of recruitment for the Sunshine Tariff trial was that the role of a trusted intermediary, in this case the local community energy group WREN, was very important. Almost three quarters of the households that signed up for the trial were members of WREN, suggesting that those with an interest in energy issues and who trusted WREN's advice were more likely to switch.

Evidence from trials, such as SoLa Bristol, suggests that people require a number of reasons to engage. The monetary incentive is important but is often not the sole factor. Wanting to save energy, be part of a wider community project and to learn more about energy played an important role.

20 https://www.ofgem.gov.uk/system/files/docs/2017/07/upgrading_our_energy_system_-_smart_systems_and_flexibility_plan.pdf
21 Such as the Sunshine Tariff. For further information see https://www.regensw.co.uk/sunshine-tariff
22 https://www.ofgem.gov.uk/publications-and-updates/infographic-bills-prices-and-profits

5.4.2 Behaviour change

For consumers to participate in and realise the benefits from the future smart energy system, a degree of behaviour change will be required. This may be in the form of accepting some automation or remote control of appliances in return for a cheaper tariff or may require more active participation in when and how power is used in response to a price signal.

Government research showed that half of respondents would take up a smart tariff if their supplier offered one to them now. For those who were not interested, scepticism and uncertainty over the impact of a smart tariff on energy costs was the most common reason for a lack of interest. Respondents also said they were concerned about loss of control and that it would not fit their lifestyle.[23]

5.4.3 Consumer protection issues

There needs to be adequate protection against miss-selling and putting consumers at risk when introducing a new local supply model. This could happen in a number of ways:

- Changes in tariff structures may have a negative impact on some customers. For example, some types of customers will not be suited to time of use tariffs, such as a disabled consumer who might rely on use of power during peak time.
- If some customers use the public electricity networks less, they could pay lower use of system charges, which would result in other customers paying more to cover the sunk costs.
- It is important to ensure that customers do not get trapped on a particular tariff or scheme, for example if they are connected to a private network. Customers must have the right to choose their electricity supplier and microgrid operators must ensure third party supplier access.
- Privacy, data protection and cyber security are another concern. Data on individual household's electricity use pattern is personal and so falls under the Data Protection Act currently and will be subject to the General Data Protection Regulation changes come May 2018. However, consideration must be given to how these issues are communicated with customers so that they feel safe and informed and robust data protection measures must be put in place.
- New market entrants that are less regulated have the potential to reduce the protection for customers. Ofgem is currently looking into how third-party intermediaries and aggregators should be regulated.

23 DECC Smart Energy Research: Summary Report (2016).

5.5 Viability and sustainability

New supply models must have a sustainable and robust business model. There are a number of different factors that need to be considered, including:

- The supply offer must be attractive to potential customers to encourage a licensed supplier to get involved. It must also remain competitive to reduce the risk of customers switching away and the model collapsing
- Local models need to be scalable or replicable to make it worthwhile for a licensed supplier to establish new systems and ways of working, which have a cost
- When relying on new value streams to lower tariffs, such as flexibility contracts with the DSO, it is important to understand the risks associated with those revenue streams
- Ideally the model would have low upfront costs. This may be a problem for models that require customers to have flexible loads, such as a battery or EV.

6 Summary

This paper has focussed on the most recent innovations and thinking in local supply models. It has identified how it may be possible to access sources of value from a more local approach, what the emerging models are and some of the challenges and considerations to think through.

The following table summarises the key considerations for each model and provides a high-level assessment of whether the consideration is a barrier to roll-out or not.

■ **Green** = No barrier ■ **Amber** = Potential barrier ■ **Red** = Likely barrier

Model	Sources of value	Regulatory challenges	Technical challenges	Commercial challenges	Acceptability	Viability / sustainability
Local generation tariffs	Price time shifting Supplier margin in return for recruitment Potential to access lower UoS charges / flexibility contract Better price for generator	Slow move towards HH settlement, but is already available	Rely on smart meters Households require flexible load	Needs willing licensed supplier Uncertainty with flexibility markets Cost of flexible load	Requires switching and behaviour change But strong local story and potential for community-led marketing	Requires scale to be of interest to supplier Must remain competitive to retain customers
Microgrids	Avoiding/reducing UoS charges from matching Supplier margin if not-for-profit Better price for generator Potential price time shifting	Potential for charging review to increase UoS charges behind the meter Rules and regulations on building and managing private networks	Balancing provided by exempt supplier - storage, DSR etc. Households may require flexible load	Cost of setting up balancing and billing functions for exempt supplier	Requires signing up to alternative model But should be cheaper	Must remain competitive to retain customers
Peer-to-peer trading	Price time shifting Potential to access lower UoS charges/flexibility contract Better price for generator	Cannot sell direct over public network without a licence/derogation	Households may require flexible load Need accessible trading platforms	Needs willing licensed supplier if using public network	Requires signing up to alternative model But potential for strong local story	Requires good balance of generation and demand participants May only appeal to early adopters / energy aware
Aggregators	Flexibility contract	Currently restricted from entering certain markets, e.g. Balancing Mechanism	Households require flexible load and possibly some automation	Cost of flexible load and automation. Uncertainty accessing flexibility markets	Separate payment from energy bill may be more appealing	Market limited to those with flexible load

Each of the emerging models has potential to access new sources of value and bring down energy costs for consumers. However, there are still questions about their viability, as they are all still in the early stages of development.

Regen passionately believes that sustainable energy has a vital role at the heart of a successful economy and thriving local communities. We are an independent not for profit that uses our expertise to work with industry, communities and the public sector to revolutionise the way we generate, supply and use energy.

Energy is the beating heart of our communities, an unseen web that binds us together. Radical change in such a critical system is not going to be easy. Our experience over 13 years is that we need entrepreneurial businesses who are forming partnerships and driving innovation; finance providers looking for new opportunities and regulators and utilities backing innovation. We also need the engagement and support of the local people and communities who rely on energy in every aspect of their lives.

We are ambitious on the scale of our impact. From our base in the south west of England we share our knowledge and experience of driving radical change in our energy system nationally and internationally.

RENEWABLE DEPLOYMENT

SMART ENERGY AND STORAGE

GRID AND NETWORK MANAGEMENT

DECARBONISATION AND ENERGY STRATEGY

HEAT

OFFSHORE RENEWABLE ENERGY

COMMUNITY ENERGY

WOMEN IN RENEWABLES

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