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Local Electricity Supply: Opportunities, archetypes and outcomes

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and Dr Katy Roelich**
March 2015



Contents

Executive Summary 3

Full Report 7

1. Background 8

2. Introduction 11

3. Methods 21

4. Results 22

5. Barriers 38

6. Recommendations and Conclusions 41

7. Acknowledgements 43



Executive Summary

This report investigates how new, system-wide value opportunities have arisen in the energy system and how local electricity¹ business models can capture them. The research team was composed of Dr Stephen Hall and Dr Katy Roelich of the Schools of Environment and Civil Engineering at the University of Leeds. This report develops a detailed evidence base to explore the business models and value opportunities offered by the emerging field of local electricity supply. The purpose of this report is to offer evidence-based options for enabling the local electricity supply sector in the UK.

Focusing on electricity supply within a defined geography (community, town, city or region) can offer significant benefits to the electricity sector and consumers. As yet however there have been few real cases to test the magnitude of these opportunities in the marketplace; and none at scale. Depending on the business models being proposed this can be due to unfavorable market regulation, an unsuitable policy environment, a lack of data to justify real returns, and/or simply that the technologies in metering and ICT have only recently become sophisticated enough to enable local supply. This is why the time is now for the Government to support the development of the local supply market. The Government may wish to support the local supply market because it offers four key opportunities that national utility business models are unable or unwilling to capture or pursue:

1. Better routes to market for local generation.

Arrangements under Electricity Market Reform (EMR) are likely to constrain the market for small scale power purchase agreements. The creation of new local supply business models has the potential to give community and small scale generators a better route to market for the power they produce and to support the burgeoning local generation sector.

2. Fulfilling the potential of the demand side.

Aside from isolated examples with large industrial customers, the benefits of demand side management are being missed in the UK, impacting customer bills and making energy infrastructures more expensive. For domestic and SME customers, the local benefits offered by demand side services are currently unavailable, due to the undeveloped local supply market. Fostering this market will validate the claims that these services could lead to lower household bills and increased system efficiency.

3. Real energy efficiency gains. To date energy efficiency programs have been delivered through national utilities. This faces two problems, the utility business model struggles to operate if substantive efficiency gains are made by all customers, and many customers have not engaged with their energy supplier on efficiency programmes. There is a missed opportunity to roll out the energy service company (ESCO) business model in UK, in part due to regulatory barriers and in part due to uncertainty over returns and organisational arrangements. Proposed local supply archetypes can begin to address this, but incentivising innovation in this space is critical.

4. Re-localising energy value. Citizens, Municipalities and regional development bodies in many European countries have begun to see energy value as a key component of economic prosperity. They are beginning to play a more active role in the generation and supply of their own energy needs. In the UK, our market structure has resulted in a significant 'leakage' of energy value out of cities, regions and ultimately the nation. Enabling new, local business models to be tested that reverse this loss of value is an important next step.

This report shows the stakeholders currently active in the local supply market space are predominantly pursuing outcomes beyond simple private profit gains. The research shows a latent sector driven to secure outcomes in local economic development, realise socio-economic goals, deliver environmental benefit through electricity decarbonisation, and participate in the energy sector as a self-governance and community resilience activity.

These local supply stakeholders are engaging in this space using a variety of archetypes. These range from relatively simple white labelling arrangements, through community aggregation, peer to peer software platforms to full blown local utility structures. The archetypes identified are:

The current archetype is the familiar utility business model. This model struggles to deliver strong incentives to independent generators, doesn't deliver real energy efficiency gains, is geographically blind and leaks value out of local communities.

The Local White Label archetype is a departure from this model, as it involves a partnership with another brand for consumer billing, here the branded partner could specify a higher mix of local energy, and could offer fairer tariffs by controlling costs locally.

A Local Aggregator groups a set of consumers at a community level and negotiates fairer tariffs with a licensed supplier, offers services to infrastructure providers, could pool local generation and aims to shift demand to cheaper times of day.

A Local Pool and Sleeve archetype is a form of direct supply. This archetype aims to aggregate distributed generation from a local area (pooling) and then supply a specific consumer or consumers within a local area with equivalent power without using wholesale market intermediaries (sleeving); thus 'pool and sleeve'. This archetype is better suited to growing distributed generation than participating in energy efficiency or demand reduction programmes.

The Municipal Utility archetype is a fully licensed supplier but is focussed on linking generation and consumption in a local area. It is not well suited to delivering real energy efficiency gains but can re-localise a significant proportion of energy value, offer network services and incentivise local generation.

The Municipal ESCo is fully licensed, but sells energy services such as a warm home and hot water as opposed to simple units of electricity or gas. In so doing they create a business model that achieves all the gains of a municipal utility but also incentivises real energy efficiency.

A Multi Utility Service Company or MUSCo has similar benefits to an ESCo but can provide other services such as telecoms and water, here these services can be linked up to provide even deeper efficiency gains at the consumer and system level.

The Peer to Peer archetypes use virtual platforms to enable consumers to buy directly from generators. The technical and organisation innovation that allows this to happen is relatively new and still requires a fully licensed supply partner to make sure consumers continue to receive power when the supply from the intermittent generators is low.

The Peer to Peer with a Local Balancing Unit archetype brings the P2P process within a defined area and allows the Peer to Peer model to offer similar services to the local aggregator.

Many of these archetypes are 'intermediaries' in that they offer energy services that can happen outside a full supply license, but need a Third Party Fully Licensed Supplier to provide conventional services. The research also identified a not for profit administrator archetype as a useful possible enabler. This would be a body with a full supply license, but that was aimed solely at facilitation of these intermediary archetypes. Together these archetypes form the current thinking on ways to achieve the benefits of local supply that are currently unrealised in the UK's energy market.

Some of these archetypes are constrained by the regulatory environment, a lack of capacity/experience in a new sector, a lack of understanding of replicable models, and unclear risk frameworks. In response to these barriers this report proposes a set of short, medium and long term strategic activities that could be carried out at the national scale that would foster this sector and help to realise as yet untapped opportunities in the energy market. These are:

■ **Short Term Proposal 1:
Local supply innovation fund**

A substantial but time-limited fund of comparable size to the urban and rural community energy funds, explicitly aimed at testing local supply archetypes in the market

■ **Short Term Proposal 2: A ‘portal of power’**

An online platform with clear policy and regulatory advice specifically generated by and tailored for local supply stakeholders

■ **Short Term Proposal 3: Resource the Local Supply Working Group or similar forum**

Continued resource to support the Local Supply Working Group which has progressed the understanding of local supply in the UK and will be needed to guide its future development

■ **Medium Term Proposal 1: Clarify the requirement for national supply**

New fully licensed suppliers are looking to exploit the benefits of focussing on particular geographies, but regulation is not suited to this. New frameworks and customer protections for geographic supply are needed.

■ **Medium Term Proposal 2: Amend the requirement for fully licensed suppliers to offer only four tariffs for those areas operating local supply archetypes.**

Fully licensed suppliers looking to partner with ‘intermediary archetypes’ that rely on this relationship are being penalised by the requirement to offer only four main tariffs. This has been facilitated by a temporary arrangement for the ‘local white labelling’ sector, but will need to be addressed as new local supply archetypes and intermediary relationships proliferate.

■ **Medium Term Proposal 3: Allow for a ‘local balancing unit’ as specified² or as a result of further development.**

This would allow new local business models such as aggregators and junior suppliers to maximise the benefits of local supply and demand management, offering benefits to suppliers, network managers and system operators.

■ **Long Term Proposal 1: Investigate the opportunity to allow local ESCo or multi utility models which incentivise substantive efficiency gains to be exempt from supplier switching legislation.**

As a longer term activity, the requirements on suppliers to ensure the domestic consumers’ right to switch supplier need reviewing to make space for domestic energy performance contracting that can be delivered where it is relevant. i.e. by being recouped through the household energy bill. New ways of securing consumer protection and local referenda could replace the current model and allow for longer term domestic contracts. This would unlock new opportunities for energy efficiency in deep retrofit, micro generation and appliance efficiency.

■ **Long Term Proposal 2: Investigate the opportunities for demand reduction-centred business models and their treatment in regulation and policy.**

Much more work is required to investigate how energy demand reduction can be incorporated into markets and incentives. The opportunities of demand reduction can be delivered by new aggregator business models as framed in the archetypes in this report. However to date demand reduction has been undervalued in favour of policy mechanisms aiming to reduce unit prices as opposed to final bills. Local supply options can deliver demand side services that reduce final bills, deliver benefits to distribution and transmission system operators and reduce the need for centralised generation investments across the system.

Footnotes

¹ This report focusses primarily on local electricity supply, as the heat sector is unregulated, and gaseous, liquid and solid fuels markets are regulated separately.

² https://www.elexon.co.uk/wpcontent/uploads/2014/08/Encouraging_local_energy_supply_through_a_local_balancing-unit.pdf

Disclaimer

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Local Electricity Supply: Opportunities, archetypes and outcomes

Full Report

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1. Background

This report summarises the current situation with regard to local electricity supply in the UK³. There has been a great deal of recent interest in the opportunities offered by the development of local electricity supply business models. Focussing on supply in a defined geography has the potential to: expand the penetration of renewable energy, create new opportunities for smart grid investment, enable full utilisation of smart meter features such as demand management, enable new business models for energy efficiency, re-localise a portion of energy value, and address socio-economic issues such as fuel poverty.

There is an emergent evidence base to justify these claims, but as yet there have been few real cases to test their validity in the marketplace and none at scale^{4,5}. This may be due to unfavourable market regulation, an unsuitable policy environment, and/or simply that the technologies in metering and ICT have to date not been sophisticated enough to enable local supply. The aim of this report is to summarise the existing thinking on the benefits of local supply, describe the current state of play in a rapidly changing context, and propose ways in which energy policy and market regulation can facilitate the establishment of new, local suppliers.

The report summarises the opportunities that are missed because of the current lack of local supply entities in the UK. This is not a comprehensive account of market failure in the UK electricity sector, but a targeted summary of the opportunities that could be exploited if different local supply options were available. New technologies are driving a search for new business models at all scales in the energy sector, and the regulator has recognised there may be a need to look closely at how these business models engage with and/or are restricted by current market arrangements⁶.

1.1 Defining Local Supply

The House of Commons Energy and Climate Change Committee report on Local Energy⁷ proposes the value of supplying locally generated energy to local consumers arises where households impacted by energy developments may be compensated by cheaper tariffs. The Committee's report tends to focus on local supply either as an enabler of better routes to market for local generation, or an opportunity for national suppliers to provide lower bills to consumers proximate to their renewable energy developments, predominantly as an acceptance measure, not because there have been any local supply innovations or material cost reductions. These isolated examples are limited to encouraging the Power Purchase Agreement (PPA) market for local generation, or are straightforward reductions on standard tariffs. These are positive steps but do not capture the full theoretical benefit of innovative, geographically based supply structures.

In this research we go beyond the House of Commons definition, we focus on types of local supply that enable specific values to be captured by exploiting opportunities only available where new, geographically specific energy supply relationships exist.

The same Select Committee report argues DECC has chosen to focus narrowly on community groups when discussing local energy, and overlooks the contributions that other types of project could make; such as local authority, housing association and independent developer led. The report recommends Government assesses the role that different models of ownership could play in the local energy mix as well as what sources of finance might be available⁸.

Before progressing further, it is useful to propose a working definition of 'Local Supply'. This should be subject to debate, but a useful starting point for the purposes of this work is:

Local supply is the operation of an organisational form with either the legal ability, or in partnership with another agency with that ability, to supply electricity to commercial and domestic consumers predominantly within one of the 14 Grid Supply Point Regions.

Working with this definition, a broad range of organisational forms can be considered (i.e. local authorities, private companies, community groups, housing associations, charities, social enterprises, and partnerships thereof) that enable specific values to be captured by exploiting the opportunities that are only available where new, geographically specific energy supply relationships exist. Whilst this definition includes private market actors, the evidence below shows those organisations engaging with the local supply landscape are predominantly drawn from civil society broadly defined, and are compatible with the aims of the community energy programme in DECC.

1.2 The Local Supply Working Group

In August 2014 the Department of Energy and Climate Change (DECC) set up a Local Supply Working Group (LSWG). The LSWG was tasked with building on the Community Energy strategy, which is designed to enable community organisations to participate in the energy sector through four activities:

- energy generation and supply, this includes electricity and heat
- demand reduction to help reduce energy use and save people money
- purchasing through collective switching and purchasing schemes to help consumers secure better deals on energy tariffs
- demand management by shifting energy demand away from peak times of the day to reduce the need to invest in costly energy infrastructure.

To summarise the groups terms of reference; of these four, DECC recognises that electricity generation is by far the most developed part of the community energy (CE) sector, and that there is a desire from within the sector to supply this electricity to consumers directly. The ability to supply consumers, group members and/or those in fuel poverty may enable community groups to deliver an integrated approach bringing together energy generation, supply and demand side responses, with beneficial effects on final household bills. However, the lack of currently operating business models means there is an evidence gap on the economic and wider benefits of local energy supply. There are also requirements of consumer protection to be met.

The LSWG notes that potential routes to markets for CE and other local energy organisations do exist, such as by setting up a fully licenced energy supply company. However the requirements of becoming a licenced supplier are challenging for smaller organisations given the role of a licence holder in not just supplying energy to consumers but ensuring the continued operation and integrity of the entire energy system. As well as these broader responsibilities, the specific barriers experienced by smaller groups include: high start-up costs, legal complexity, and business risks. At present, only those projects that are able to supply electricity directly to the site on which it is generated are able to do this through a Power Purchase Agreement without undertaking the complex requirements and costs of a full supply licence. Alternative routes to market for organisations with embedded generation or aspirations to supply do exist, such as operating as an exempt supplier, operating a private wire, entering a white label relationship with a pre-existing supplier and Licence Lite (offering some relief from the high cost, high-competency industry code management requirements). Each of these options captures different values through exploiting different opportunities in the system.

The objectives of the LSWG are to define DECC's strategic objectives on community energy and local supply matters. The group aims to gain a clearer understanding of the current direct/local supply landscape both locally and regionally, why it is not working for community groups/other non-traditional market entrants and the ambition and scale of local supply aspirations from across the local energy spectrum.

1.3 The Structure of this Report

This report forms part of the output of the working group and is structured as follows. Section 2 frames the issues of local supply in the UK. There are currently only very isolated, emergent or theoretical benefits to local supply and as such this review draws on a wide spectrum of published outputs to define the issue through a focus on outcomes and opportunities. Here outcomes are the material changes to people's lives, environmental impacts or system changes that local energy actors are pursuing. Opportunities are the value streams in the electricity system that are currently going uncaptured due to a lack of replicable local supply business models. Section 3 defines the methods that have been used. Section 4 has three parts; firstly the current landscape is briefly described, secondly the archetypes of local supply that are being proposed are presented in comparable forms, thirdly the opportunities these archetypes can capture are compared. Section 5 discusses these options in relation to the current market framework. Section 6 concludes with strategic considerations and possible policy responses.

Designing the report in this way was necessary due to the careful specification needed when thinking through the actual changes being pursued by the groups that are active in the community and local energy space. It is not always regulatory system change or further price incentives that are needed to allow the growth of local energy innovation, by focusing on the outcomes that are being pursued the research team was able to pinpoint where a new supplier structure might help and where other avenues might be pursued.

Footnotes

- ³ This report focusses primarily on local electricity supply, as the heat sector is unregulated, and gaseous, liquid and solid fuels markets are regulated separately.
- ⁴ Sustainability First (2014) GB Electricity Demand Project; realising the resource, Paper 10, The Electricity Demand Side and Local Energy: how does the electricity system treat 'local'?
- ⁵ Rhodes, M. (2014) Should communities be running their own energy companies? Encraft Briefing Note
- ⁶ Ofgem (2015) Non-traditional business models: Supporting transformative change in the energy market <https://www.ofgem.gov.uk/ofgem-publications/93586/non-traditionalbusinessmodelsdiscussionpaper.pdf>
- ⁷ House of Commons (2014) Energy and Climate Change Committee, Local Energy Sixth Report of Session 2013–14
- ⁸ *ibid*

2. Introduction

In the early 20th century, energy was provided in the UK at a local level by a range of public and private actors, including municipalities^{9,10}. Energy systems were small and localised, and evolved to serve specific users and locations¹¹. The 1920s saw the start of a phase of standardisation and centralisation to improve economies of scale, including development of the national grid, and the UK energy system was nationalised in the late 1940s¹². Energy remained within state hands until the late 1980s when the government of the time started a process of privatisation, motivated by the belief that state operation of infrastructure was inefficient. During the 1990s, generation and supply were separated and the retail markets were liberalised to enable competition for both electricity and gas. Crucially, privatisation and liberalisation happened after centralisation so the newly formed suppliers were large, complex organisations. The post-privatisation policy and regulatory system has evolved around, and favours, these large suppliers, which are profit-oriented and throughput-based¹³.

2.1 Supply Market Concentration

Today's electricity supply market in the UK is dominated by the Big Six major suppliers who account for circa 95% of domestic supply¹⁴ and 80% of commercial supply. At the end of 2013 there were 24 companies in total offering electricity and/or gas supply to households and 30 companies offering electricity and/or gas supply to commercial consumers¹⁵. There are signs of diversification in the UK supply market, this diversification for domestic consumers is characterised by a number of low-carbon energy suppliers, a co-operative supplier and a private supplier focussed on geographically specific white labelling¹⁶. These smaller environmentally or socially focussed suppliers also offer commercial services, but supply market diversification for commercial customers is largely accounted for by supplier arms of corporate generators. This supply market structure is almost exclusively operated at a national level, as the licenses and industry codes mandate fully licensed suppliers to be party to the national Balancing and Settlement Code, and to offer services to all customers regardless of geography. Whilst the market shares of the national utilities are falling overall, the domestic supply market can still be characterised as relatively uncompetitive and there have been concerns raised by the regulator and the Competition and Markets Authority¹⁷ as to the poor outcomes being realised by householders and SME's¹⁸.

2.2 Missing the Opportunities of Local Supply

The national nature of the supply market, concentrated or otherwise, means a number of opportunities to secure economic, social and environmental outcomes go uncaptured. Small to medium scale renewable energy schemes find it hard to compete with larger generators because vertically integrated utilities have a disincentive to support sustainable power purchase agreements¹⁹. This has led the UK government to introduce the option of a purchaser of last resort, to provide backstop PPAs to new entrants to the Contracts for Difference (CfD) scheme²⁰. Further: the national structure and multinational ownership of energy utilities means energy value leaks out of local economies²¹. There are several technical and behavioural benefits on the demand side of energy supply that can accrue to householders, businesses and system managers, which are militated against by the national supply market²² and the business models of national utilities undermine the potential of energy efficiency^{23,24}.

2.3 Why Supply is Nationally Regulated

The UK energy system is based on ‘top down’ control that directs energy from centralised generation to meet demand at any point. When this approach was conceived, following privatisation in the 1980s, ICT was expensive and could only be operated economically when concentrated in one place, therefore, this national system of control made a lot of sense. Regulation and trading systems followed this national centralised model and have remained the same ever since. Energy trading arrangements are based on the assumption that organisations manage their physical position and achieve contracted balance at the national level. Furthermore, organisations are assumed to be energy specialists, operating at the national scale, who can trade their positions on the wholesale market. However, the emergence of smart technologies and distributed generation create new value opportunities that can be best captured by local structures, this is incompatible with an entirely nationally focussed system. The diversity and variety of local demand and generation suggests that some forms of local balancing could be a more effective and efficient to optimise supply and demand, and may be able to complement and run in parallel to national balancing.

2.4 New Supplier New Outcomes: Local Suppliers are not just ‘Mini Utilities’

It is increasingly recognised that a move towards greater decentralisation of the energy system could more effectively address the energy trilemma of climate change, security and affordability³⁰. This has opened the way for engagement of new actors in the energy system, including community groups, social enterprises and local authorities. There is potential for local actors to engage with each or many parts of the energy system, including generation, distribution, supply and demand reduction, and a real appetite to take more control of local energy provision^{31,32}. Furthermore, local authorities can not only engage directly but also shape the context for other local actors^{33,34}. The vast majority of local energy projects are concerned with energy generation and/or demand reduction initiatives; few have addressed supply, because of the complex regulatory environment and high set up costs.

The motivations of local actors seeking to enter the energy market are diverse; table 1 presents a selection of motivations for engagement in local energy reported by local authorities and community groups^{35,36}. Table 1 also identifies a growing evidence base that suggests pursuing these outcomes through the energy system is realistic. Local actors often report multiple motivations, which can make it difficult to identify optimal solutions. Furthermore, motivations vary significantly between different actors, which means that there is little standardisation and little opportunity to learn from predecessors. One of the principal motivations for engagement in local supply is social; addressing fuel poverty by reducing prices, or tariff fairness. However; local supply is increasingly part of efforts to increase local accountability and control and energy independence.

Table 1: Outcomes cited as motivations by local supply stakeholders and supporting evidence.

Area	Outcomes	Example evidence
Economic	Competitiveness and economic growth	37, 38, 39
	Job creation	40, 41, 42
	Revenue generation	43, 44
Social	Fuel poverty reduction	45, 46, 47, 48
	Regeneration	49, 50
	Skills and education	51, 52, 53
	Social cohesion	54, 55
	Fairness e.g. tariff discrepancy	56, 57
Environmental	Carbon emissions reduction	58, 59
	Air quality	60, 61
Self-governance or self determination	Local accountability & control	62, 63
	Energy independence	64, 65

For this work it is critical to recognise that a significant proportion of actors engaged in the question of local supply are motivated by reasons beyond the opportunity to set up a profitable enterprise for the delivery of private returns. They do so based on the pursuit of a mix of the outcomes categorised in Table 1. This is important because different ways of organising local supply (which we call archetypes) enable different opportunities to be exploited and different outcomes to be pursued to mainstream operation.

2.5 The Four Opportunities of Local Supply

Table 1 describes a range of *outcomes* which are being pursued through engagement with the electricity system. The evidence cited in the table identifies a number of opportunities that can be exploited to secure these outcomes. This relationship has not always been clear in the literature on local energy systems and economies. Here we place these opportunities into four categories: Better routes to market for local generation, fulfilling the potential of the demand side, real energy efficiency gains and re-localising energy value. Further, each of these can enable reductions in fuel poverty.

Below, the contribution of each opportunity to the wider energy system is summarised, and the importance of *local* supply to their exploitation is discussed. Many of these opportunities constitute rational revenue propositions; yet the fact that they remain uncaptured shows that current market actors are either unwilling or unable to exploit them due to their size, business models or regulated structure. Emerging local supply models (or archetypes as we call them in this report) have been suggested as ways of better capturing these opportunities. In section 4 we describe this potential in more detail. Here, however we confine ourselves to defining these opportunities and linking them to the outcomes being pursued by local energy groups.

2.5.1 Opportunity 1: Better routes to market for local generation

Local supply has been proposed as a way of maximising the amount of community/local energy that enters the energy system. Much of the debate around local supply is motivated by the fact that community and local generation schemes face unfavourable conditions in the wholesale electricity market due to their characteristics as owners of small scale intermittent generation^{66,67,68}. Currently community energy schemes are able to access fixed FiT tariffs for the power they

produce from schemes up to 5MW capacity. In the DECC Community Energy Strategy the Government signalled its intent to raise the FiT tariff to 10MW for community energy schemes wanting to receive the fixed FiT. Recently however DECC announced that this would not happen due in part to the effect of raising the threshold on new schemes that remained under 5MW⁶⁹.

In order to retail power in the first place, generators must either participate in the national BETTA market which requires significant overheads, often too large for community and small commercial schemes to bear in relation to their output, or sell their output via a third party which is a BETTA participant (via PPAs). This places community energy schemes in a difficult position, as given the upcoming phase out of the Renewables Obligation, the only option for schemes rated above 5MW will be to sell their electricity into the market via a PPA with a third party licensed supplier (TPLS) or market trader. Responses to a 2012 call for evidence by DECC⁷⁰ demonstrated the terms of PPAs have been steadily declining, leading some to predict small, intermittent generators will be likely to achieve below-reference price for the power they produce.

Under the CfD support system, the price received will be referenced to that of the day ahead market, and the difference between the reference price and the strike price is paid to the generator. Cornwall energy⁷¹ amongst other commentators⁷² have demonstrated how the complex auction structures such as those proposed under the CfD scheme: militate strongly against non-expert participation in the bidding system, can slow down the renewable project build rates, and act as a barrier to new entrants.

The combination of a complex and competitive auction structure and unfavourable conditions in the PPA market put larger companies and vertically Integrated utilities in a powerful position to capture the rationed support available under the CfD mechanism. This is an unequal playing field as incumbents can use market position to consolidate existing advantage. This will likely constrict the community energy market to

under 5MW schemes, undermine innovation in the sector and ultimately undermine the potential for medium scale renewables in the 5-50MW range⁷³. Recent CfD allocations however do show schemes in the 5-50MW have performed well in the auction mechanism⁷⁴ and have included community and municipal developers. Their continued presence and ability to further succeed will be dependent on the strength of PPAs into the future.

These issues have led researchers and commentators to argue that a local supply option might better serve community and other small independent generators,^{75,76,77,78} to cite only a number of the many examples. The idea that a local supply structure would be able to offer better PPA's to embedded generators is based on two notions. First, that a national utility business model is not interested in small scale community PPA's for the reasons outlined above, and therefore is incentivised to offer poor terms. Second, if a local supply entity was set up with a goal of marketing local power, their business model could be oriented towards: ensuring the generators' PPAs realised the full embedded benefits available (derived from the avoidance of various network and other charges), pass on more value from 'green certificates', and avoid unnecessary charges being incorporated into poor PPA offers⁷⁹. In order to access such embedded benefits the generation would need to meet demand through a supplier within the same GSP group⁸⁰. As such any 'local' supplier looking to operate to secure better PPA deals for a proximate community, would likely find it important to operate within a single GSP region⁸¹. In section 4 we discuss the current options and possible archetypes that would underpin better PPA's or similar contractual arrangements that would allow local generation to receive higher returns. Here it is only important to note that local supply has been proposed as a solution to the poor prices being achieved by small generators in the national market.

2.5.1a Opportunity 1 and Outcomes

The opportunity to secure better prices for exported electricity is not being pursued by most community or municipal energy schemes to generate profit. As evidenced in Table 1 the values being pursued by these actors are diverse. The result of achieving a better price for power generated is more local and independent energy generation schemes which may be pursued to secure environmental (decarbonisation of electricity) and/or socioeconomic outcomes. Different forms of local supply may be able to achieve this in different ways and with varying degrees of success. Opportunity 1: 'Better routes to market for local generation', has to potential to deliver these outcomes and has been the main focus thus far of the actors from the community energy space. There are further, more systemic opportunities available within local supply that also speak to the same value set. The next opportunity looks beyond the generation market.

2.5.2 Opportunity 2: Fulfilling the potential of the demand side

When the varieties of local generation and demand within a particular GSP are looked at together, there are a number of opportunities for the creation of value that result from better matching of generation and demand. This can include a reduction in transmission losses and grid constraints, energy security and avoidance of 'over generation'. These opportunities are often considered to be on the 'demand side' as they all rely on having a number of consumers or generators willing to participate closely in the system by flexing their consumption/load. For clarity these are split into two sub groups here: Demand response/participation and time of use tariffs. Space does not permit a full breakdown or close explanation of these opportunities, what is important here is to demonstrate the fact these opportunities exist in the system and how their under-exploitation to date has been due in part to a dearth of local supply business models.

2.5.2a Demand Response and Participation

Demand side response and participation (DSR/P) refers to the ability of a number of consumers to reduce their electrical consumption (demand) in response to signals from suppliers, infrastructure or system operators. Often demand response is thought of in terms of hardwired solutions to enable third parties to affect a consumer's load profile; whereas demand participation is more aligned with customer behaviour to schedule loads differently, though both can be used in the same project. In broad terms these demand responses may be useful for:

- Suppliers; as a real time service to avoid imbalance charges in the Balancing Mechanism
- Distribution and Transmission network operators; to manage network constraint (avoid overloading), fault management and to defer or eliminate the need for future reinforcements⁸²
- The System operator to use as operating reserves to maintain system balancing⁸³

Each of these services has a value to the parties above which can be monetised, yet due to the liberalised nature of the market the values of demand side response accrue to different parties at different times⁸⁴. Though these values exist and could be substantial⁸⁵, Ofgem has conceded that there is little visibility on their systemic use⁸⁶. Recent work⁸⁷ identifies two major problems with the current system in its incentivisation of DSR/P. The first is the way in which the values in demand response accrue to different parties at different times. For example, if a DNO was experiencing network stress on a sunny, windy day they may wish to access DSR/P in real time, yet if this were widely taken up this may affect the supplier position after gate closure⁸⁸. The second issue is the current inability of DSR/P business models to meaningfully engage with householders as the distribution and supply function are legally separated in the UK. This means demand side services are unable to be incorporated onto consumer bills. The national nature of most utilities also militates against geographically specific demand response services which are necessary for DNO system management^{89,90}.

There are existing business models for demand response and services in the UK⁹¹. These are often national models that predominantly contract with the system operator (National Grid) for short term operating reserve and with regional DNO's to enable network management. Currently these business models operate on a commercial to commercial basis and/or outside the supplier framework. They operate outside the supplier framework because long term contracting is not possible due to the legal requirement for consumers to be able to switch supplier, and they operate commercial to commercial because load response from domestic properties is too small unless it is highly aggregated. Attempts have been made to run projects aggregating domestic load⁹² but this requires novel business models for domestic load aggregation and have been specified to avoid bilateral contracting with suppliers⁹³.

Research has shown there are outcomes from demand side projects that can benefit local economic development by making space on congested networks for new developments, and that this would be made easier if local supply structures existed⁹⁴. Equally, the penetration of smart meters offers new ways of aggregating customers with small demand and undertaking close community level engagement to deliver load shifting which can be traded as a demand side service⁹⁵ all of these benefits are currently unable to be accessed by all domestic consumers and most SMEs for two reasons; 1) because the right to switch supplier militates against long term contracts for domestic customers and 2) because many of these services are most beneficial when deployed within a defined geography. Many of these opportunities could be exploited if new local supply and/or aggregator business models were to emerge that could engage with the domestic, SME and larger commercial market. There is then a clear set of values available through the aggregation of domestic and SME load alongside commercial load, which if it could be pursued through local energy supply or contracting solutions, would offer significant benefits to the system.

2.5.2b Time of Use Tariffs

Whilst realising the full opportunities of DSR/P is dependent on geographical aggregation they are not the whole picture on the local demand side opportunities. With the roll out of smart meters, there is the option for consumers to be offered tariffs which price power differently in different times of the day. Research into so-called time of use tariffs⁹⁶, has shown that impacts on customer bills would be mixed if no behaviour change is assumed. However, recent research⁹⁷ has demonstrated the potential to engage customers with smart meters and shifting demand to cheaper times of day, i.e. away from load peaks where electricity is expensive. There are benefits to national suppliers that wish to engage in demand side participation, currently small commercial and domestic customers are settled on a profile, whereas large customers are settled half hourly and benefit from using power at times when electricity is cheap, this option has not been open to domestic customers as the costs involved in settling smaller users half hourly are too high. However, by aggregating smaller users with similar load curves behind a virtual meter, an aggregator could theoretically offer cheaper tariffs to participants 'behind' the virtual meter if they were able to adjust their collective load profile to shift demand to cheaper periods⁹⁸. This model would require contractual partnership with a third party licensed supplier to manage the billing process and system balancing functions. This has been most progressed in the UK by the Energy Local concept and developed under the 'Local Aggregator' archetype discussed in section 4. National supplier smart metering enables time of use tariffs but is largely unable to offer the sophistication of demand participation offered by a local aggregator.

2.5.2c Opportunity 2 and Outcomes

For demand side response and participation there are two clear value opportunities if a geographic business model were adopted. Firstly demand side services can be offered to suppliers, network managers and system operators. How these services are remunerated is currently complex as it is very difficult to do so through national suppliers.

If a local supplier were to enter the market place they would be better able to engage with consumers in their area, contract with these parties and pass savings on through bills. Secondly, if groups of small consumers are aggregated they may benefit from shifting demand to cheaper periods in half hourly settlement. By passing the monetary values of these opportunities to customers the outcomes can be cheaper bills, which in turn deliver socio-economic goals such as fuel poverty reduction and fairer tariffs. For municipal authorities these demand side approaches can materially enable new economic development projects in areas of network constraint⁹⁹, this in turn contributes to local economic growth and competitiveness. Thus opportunity 2 can be seen to deliver several outcomes described in Table 1.

2.5.3 Opportunity 3: Real energy efficiency gains

Both opportunities 1 and 2 above could deliver positive outcomes in the energy system but do nothing to reduce the final volume of electricity used by households and business.

Space does not permit a breakdown of the energy efficiency policies deployed recently in the UK. However it is worth noting that even though the UK benefits from some of the lowest retail electricity and gas prices in the EU-15¹⁰⁰ it also suffers the highest levels of fuel poverty in the EU-15 with one of the most energy inefficient building stocks in Europe^{101,102}. Clearly there are significant energy demand reductions available by deploying energy efficiency measures. Recent research has shown sustained engagement in cost effective or cost neutral energy efficiency at the local level in the UK could secure an 18% reduction in GHG emissions from commerce, industry and domestic users by 2020¹⁰³. However, even those energy efficiency investments that represent commercially attractive revenue opportunities are underexploited in the UK^{104,105}.

It is useful to focus on the new opportunities that might be exploitable if local suppliers had the freedom to engage with customers differently to the traditional national utility model. The national utility business model is largely dependent on three pillars.

1. Vertical integration, the matching of the output of its generation fleet to its consumer demand. In this way national utilities can achieve de-facto retail as opposed to wholesale prices for the power produced.
2. Expanding the consumer base, in order to increase shareholder value each utility can capture more market share to increase its profitability.
3. The stability in or growth of the effective demand of the consumer base.

For the traditional utility model, any significant reduction in final demand undermines returns. As such, the conventional utility model cannot reasonably pursue genuinely transformative energy efficiency reductions without undermining their core business of maximising kWh unit volume sold¹⁰⁷. The response from utilities is that they can do so because they can rely on securing expanding market share. If local supply licenses were to proliferate with single local suppliers, bound to operate only in one geographic area, then the expanding market share argument could not hold. In this way, if substantive energy efficiency opportunities are to be fully exploited the business model of electricity supplier must change to incentivise energy efficiency.

The Energy Service Company or 'ESCO' business model may enable energy demand reductions of between 22% and 35% more than the traditional utility model¹⁰⁸. ESCOs provide energy services (e.g. a warm home, hot water, efficient appliances and lighting) rather than sell energy by the unit to provide these services. The focus on service delivery as opposed unit throughput, incentivises them to reduce consumer demand, and realise revenues from energy savings¹⁰⁹; this results in a business model that is far more compatible with delivering substantive, systemic energy efficiency gains and resulting in lower CO₂ emissions¹¹⁰. ESCOs are a growing phenomenon in the UK^{111,112}, but have exclusively operated in the public and private sectors, and have done so under three main models: ESCOs operating on a business-to-business basis, Local public-private partnerships involving local authorities,

and limited energy service offers from major energy retailers¹¹³. Business to business energy performance contracting is more prevalent as medium to large businesses and public bodies have the administrative capacity to separate out energy bill savings through contracting procedures outside the supply structure. The ability of SME and domestic consumers to benefit from the ESCo model is hampered by conflicts between the mandate of the regulator—to protect the interests of customers by promoting competition through the supplier switching mechanism—and the need for long-term contracts to justify the large upfront capital investment¹¹⁴.

Recent research¹¹⁵ has proposed the ESCo and extended Multi Utility Service Company (MUSCo) models¹¹⁶ are far better aligned with realising the untapped opportunities of energy efficiency. Also the local focus, institutional trust and buildings stock expertise of local government is showing widespread benefits for engaging citizens in energy efficiency retrofit¹¹⁷. Linking the local expertise of municipalities with a supply business model that is able to invest in substantial energy efficiency is a critical branching point in this research which should not be understated (see section 4.3).

2.5.3a Opportunity 3 and Outcomes

The opportunity of real energy efficiency gains has positive contributions to make to many of the outcomes in Table 1. Economic development is served by putting more disposable income into the pockets of local citizens. Socio-economic goals of fuel poverty reduction are directly addressed by energy efficiency investments, particularly in local authority housing stock and in housing association accommodation. Energy efficiency retrofit also increases new jobs and skills and reduces carbon emissions. The lack of suitable business models in the supply market that are able to incorporate retrofit savings directly into bills, and the benefits of local focus, place energy efficiency as a fundamentally undervalued and underexploited opportunity in the local supply space.

2.5.4 Opportunity 4: Re-localising energy value

Citizens, Municipalities and regional development bodies in many European countries have begun to see energy value as a key component of economic prosperity, and have thus investigated the potential to play a more active role in the generation and supply of their own energy needs. In the UK our market structure has resulted in a significant 'leakage' of energy value out of cities, regions and ultimately the nation^{118,119}. Enabling new, local business models to be tested that reverse this loss of value is an important next step. New tools for the assessment of the flows of energy value through regions have shown that up to 10% of GVA 'leaks' out of the local economy in the payment of the energy bill¹²⁰, and that there are a number of opportunities to re-localise these values, to the benefit of the local economy^{121,122,123,124}.

The assessment of value within the energy economy and the aspiration to re-localise a proportion of this value is a key motivator for many stakeholders in the local supply sector, as they see local supply business models as critical to enabling the three opportunities above, but within a beneficial ownership structure that has a high element of local equity stakes^{125,126}.

2.5.4a Opportunity 4 and Outcomes

The values at stake in the energy system have begun to attract attention from economic development professionals across UK cities. By taking a stake in the energy economy, local authorities in particular may be able to secure new revenue streams in times of austerity. The re-localisation of energy values has the potential to contribute to all of the outcomes described in Table 1. The determining factor will be how the different value streams are redeployed. There is nothing stopping a municipal energy company from using revenues to support frontline services, yet there are also the opportunities for revenues to be recycled into further energy system outcomes. What matters here is that once energy values are re-localised they come under an element of democratic control they currently do not enjoy.

2.6 The Need for Archetypes of Local Supply

This literature review has highlighted four missed opportunities in the energy sector that may be addressed by closer engagement with the UK electricity supply market. There is clearly significant scope for local supply to contribute to several core aims of UK energy policy and realise wider beneficial outcomes across economic, social, environmental and governance spheres. This review has intentionally avoided discussion of the solutions that have been suggested in secondary literatures as this is the role of sections 4 and 5. Here the outcomes being pursued by local supply actors have been linked to four missed opportunities in the UKs energy sector. In order to develop this sector, clarity is needed on the archetypes of local supply that are being pursued by different actors. The potential for these archetypes to capture the missed opportunities presented needs closer analysis, as do the barriers and policy responses that are needed to nurture this sector. This is the output of the remainder of this report. Firstly however, research methods are defined.

Footnotes

- ⁹ R. Fouquet and P. J. G. Pearson, "A thousand years of energy use in the United Kingdom," *Energy Journal*, vol. 19, no. 4, pp. 1-41, 1999.
- ¹⁰ Julian, C., (2014) *Creating Local Energy Economies Lessons from Germany*, Republica. London
- ¹¹ Hughes, *Networks of power: electrification in Western society, 1880-1930*. Baltimore: Johns Hopkins University Press, 1983.
- ¹² Grid, "The National Gas Archives - Nationalisation," 2005. [Online]. Available: <http://www.gasarchive.org/Nationalisation.htm>. [Accessed: 08-Mar-2014].
- ¹³ C. Mitchell, *The political economy of sustainable energy*. Palgrave Macmillan, 2010.
- ¹⁴ Ofgem (2014b) *State of the market: Assessment*, London: Office of Gas and Electricity Markets
- ²² Sustainability First (2014) *GB Electricity Demand Project; realising the resource*, Paper 10, *The Electricity Demand Side and Local Energy: how does the electricity system treat 'local'?*
- ²³ *Realising Transition Pathways Engine Room* (2015). *Distributing Power: A transition to a civic energy future*. Realising Transition Pathways Research Consortium. Available at: http://www.realisingtransitionpathways.org.uk/publications/FINAL_distributing_power_report_WEB.pdf
- ²⁴ Roelich K; Knoeri C; Steinberger JK; Varga L; Blythe PT; Butler D; Gupta R; Harrison GP; Martin C; Purnell P (2015) *Towards resource-efficient and service-oriented integrated infrastructure operation*, *Technological Forecasting and Social Change*, 92, pp.40-52. doi: 10.1016/j.techfore.2014.11.008
- ²⁵ Lockwood, M. (2014) *Energy networks and distributed energy resources in Great Britain*. Energy Policy Group Working Paper 1406
- ²⁶ Rhodes, M. (2014) *Should communities be running their own energy companies?* Encraft Briefing Note
- ²⁷ Elexon (nd) *Encouraging local energy supply through a local balancing unit*. Available at: https://www.elexon.co.uk/wp-content/uploads/2014/08/Encouraging_local_energy_supply_through_a_local_balancing-unit.pdf
- ²⁸ Rhodes, M. (2014) *Should communities be running their own energy companies?* Encraft Briefing Note
- ²⁹ Gillie, M., Alexander, R., Charnock, G (2009) *Getting The Most From Community Generation - An Economic And Technical Model To Control Small Scale Renewable Community Generation And Create A Local Energy Economy*, 20th International Conference on Electricity Distribution Prague, 8-11 June 2009, Paper 0190

- ³⁰ J. W. Hall, J. J. Henriques and R. J. Nicholls (eds), *A Fast Track Analysis of strategies for infrastructure provision in Great Britain: Technical report*. Oxford 2012.
- ³¹ Core Cities, *Core Cities Growth Prospectus Policies Step 6 : Power Up the Cities*. 2013.
- ³² DECC, *Community Energy Strategy*
- ³³ Hawkey, D., Tingey, M. and Webb, J. (2014) *Local engagement in energy system development: Present practice, future need and pathways to 2050*. Pilot research study. Final Report.
- ³⁴ Bale, C.S.E, Foxon, T.J., Hannon, M.J. and Gale, W.F. (2012) *Strategic energy planning within local authorities in the UK: A study of the city of Leeds.. Energy Policy 48 242-251*.
- ³⁵ Roelich and Bale (2014) *Municipal energy companies in the UK: Motivations and barriers*. International Symposium of Next Generation Infrastructure.
- ³⁶ Seyfang, G., Park, J.J., Smith, A. (2013) *A thousand flowers blooming? An examination of community energy in the UK Energy Policy 61 977-989*
- ³⁷ Core Cities (2013) *Core Cities Growth Prospectus Policies Step 6: Power Up the Cities*, Core Cities, <http://www.corecities.com/what-we-do/publications/core-cities-growth-prospectus-policies-step-6-power-up-the-cities>
- ³⁸ Gouldson, A., Kerr, N., Topi, C., Dawkins, E., Kuylenstierna, J. and Pearce, R. (2012) *The economics of low carbon cities. A mini-Stern review for the Leeds city region*. The Centre for Low Carbon Futures.
- ³⁹ Gouldson, A., Colenbrander, S., McAnulla, F., Sudmant, A., Kerr, N., Sakai, P., Hall, S. and Kuylenstierna, J. C. I., 2014. *Exploring the Economic Case for Low-Carbon Cities*. New Climate Economy contributing paper. Sustainability Research Institute, University of Leeds, and Stockholm Environment Institute, York, UK.
- ⁴⁰ Heinbach, K., Aretz, A., Hirschl, B., Prahl, A., Salecki, S., (2014). *Renewable energies and their impact on local value added and employment*. *Energy, Sustainability and Society*, 4:1
- ⁴¹ UKERC (2014) *Low carbon jobs: The evidence for net job creation from policy support for energy efficiency and renewable energy* Available at: <http://ecowatch.com/wp-content/uploads/2014/11/UKERC-Low-Carbon-Jobs-Report.pdf>
- ⁴² Blyth et al (2014) *Low carbon jobs: The evidence for net job creation from policy support for energy efficiency and renewable energy*, UKERC, Available at, <http://www.ukerc.ac.uk/publications/low-carbon-jobs-the-evidence-for-net-job-creation-from-policy-support-for-energy-efficiency-and-renewable-energy.html>
- ⁴³ Busch, H., McCormick, K., (2014). *Local power: exploring the motivations of mayors and key success factors for local municipalities to go 100% renewable energy*, *Energy, Sustainability and Society*, 4: 5
- ⁴⁴ Bristol City Council (2015) *Establishment of an Energy and Technology company and associated Companies*, Report to Cabinet 3 February 2015 Executive Summary Of Agenda Item 6.
- ⁴⁵ Bale, C., Bush, R. & Taylor, P (2014) *Spatial mapping tools for district heating: helping local authorities tackle fuel poverty*, Final Report.
- ⁴⁶ Roelich and Bale (2014) *Municipal energy companies in the UK: Motivations and barriers*. International Symposium of Next Generation Infrastructure.
- ⁴⁷ Seyfang, G., Park, J.J., Smith, A. (2013) *A thousand flowers blooming? An examination of community energy in the UK Energy Policy 61 977-989*
- ⁴⁸ Bale, C.S.E, Foxon, T.J., Hannon, M.J. and Gale, W.F. (2012) *Strategic energy planning within local authorities in the UK: A study of the city of Leeds.. Energy Policy 48 242-251*
- ⁴⁹ Aiken, M., Cairns, B. & Thake, S. (2009) *Community ownership and management of assets: supplementary literature review*.
- ⁵⁰ Webb, J. & Hawkey, D. (2013) "We're not talking about lab experiments here, are we?": *Governance of Urban Sustainable Energy in Comparative Context*. Paper presented at iGov Workshop on Theorising Governance Change for a Sustainable Economy.
- ⁵¹ Haggett, C. Creamer, E., Harnmeijer, J., Parsons, M. & Bomberg, E. (2013) *Community energy in Scotland: the social factors of success*.
- ⁵² Gubbins, N. (2010) *The role of community energy schemes in supporting community resilience*
- ⁵³ Blyth et al (2014) *Low carbon jobs: The evidence for net job creation from policy support for energy efficiency and renewable energy*, UKERC, Available at, <http://www.ukerc.ac.uk/publications/low-carbon-jobs-the-evidence-for-net-job-creation-from-policy-support-for-energy-efficiency-and-renewable-energy.html>
- ⁵⁴ *ibid*
- ⁵⁵ Seyfang, G., Park, J.J., Smith, A. (2013) *A thousand flowers blooming? An examination of community energy in the UK Energy Policy 61 977-989*
- ⁵⁶ *ibid*
- ⁵⁷ Roelich and Bale (2014) *Municipal energy companies in the UK: Motivations and barriers*. International Symposium of Next Generation Infrastructure.
- ⁵⁸ Fang, W.S. and Miller, S.M. (2013) *The effects of ESCOs on carbon dioxide emissions*. *Applied Economics*. 45. 4796–4804.
- ⁵⁹ Gouldson, A., Colenbrander, S., McAnulla, F., Sudmant, A., Kerr, N., Sakai, P., Hall, S. and Kuylenstierna, J. C. I., 2014. *Exploring the Economic Case for Low-Carbon Cities*. New Climate Economy contributing paper. Sustainability Research Institute, University of Leeds, and Stockholm Environment Institute, York, UK
- ⁶⁰ Bale, C.S.E, Foxon, T.J., Hannon, M.J. and Gale, W.F. (2012) *Strategic energy planning within local authorities in the UK: A study of the city of Leeds.. Energy Policy 48 242-251*
- ⁶¹ Bulkeley, H., Betsill, M.M., 2003. *Cities and Climate Change: Urban Sustainability And Global Environmental Governance*. Routledge, New York.
- ⁶² Callaghan, G., and Williams, D., (2014) *Teddy Bears and Tigers: How renewable energy can revitalize local communities*. *Local Economy*, September-November 2014; vol. 29, 6-7: pp. 657-674., first published on September 11, 2014
- ⁶³ Seyfang, G., Park, J. J., Smith, A. (2013) *A thousand flowers blooming? An examination of community energy in the UK, Energy Policy 61. pp. 977-989*
- ⁶⁴ *Realising Transition Pathways Engine Room (2015). Distributing Power: A transition to a civic energy future*. Realising Transition Pathways Research Consortium. Available at: http://www.realisingtransitionpathways.org.uk/publications/FINAL_distributing_power_report_WEB.pdf
- ⁶⁵ Seyfang, G., Park, J.J., Smith, A. (2013) *A thousand flowers blooming? An examination of community energy in the UK Energy Policy 61 977-989*
- ⁶⁶ DECC (2012) *Consultation outcome Barriers to long-term contracts for independent renewable generation investment*. Available at <https://www.gov.uk/government/consultations/barriers-to-long-term-contracts-for-independent-renewable-generation-investment>
- ⁶⁷ Platt, R., Straw, W., Aldridge, J., Williams, J., (2014) *City Energy: A New Powerhouse for Britain*. IPPRR, London
- ⁶⁸ *Realising Transition Pathways Engine Room (2015). Distributing Power: A transition to a civic energy future*. Realising Transition Pathways Research Consortium. Available at: http://www.realisingtransitionpathways.org.uk/publications/FINAL_distributing_power_report_WEB.pdf
- ⁶⁹ DECC (2014) *Government Response to the consultation on support for community energy projects under the Feed-in-Tariffs Scheme*. URN: 14D/387 November 2014
- ⁷⁰ <https://www.gov.uk/government/consultations/a-call-for-evidence-on-barriers-to-securing-long-term-contracts-for-independent-renewable-generation-investment>
- ⁷¹ Cornwall Energy (2012), *The Energy Bill and its impact on Community Energy, A report for Cooperatives UK*
- ⁷² Morris, C., (2014) *Actual outcomes of auctions in France, Brazil, and the Netherlands* <http://energytransition.de/2014/06/outcome-of-renewables-auctions/>
- ⁷³ *i.e. Cornwall energy (2012); Morris, C (2014)*.
- ⁷⁴ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/407059/Contracts_for_Difference_-_Auction_Results_-_Official_Statistics.pdf
- ⁷⁵ Platt, R., Straw, W., Aldridge, J., Williams, J., (2014) *City Energy: A New Powerhouse for Britain*. IPPRR, London
- ⁷⁶ *Realising Transition Pathways Engine Room (2015). Distributing Power: A transition to a civic energy future*. Realising Transition Pathways Research Consortium. Available at: http://www.realisingtransitionpathways.org.uk/publications/FINAL_distributing_power_report_WEB.pdf
- ⁷⁷ Evidence to DECC Local supply working group
- ⁷⁸ http://www.energylocal.co.uk/?page_id=49
- ⁷⁹ Evidence to DECC Local supply working group
- ⁸⁰ Personal communications with Ofgem
- ⁸¹ Elexon (2014) *Encouraging local energy supply through a local balancing unit*. Available at https://www.elexon.co.uk/wpcontent/uploads/2014/08/Encouraging_local_energy_supply_through_a_local_balancing-unit.pdf
- ⁸² Pudjianto, D., Djapic, P., Auinedi, M., Kim Gan, C., Strbac, G., Huang, S. and Infield, D. (2013) *'Smart control for minimizing distribution network reinforcement cost due to electrification'* *Energy Policy 52*, pp 76-84
- ⁸³ Energy Networks Association (2014) *Demand Side Response shared services framework Concept Paper*, Electricity Demand Side Response Working Group, ENA, London
- ⁸⁴ Lockwood, M., (2014) *Energy networks and distributed energy resources in Great Britain*, iGov EPG Working Paper: 1406
- ⁸⁵ Wilson, M (2011) *ASSESSMENT OF DSR PRICE SIGNALS*, Pöyry; available at: http://www.poyry.co.uk/sites/www.poyry.uk/files/717_DSR_Price_signals_Report_v1_0.pdf
- ⁸⁶ Ofgem (2013g) *Assessment of the RIIO-ED1 Business Plans*

- ⁸⁷ Lockwood, M., (2014) Energy networks and distributed energy resources in Great Britain, IGov EPG Working Paper: 1406
- ⁸⁸ For more on market trading and gate closure see: https://www.elexon.co.uk/wp-content/uploads/2013/11/beginners_guide_to_trading_arrangements_v4.0_cgi.pdf
- ⁸⁹ KEMA (2011) GB Demand Response, Report 2: Strategic issues and action planning Report for the Energy Network Association, http://www.energynetworks.org/modx/assets/files/news/publications/KEMA_CUE%20Report_Strategic%20Issues%20and%20Action%20Planning_March2011.pdf
- ⁹⁰ Sustainability First (2014) GB Electricity Demand Project; realising the resource, Paper 10, The Electricity Demand Side and Local Energy: how does the electricity system treat 'local'?
- ⁹¹ E.g. <http://www.flexitricity.com/>
- ⁹² <https://www.google.co.uk/#q=scottish+power+ace+project>
- ⁹³ Communications with DNO's within Low Carbon Networks Fund submissions
- ⁹⁴ Hall, S., & Foxon, T. J. (2014). Values in the Smart Grid: The co-evolving political economy of smart distribution. *Energy Policy*, 74, 600-609.
- ⁹⁵ Gillie, M., Alexander, R., Charnock., G (2009) Getting The Most From Community Generation - An Economic And Technical Model To Control Small Scale Renewable Community Generation And Create A Local Energy Economy, 20th International Conference on Electricity Distribution Prague, 8-11 June 2009, Paper 0190
- ⁹⁶ Thumin, J., (2014), Investigating the potential impacts of Time of Use (TOU) tariffs on domestic electricity customers, Report to Ofgem, Centre for Sustainable Energy, Available at: <https://www.ofgem.gov.uk/ofgem-publications/87361/toutariffsandclustering-reportvfinal160414.pdf>
- ⁹⁷ Gillie, M., Alexander, R., Charnock., G (2009) Getting The Most From Community Generation - An Economic And Technical Model To Control Small Scale Renewable Community Generation And Create A Local Energy Economy, 20th International Conference on Electricity Distribution Prague, 8-11 June 2009, Paper 0190; He, X., Keyaerts, N., Azevedo, I., Meeus, L., Hancher, L., & Glachant, J. M. (2013). How to engage consumers in demand response: A contract perspective. *Utilities Policy*, 27, 108-122. Torriti, J. (2012). Price-based demand side management: Assessing the impacts of time-of-use tariffs on residential electricity demand and peak shifting in Northern Italy. *Energy*, 44(1), 576-583.
- ⁹⁸ http://www.energylocal.co.uk/?page_id=49
- ⁹⁹ Hall, S., & Foxon, T. J. (2014). Values in the Smart Grid: The co-evolving political economy of smart distribution. *Energy Policy*, 74, 600-609.
- ¹⁰⁰ Vaasa ETT (2013) European Residential Energy Price Report 2013, Vaasa ETT, Available at, http://www.vaasaett.com/wp-content/uploads/2013/05/European-Residential-Energy-Price-Report-2013_Final.pdf
- ¹⁰¹ UKACE Fact File (2013) The Cold Man of Europe, UKACE, Available at, <http://www.ukace.org/wp-content/uploads/2013/03/ACE-and-EBR-fact-file-2013-03-Cold-man-of-Europe.pdf>
- ¹⁰² Kerr, N., (2015) Assessing the indirect impacts of energy efficiency improvements in the UK building stock, Infrastructure financialisation workshop, University of Leeds, February 2015.
- ¹⁰³ <http://www.climatesmartcities.org/case-studies>
- ¹⁰⁴ DECC (2012a) The Energy Efficiency Strategy: The Energy Efficiency Opportunity in the UK, Department of Energy and Climate Change, November 2012
- ¹⁰⁵ Grubb, M., Hourcade, J.C., Neuhoﬀ, K.(2014) Planetary Economics: Energy, Climate Change and the Three Domains of Sustainable Development, Routledge, Abingdon/New York
- ¹⁰⁶ Hannon, M.J., Foxon, T.J. and Gale, W.F. (2013) The co-evolutionary relationship between energy service companies and the UK energy system: Implications for a low-carbon transition. *Energy Policy*. 61. 1031-1045; Also Hannon, M. J., & Bolton, R. (2014). UK Local Authority engagement with the Energy Service Company (ESCO) model: Key characteristics, benefits, limitations and considerations. *Energy Policy*.78 198-212
- ¹⁰⁷ Roelich et al (2015) Towards resource-efficient and service-oriented integrated infrastructure operation. *Technological Forecasting and Social Change* 9 40-52
- ¹⁰⁸ Fang, W.S., Miller, S.M. and Yeh, C.C. (2012) The effect of ESCOs on energy use. *Energy Policy*. 51. 558-568.
- ¹⁰⁹ Roelich et al (2015) Towards resource-efficient and service-oriented integrated infrastructure operation. *Technological Forecasting and Social Change* 9 40-52
- ¹¹⁰ Fang, W.S. and Miller, S.M. (2013) The effects of ESCOs on carbon dioxide emissions. *Applied Economics*. 45. 4796-4804.
- ¹¹¹ Hannon, M.J., Foxon, T.J. and Gale, W.F. (2013) The co-evolutionary relationship between energy service companies and the UK energy system: Implications for a low-carbon transition. *Energy Policy*. 61. 1031-1045;
- ¹¹² Bertoldi, P., Rezessy, S. and Vine, E. (2005) Energy service companies in European countries: Current status and a strategy to foster their development. *Energy Policy*, 34. 1818 -1832.
- ¹¹³ Realising Transition Pathways Engine Room (2015). Distributing Power: A transition to a civic energy future. Realising Transition Pathways Research Consortium. Available at: http://www.realisingtransitionpathways.org.uk/publications/FINAL_distributing_power_report_WEB.pdf
- ¹¹⁴ Bolton R, Foxon T J, 2013, "Urban infrastructure dynamics: market regulation and the shaping of district energy in UK cities" *Environment and Planning A* 45(9) 2194 - 2211
- ¹¹⁵ Roelich et al (2015) Towards resource-efficient and service-oriented integrated infrastructure operation. *Technological Forecasting and Social Change* 9 40-52; also RTP Enngine Room (2015) above.
- ¹¹⁶ MUSCOs may offer services based on the heat and water sectors alongside electricity, and with the potential to offer further services such as mobility and telecommunications.
- ¹¹⁷ Local Government Association (2015) Local authority energy efficiency case studies, Available at, http://www.local.gov.uk/the-lga-and-climate-change/-/journal_content/56/10180/5527650/ARTICLE
- ¹¹⁸ Core Cities (2013). Core Cities Growth Prospectus Policies Step 6: Power Up the Cities, Core Cities, Available at: <http://www.corecities.com/what-we-do/publications/core-cities-growth-prospectus-policies-step-6-power-cities>
- ¹¹⁹ Rutledge, I. (2012) Who owns the UK electricity generating industry and does it matter. Sheffield Energy Resources Information Services, Chesterfield.
- ¹²⁰ <http://www.climatesmartcities.org/case-studies>
- ¹²¹ Sherwood, N. and Tompt, J. (2013) Herefordshire economic evaluation. Opportunities to grow our local renewable energy economy. TEEconomy: Establishing the potential of a transition enterprise economy. REconomy. April 2013
- ¹²² Cumbers, A., Danson, M., Whittam, G., Morgan, G. and Callagan, G. (2013) Repossessing the future: A common weal strategy for community and democratic ownership of Scotland's energy resources. The Jimmy Reid Foundation, Biggar, South Lanarkshire.
- ¹²³ Hall, S., Foxon, T.J., Bolton, R., (2014). The New Civic Energy Sector: implications for ownership, governance and financing of low carbon energy infrastructure. Presented at the BIEE 10th Academic Conference, St John's College, Oxford
- ¹²⁴ Britton, J., and Woodman, B., (2014) Local Enterprise Partnerships and the low-carbon economy: Front runners, uncertainty and divergence Local Economy, September-November 2014; vol. 29, 6-7: pp. 617-634.,
- ¹²⁵ Julian, C., (2014) Creating Local Energy Economies Lessons from Germany, Republica. London
- ¹²⁶ Platt, R., Straw,W., Aldridge, J., Williams, J., (2014) City Energy: A New Powerhouse for Britain. IPPRR,London

3. Methods

To assess the current landscape and future potential for local supply the research team utilised four methods.

Firstly a desk based review of secondary policy documents, advocacy reports, regulatory standards and technical briefings was undertaken to provide the evidence base above. Secondly a series of 12 semi-structured interviews was undertaken with actors from across the local supply space comprising: six local authority interviews with five officers active in either setting up new supply structures or engaging with municipal energy more widely, two CEO's of innovative local supply models, two Innovation managers at distribution network companies, one provider of 'license in a box' services and one interview with three members of Ofgem. Thirdly five members of the national Local Supply Working Group completed qualitative questionnaires describing archetypes of local supply in the UK, including their barriers to implementation. Finally an intensive session of 15 focus groups was conducted in one day at a Local Supply Workshop, facilitated by DECC and The Cabinet Office. These focus groups ran five groups in three parallel sessions on: the future of local supply, experiences of local supply, and strategic options for local supply.

This multi-method approach generated in-depth data on the aspirations, motivations and outcomes being pursued by local supply actors, a suite of archetypes of local supply, with various theorised benefits, and an analysis of the barriers that these archetypes face given current system regulation, stakeholder capacity and understandings of future options. These results are presented below.

4. Results

This section is presented in three parts. The first describes arrangements for exemptions and unlicensed supply that operate in parallel to the current arrangements for licensed supply. We go on to describe a series of arrangements that could be used to enable local supply, which we call archetypes. In the final part we identify how these archetypes contribute to the opportunities described in section 2.5.

4.1 Existing Exemptions and Unlicensed Supply

The 1989 Electricity Act and the 2000 Utilities Act make provision for the Secretary of State to grant exemptions from the requirement to hold a supply licence. The qualifying criteria for exemption are set out in the 'Class Exemption Order'¹²⁷, which aims to minimise the burden of regulation on persons operating in a limited manner in the generation, supply and distribution of electricity.

The specific objective of the class exemption order for supply was to "exempt those persons who supply electricity from their industrial or local embedded plant"¹²⁸ and this includes a series of thresholds:

- (i) they may supply customers up to a maximum of 5 MW of power- of which up to 2.5 MW may be to domestic customers.
- (ii) they may supply a single consumer or a qualifying group at a remote location subject to a requirement that one third of that consumption is supplied on-site or over private wires.
- (iii) customers of such suppliers may resell up to 10% of the power bought of which no more than 250 MW hours per annum may be supplied to domestic customers¹²⁹.

Class exemptions apply to projects like:

- **Prosumption** – for example: solar panels on a village hall generating electricity, which is used directly by the village hall
- **Direct supply** – for example: solar panels on a village hall owned by a co-operative which is sold directly to the village hall.
- **Private wire supply** – for example, Woking Borough Council generates and distributes (via a private wire network) electricity directly to local commercial and domestic consumers¹³⁰.
- Exemption under 5MW using the public network¹³¹.

Class exemptions are automatically applicable if organisations meet the conditions of the exemption in question. In such circumstances, it is not necessary to apply to DECC or Ofgem for the exemption to apply, or to notify that a class exemption is being claimed¹³². This makes it difficult to track the prevalence of these kinds of exemptions.

In addition the Secretary of State can issue individual exemptions, for which a formal application must be made. However; individual exemptions are predominantly used to grant exemption from generation licences and it is very unusual for individual exemption to be granted for supply; "*The Department [DECC] considers that in most cases it is not appropriate to grant exemption from the requirements of supply or distribution licence. This is because it is rarely considered appropriate for these activities not to be subject to the full terms of licensing regime*"¹³³. There is one recent example of an individual supply licence exemption for MVV Davenport to supply 1MW of electricity purchased from a licenced supplier to the Naval Base in Devonport, which is not automatically exempt (because it is not supplied on-site or over a private wire)¹³⁴. However, this is a temporary exemption in lieu of development of an energy from waste plant on-site, which would be exempt.

The current landscape of unlicensed supply has not to date enabled the exploitation of the four opportunities outlined above. This is largely because most of the missed opportunities of local supply require some level of use of the public distribution network and some form of regulated billing. As such, new archetypes of local supply are needed that can either use innovative business models/ technology to operate within the current regulatory system, or that could operate were the marketplace or system regulation more compatible with their growth. It is these archetypes that are now investigated.

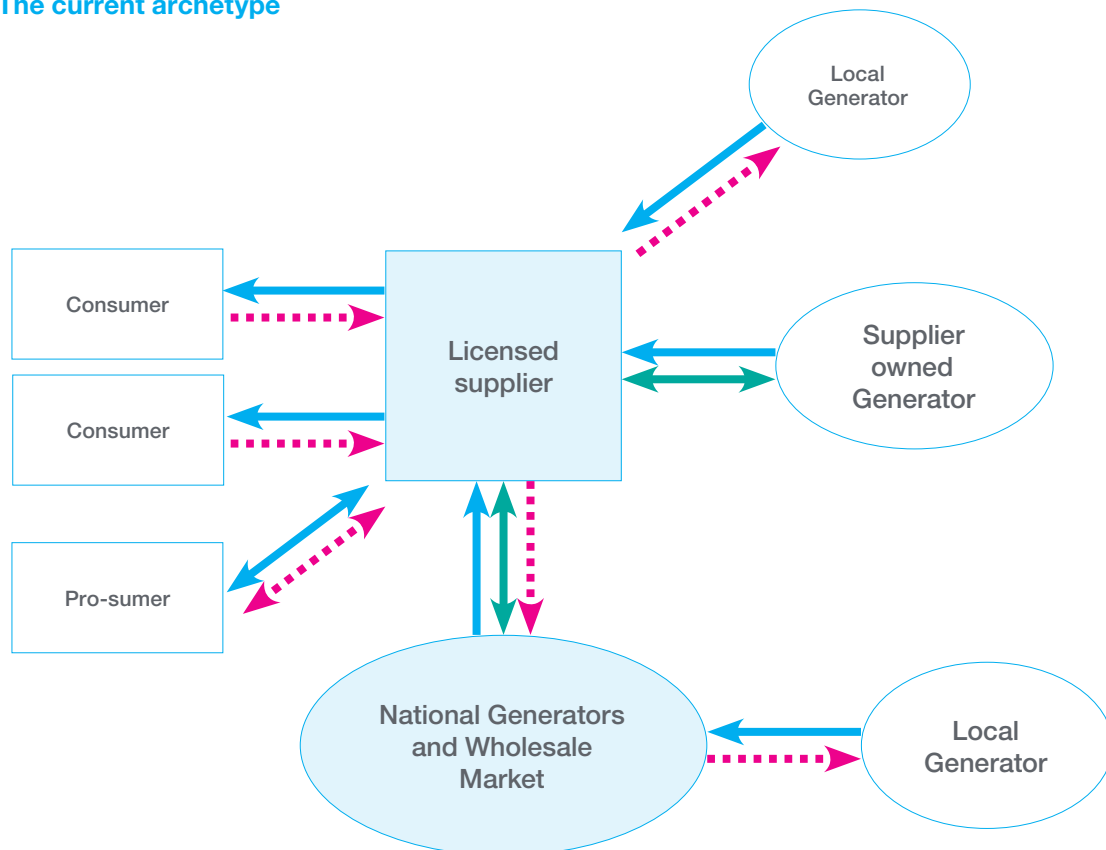
4.2 Archetypes

This section outlines a series of archetypes that have been identified by the multi-method approach described above. In each case the flows of energy, payments, services and balancing are detailed in a stylised diagram. These are not detailed market models, nor are they representative of physical energy flows. These archetypes are intended to frame the discussion of business models and organisational structures that have been suggested by various local energy stakeholders. The first archetype describes the current system; the following archetypes go beyond the pro-sumption, direct supply, private wire and exempt supply options which already exist, to describe latent archetypes which exist in cases where electricity is drawn from the public network.

4.2.1 The Current Archetype

The current archetype of energy supply in the UK makes very little space for the growth of small to medium scale independent power, disincentivises local demand side services, is poorly matched with delivering energy efficiency goals and does not retain value within the regions it serves. These issues have been described in detail above. What the system does very well is to provide relatively cheap units of power to individual households and businesses and maintains a balanced system of reliable supply. Large utilities constitute the bulk of generation and supply and endeavour to match their generation profiles with their forecast demand and top up from or sell into the wholesale market to tune their supply positions.

Diagram: The current archetype



Key

- Energy (solid blue arrow)
- Payments (dotted red arrow)
- Balancing (double-headed green arrow)

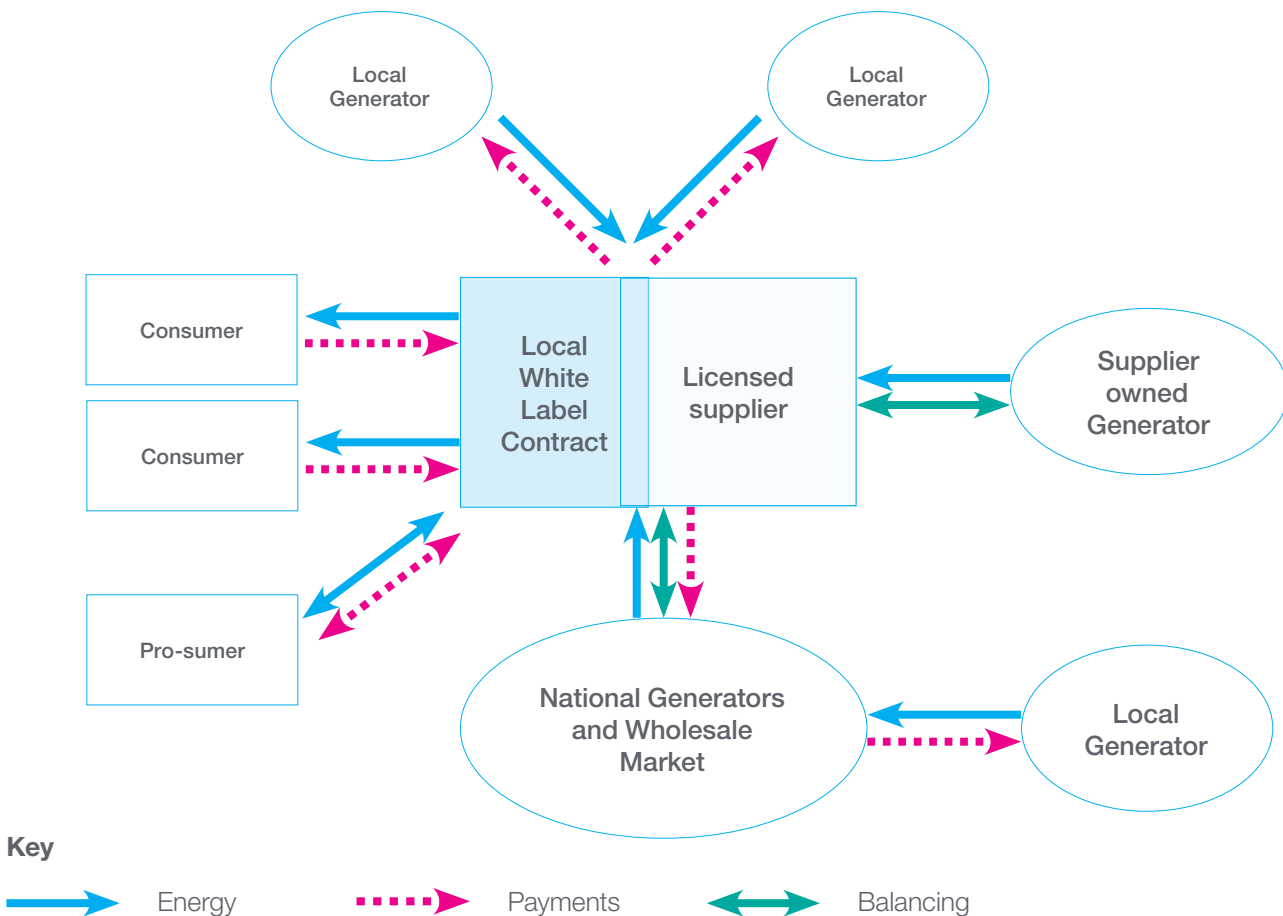
4.2.2 Local White Label Archetype

A white label provider is an organisation that does not hold a supply licence and instead partners with a licensed supplier to offer gas and electricity using its own brand. Existing national examples of this are Sainsbury’s Energy (partnering with British Gas) and Ebico (partnering with SSE). White labels are thought to play a role in engaging energy customers through offering distinct tariffs, higher levels of customer service and different sales channels¹³⁵. The licenced supplier provides a range of services to the white label provider, including billing, energy trading, industry settlements, metering and reporting; but interactions with customers are branded as the white label provider and customer service could be offered directly by the white label provider. The tariff price is jointly decided with the licenced partner, which has been criticised for discouraging licenced suppliers from competing on price, instead relying on

the white label to attract more active, engaged customers through cheaper tariffs¹³⁶.

There is a distinction to be made between national white labels, which are primarily motivated by capturing ‘sticky’ consumers and local white labelling which can pursue wider opportunities. Local white label offerings¹³⁷ can operate at a local level serving as little as several thousand customers. Traditional white labels have been energy companies partnering with national brands that are offered to 100,000s/millions customers. The difference is important because local organisations who could only hope to reach a fairly limited customer base (in the 1000s) previously didn’t have an opportunity to set up a white label arrangement. Further details on the specific opportunities enabled by local white labelling are discussed in section 4.3.

Diagram: Local white label archetype



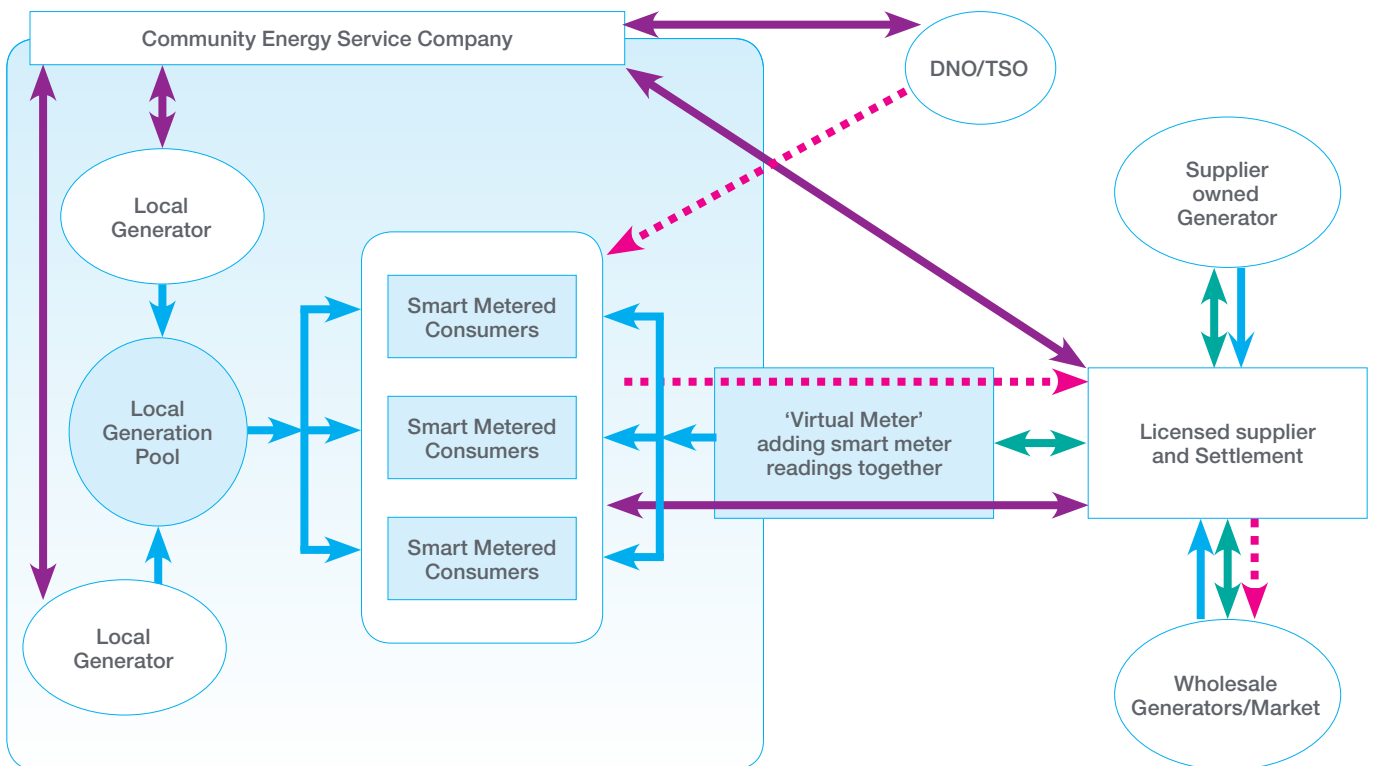
4.2.3 The Local Aggregator Archetype

The local aggregator archetype (demonstrated clearly by the Energy Local model¹³⁸) proposes the introduction of half hourly metering for groups of domestic properties which would better enable the matching of demand and local generation through automated processes and demand side participation. A core part of the local aggregator archetype is the third party negotiation between a Community Energy Services Company (CESCo) and a third party licensed supplier (TPLS). This model would allow for the use of locally generated power without the need for community generators to set up a full license, but relies on the voluntary participation of a third party fully licensed supplier. At the generation end, this archetype essentially pools local generation, netting off local supply at a virtual meter point. The Energy Local business model,

which demonstrates this archetype, has received funding from InnovateUK to run a pilot project which will generate real data to inform market modelling.

This archetype was designed to operate within the current regulatory regime, but there are still some questions over the ways in which local data is dealt with by the TPLS and Elexon. The presence of innovation funding is key in this regard to understand the choreography of data and understand real flows of value. The archetype diagram below captures all of the potential services the local aggregator model could deliver, though the research team understands the development of these services will be incremental. In this, and later archetypes, the distribution network operators and transmission system operators (DNO/ TSO) are included as the aggregator has the potential to contract demand side services.

Diagram: The local aggregator archetype



Key

- Energy
- Payments
- ↔ Balancing
- Services

4.2.4 The Local Pool and Sleeve Archetype

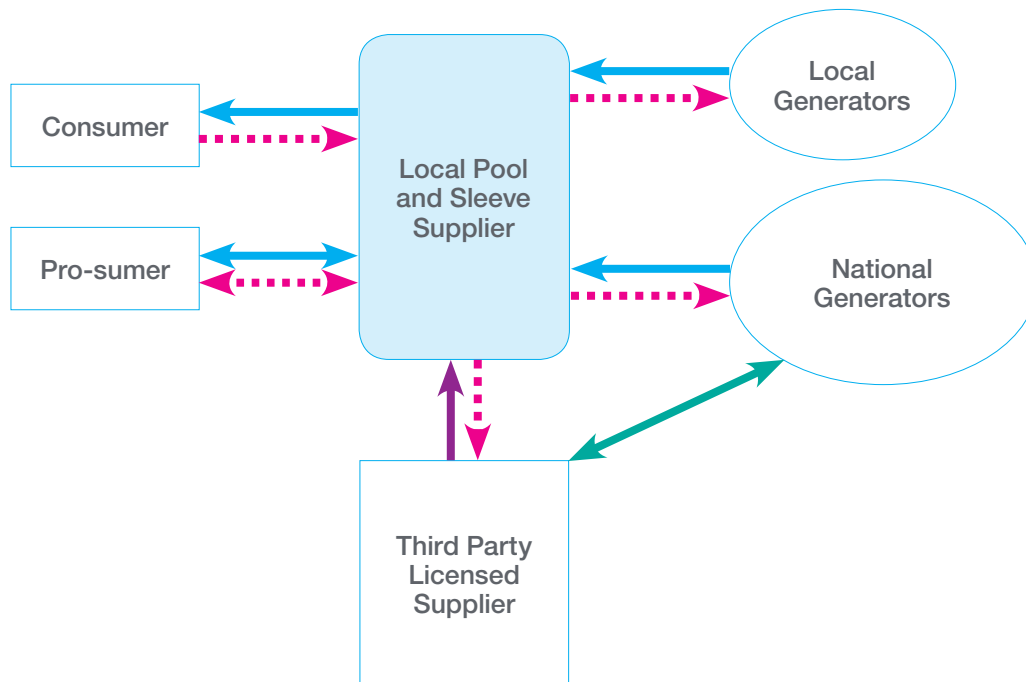
This archetype aims to aggregate distributed generation from a local area (pooling) and then supply a specific consumer or consumers within a local area with equivalent power without using additional wholesale market intermediaries (sleeving); thus ‘pool and sleeve’. This is a form of direct supply which License Lite was introduced to facilitate. ‘Licence lite’ was introduced by Ofgem in 2009 to overcome market entry barriers experienced by distributed energy generators wanting to supply their energy to customers directly¹³⁹. Licence lite allows for conditional derogation from the requirements under Standard Licence Condition (SLC) 11.2 if robust arrangements are in place with a third party licenced supplier (TPLS) to discharge code compliance in these areas on their behalf. SLC 11.2 includes a number of codes that were identified as presenting the highest cost and highest competency hurdles including:

- Master Registration Agreement (MRA)
- Distribution Connection and Use of System Agreement (DCUSA)
- Connection and Use of System Code (CUSC)
- Balancing and Settlement Code (BSC)

Licence lite holders are still obliged to comply with other licence conditions and obligations in interacting with the wider electricity market (such as procuring power, customer management, information and billing).

Since the introduction of initial guidance in 2009 no organisations have yet been granted a Licence Lite (Though at the time of writing the Greater London Authority is close). One potential reason is a lack of clear understanding amongst aspiring suppliers over the precise functioning of a Licence Lite arrangement and the balance of responsibilities between parties¹⁴⁰.

Diagram: The Local Pool and Sleeve Archetype



Key

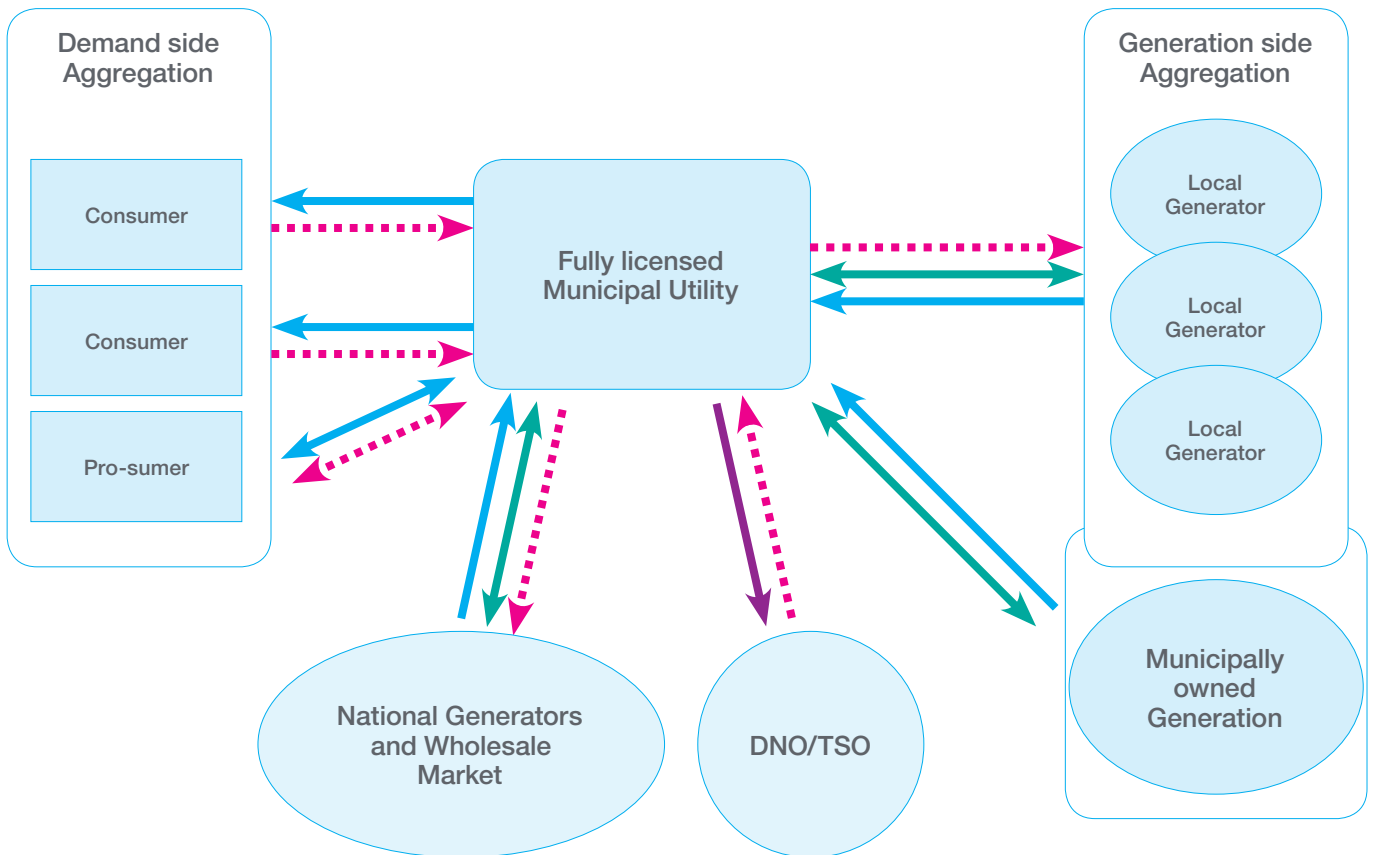
- Energy
- Payments
- Balancing
- Services

4.2.5a The Municipal Utility Archetype

A recently emerged archetype is the fully licensed municipal utility. This involves a local authority creating a fully licensed supply company and has recently been pursued through the ‘supplier in a box’ route¹⁴¹. The municipalities furthest on with these models have cited fuel poverty alleviation and the aggregation of local generation, both internally and community owned, as primary motivations driving this structure. With this aggregation of local generation load, DNO and TSO services may be possible. Equally, demand side services have greater potential with geographically aggregated customer bases. An important consideration for municipal supply is the benefit of the creditworthiness of the parent authority. DECC and Ofgem jointly recognise the

collateral needed to secure market entry is a barrier to new supply businesses, particularly where a bond market rating is not available to the new entrant¹⁴². Crucially for the Municipal model, and dependent on organisational form, individual local and combined authorities in the UK are becoming far more familiar with bond markets and are securing ratings of their own¹⁴³, in which, due to the structure of municipal finance, collateral and revenue raising powers are often favourable. Interviewees in our primary sample described the need for collateral and/or affordable credit as a significant barrier to market entry. The municipally backed model may diffuse this issue, but relies on the risk appetite and financial health of host municipalities.

Diagram: The Municipal Utility Archetype



Key

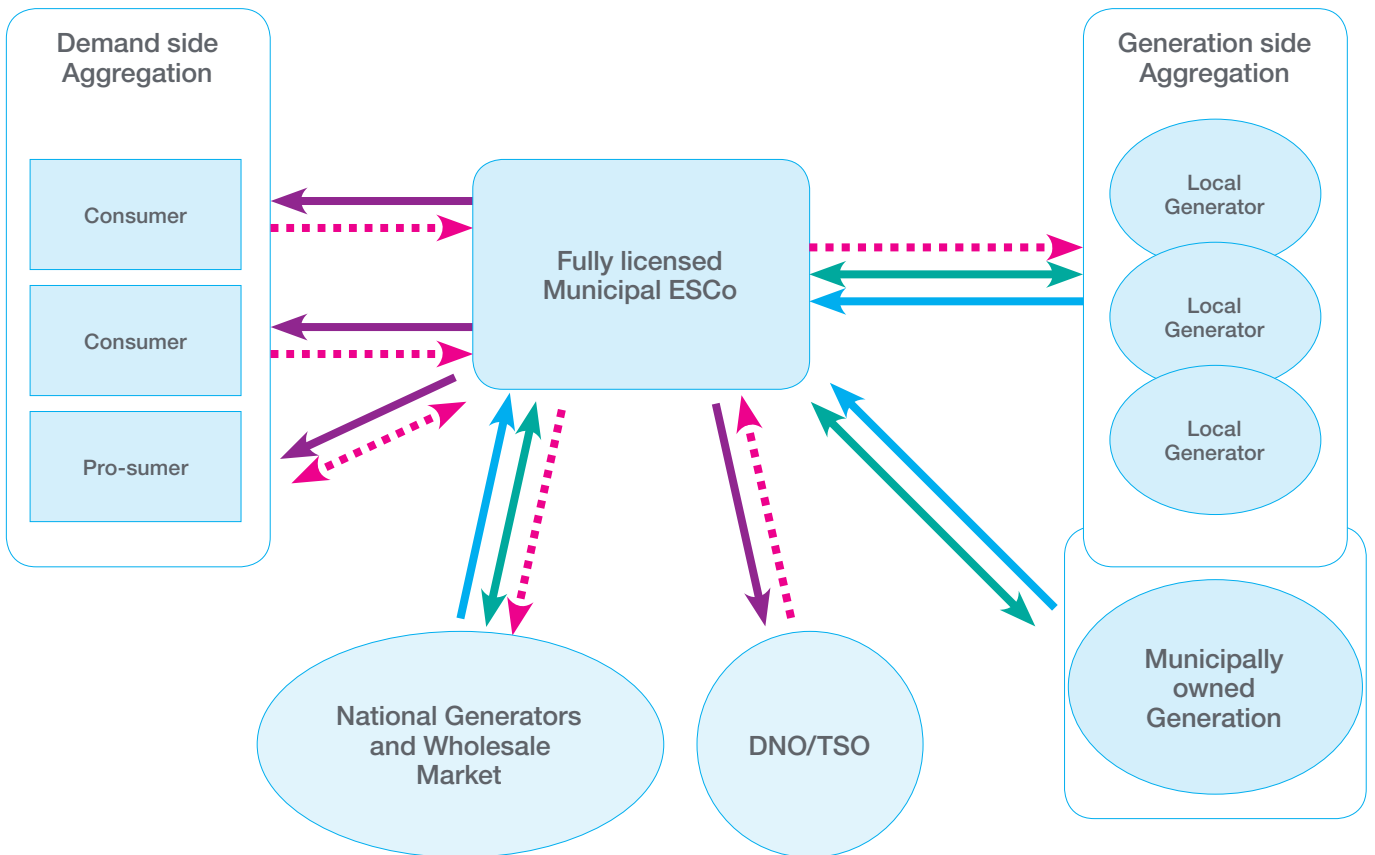
- Energy
- - - - - → Payments
- ↔ Balancing
- Services

4.2.5b The Municipal ESCo Archetype

A genuinely critical juncture for the entire landscape of local supply is the business models upon which municipal archetypes evolve. The traditional utility business model, based on units of energy sold, struggles to pursue meaningful demand reductions from consumers as this undermines the fundamental value proposition of the

business. Critically if municipal suppliers were to offer ESCo models at the outset, the route along which the local supply landscape may evolve *would* incentivise demand reduction. Thus in the Municipal ESCo Archetype below, meaningful energy efficiency is enabled by providing a service as opposed to simple units of energy.

Diagram: The Municipal ESCo Archetype



Key

- Energy (solid blue arrow)
- Payments (dotted pink arrow)
- Balancing (double-headed green arrow)
- Services (solid purple arrow)

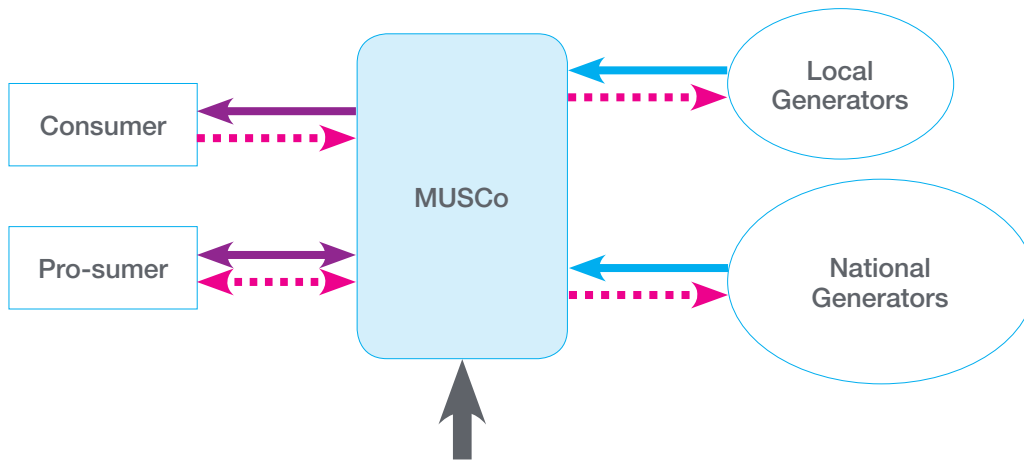
4.2.6 The Multi Utility Service Archetype

The delivery of multiple utilities within the same contract has been proposed as a way to deliver resource and cost efficiencies¹⁴⁴. This can range from simple bundling of utilities (similar to bundling of television and communications services) to the delivery of integrated infrastructure services (such as warmth and hot water) that require multiple utilities to be delivered. MUSCOs of the latter type require a fundamental shift: away from selling products or metered quantities of utility products (e.g. kWh of electricity, gas or

litres of water), and towards selling “services” (such as thermal comfort, illumination and cleanliness). Service companies generate profit by selling the same level of service at a lower level of utility consumption, which inherently incentivises demand reduction.

Current examples of MUSCOs tend to be limited to district heating schemes where heat and hot water are provided at flat-rates and system-wide efficiency is promoted to reduce individual bills (rather than individual metering).

Diagram: The Local Pool and Sleeve Archetype



Key

- Energy
- Payments
- Services
- Other Utilities

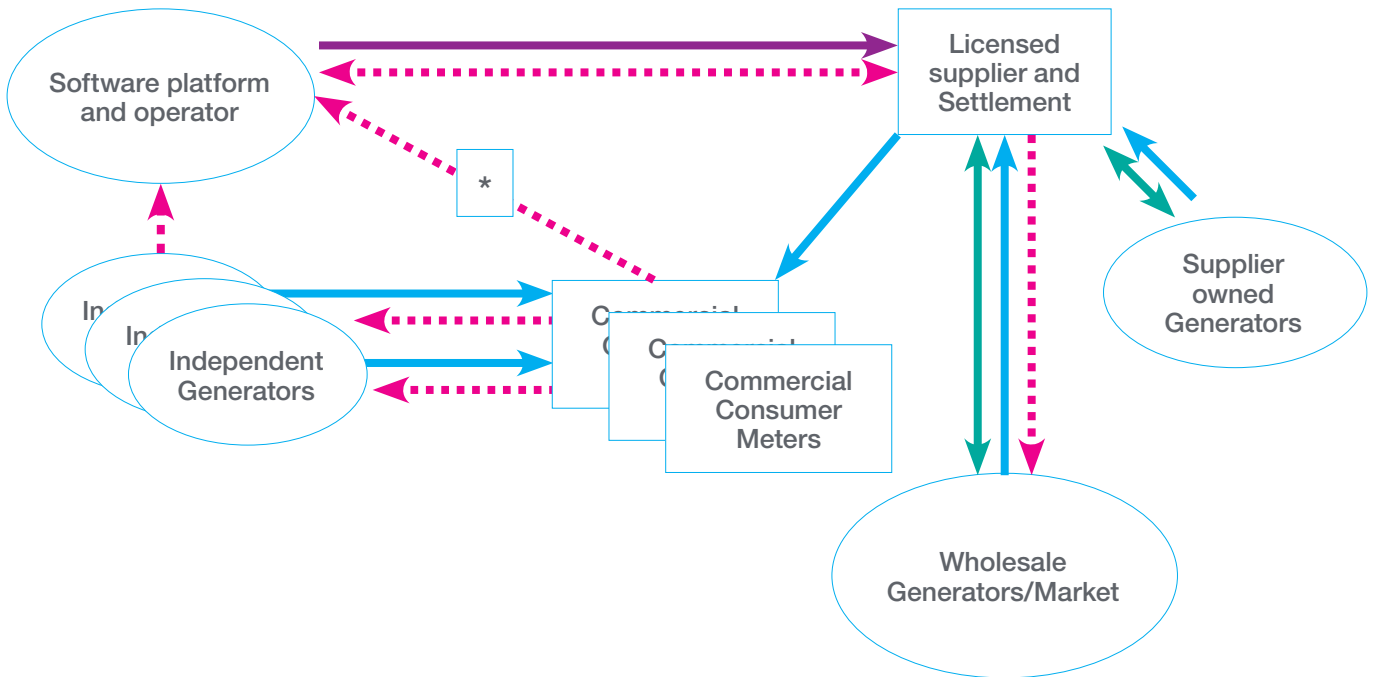
4.2.7a Peer to Peer Archetype

Recently a Peer to Peer (P2P) archetype has been proposed that utilises a software platform to allow commercial customers to select a mix of predominantly renewable and embedded generation to satisfy the majority of their electricity needs. This mechanism requires the software platform operator to match generators directly with consumers (which need to be commercial in the first instance due to metering costs¹⁴⁵). This can result in a better PPA deal for generators and a tariff that meets the needs and values of the consumer, which may be price-based but can also incorporate socio-economic or environmental values. The company that has progressed this furthest is Open Utility¹⁴⁶ which is running a trial sponsored by the DECC Energy Entrepreneurs fund¹⁴⁷. Importantly this model requires the software platform operator to partner with a third party fully licensed supplier for the billing and balancing functions, to make up for consumers demand

where a consumer’s selected generation package is insufficient to cover load. Similar to ‘sleeving’¹⁴⁸ the consumer’s load is preferably met by embedded generation, but here the embedded generation can be pooled by the software platform as opposed to being predominantly met by one generator.

In this report the value set of local supply stakeholders is held to be key. Often this is due to the organisational form these stakeholders have, be it municipal, mutual, charitable or social enterprise based. In this peer to peer archetype the actors are predominantly commercial. However it is important to note that the most active stakeholder (Open Utility) is openly committed to a value set closely related to many of those outlined in Table 1. This was gleaned through primary interviews and is demonstrated by the fact that this company only approached third party supplier

Diagram: Peer to Peer Archetype



*Billing services unclear at time of research

Key

- Energy
- - - - - → Payments
- ↔ Balancing
- Services

partnerships that had “alignment in vision and values”, these being predominantly renewable energy and decarbonisation based. This is important as it demonstrates that even in purely private relationships the actors in the local supply space are motivated by wider values than commonly assumed.

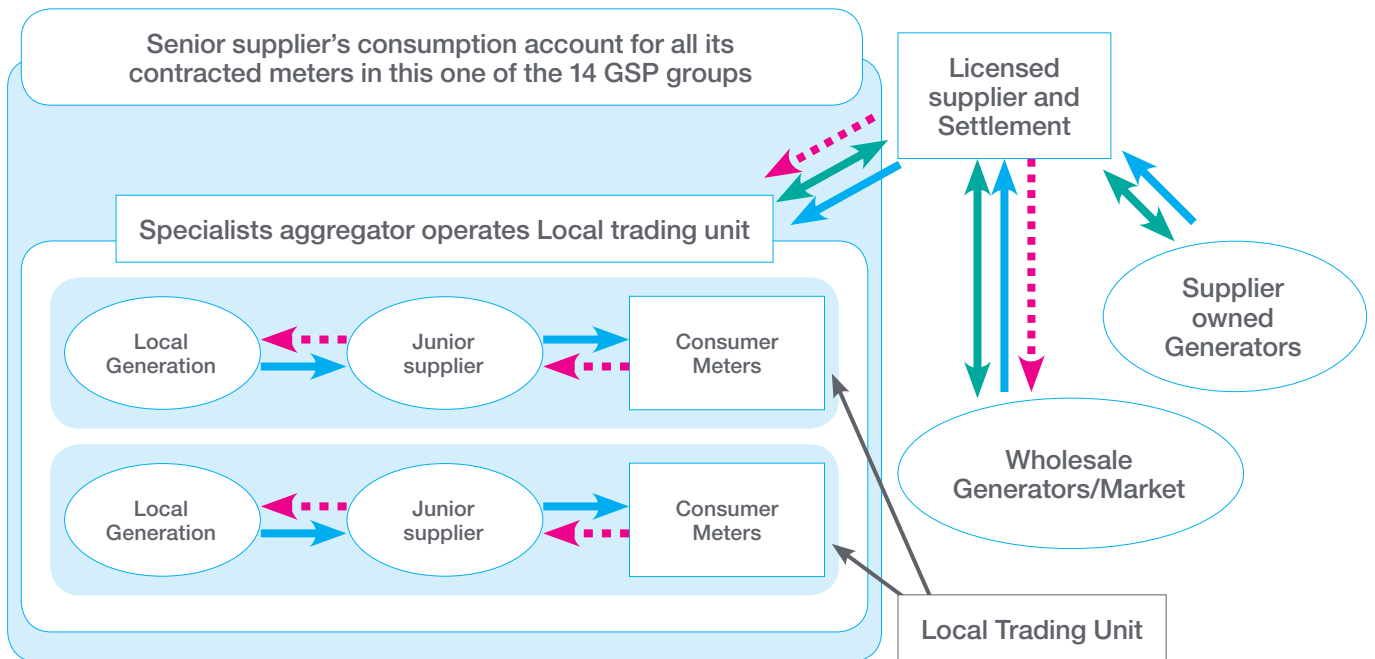
Though the P2P model operates a distinct exchange outside normal wholesale trading agreements, it is distinct from other exchanges which currently exist to provide an alternative route to market for independent generators such as the ‘e-power’ exchange¹⁴⁹. The e-power exchange acts as a market-place for short-term PPAs or surplus contracted volumes of power¹⁵⁰, which are sold to the highest auction bidder, who are fully licensed suppliers or established wholesale market traders. Similar to the Open Utility model however there is no inherent geographical restriction.

4.2.7b Peer to Peer with Local Balancing Unit

The peer to peer model in 4.2.7(a) is not bounded by geography. Generators and consumers in different GSP groups would be free to trade on the software exchange. Work by Cornwall Energy and Elexon has identified an archetype in which senior suppliers (with full supply license) would be able register a bespoke unit in settlement on behalf of a junior supplier in a single geography. This would require the creation of a settlement unit enabling export and import meters within a Grid Supply Point (GSP) Group unique to a locality to be consolidated on its own^{151,152}.

This Archetype is close to license lite in design but changes the contractual relationship between the junior and senior supplier, as it enables the junior supplier to net production and consumption before it is added to the senior supplier’s position in settlement. This reduces the exposure of the junior supplier to balancing charges,

Diagram: Peer to Peer with Local Balancing Unit



Key

- Energy
- Payments
- ↔ Balancing
- Services

makes the senior suppliers administration of associated data flows easier (reducing contractual costs), and allows the junior supplier to be clear on the net embedded benefits they are entitled to (as embedded benefits are only applicable when produced and consumed within a single GSP group).

The impact of this in tariff terms was predicted to be a 0.9p/kWh reduction in the unit cost of the average local supply tariff, reducing the gap between national utility regional tariffs from 3.5p/kWh to 2.6p/kWh¹⁵³. Importantly this work is premised on a comparison between the Big Six standard variable rate unit cost within a GSP region and is a direct comparison between tariffs offered by vertically integrated utilities and complex and lumpy local generation. This archetype does not make room for the junior supplier to engage in any innovation in demand response or energy efficiency side, and is thus a direct generation cost comparison. The archetype here is based on the P2P schematic presentation by Cornwall

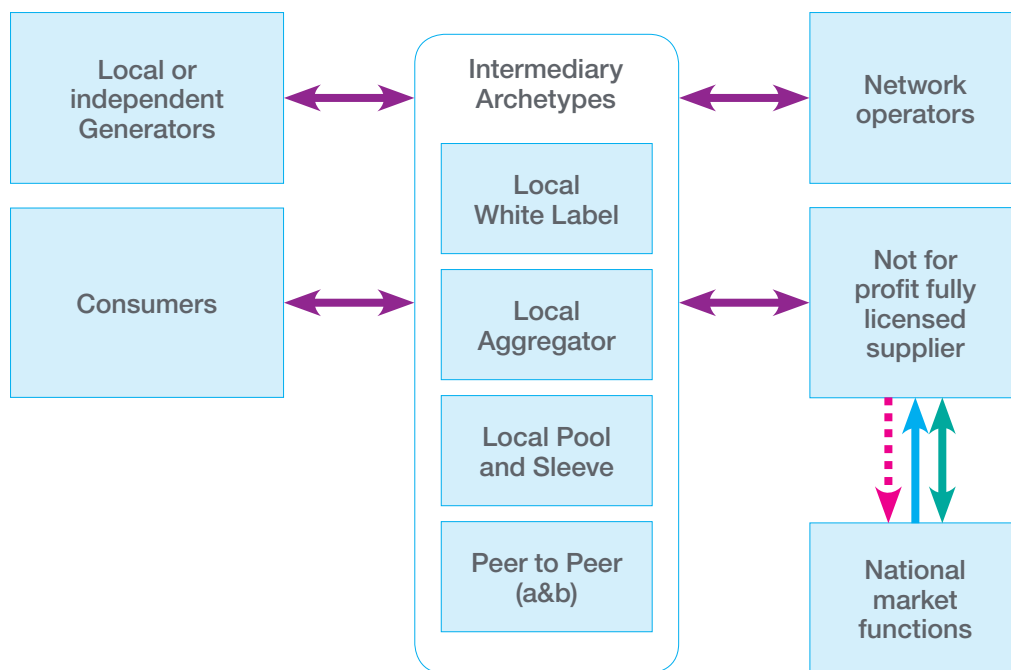
energy¹⁵⁴ on a specialist aggregator to identify costs for each local BMU and apportion embedded benefits then net off volumes before reporting to senior supplier’s BMU. This archetype requires some development as the specialist aggregator’s relationship with the junior suppliers was unclear at the time of writing.

In both formulations (a&b) the peer to peer model needs half hourly settled consumers in order to be effective.

4.2.8 Not for Profit National Supplier

Each of the archetypes above has been developed by different local supply stakeholders from a variety of different perspectives. Importantly the White Label, Local Pool and Sleeve, Local Aggregation and Peer to Peer archetypes all require a fully licensed third party supplier in order to make the archetype work in terms of both regulatory compliance and system services such as billing and metering. For the remainder of this report these are referred

Diagram: Not for Profit National Supplier



Key

- Energy
- ⋯→ Payments
- ↔ Balancing
- Services

to as 'intermediary archetypes' as they still require a contractual agreement with a fully licensed supplier. The conclusion of the local supply workshop developed and hosted by DECC and Cabinet Office (see section 3) was a voting and preference process, through which local supply stakeholders identified a further archetype which combined the aspirations of a number of local supply stakeholders. This archetype was classified as a not for profit licensed supplier whose primary role was to facilitate various local supply aspirations stated by different stakeholders. Participants cited the need to secure a profit margin when operating a licensed supply business as one element of electricity pricing which could be re-directed into securing business models compatible with the outcomes in Table 1. Published figures by the regulator¹⁵⁵ demonstrate recent operating margins or pre-tax profits on average electricity bills to vary between 0-3% from January 2009 to December 2013, representing between £2-20 on each average household bill. Projected future profit margins are higher and forecast to vary between 6-9% or £37-£52 per average household electricity bill of between £549-567. Ostensibly then, at least in the near term, there is the potential to recycle some of this value into administration of the archetypes of local supply. This could take the form of a not for profit licensed supplier facilitating one of the Intermediary archetypes presented above. How this model would come about is as yet unclear but may evolve out of a consortium of organisations engaged in any of the archetypes outlined above. As such this approach may appear as a medium to long term result of the growth of intermediary and regional full supply archetypes.

4.3 Matching Archetypes with Opportunities:

In this section the abilities of each archetype to secure the opportunities outlined in section 2 is analysed. Much of this matching is speculative due to the extremely limited or non-existent penetration of these models into the market. However the characteristics of each archetype lend themselves to securing each opportunity differently. These characteristics are briefly described before being presented in an opportunities matrix (Table 2).

4.3.1 The Current Archetype

As evidenced above the current archetype does not support independent generators, especially at a smaller scale. A situation likely to get worse as the retiring of the renewables obligation removes a 'market pull' for accredited low-carbon generation¹⁵⁶. The opportunities for deep energy efficiency are militated against by the inherent utility business model^{157,158,159}. Demand side opportunities are limited and energy value is captured internationally. Each of the archetypes below offers an alternative proposition, but some incentivise the realisation of the opportunities described in section 2.5 differently.

4.3.2 Local White Label Archetype

In a local white labelling relationship, there is potential to link local partners supply to PPA's of local generation, which could contribute to growing local energy generation, currently this is only offered by the OVO communities schemes. Responses from OVO argue that having local supply (through a local white label) enables a direct link to be made between local customers and local generation allowing costs of local generation to be fed through to the local customer base. This offers two benefits. 1) The white label partner can support local generation by buying its power, thus supporting their wider local goals for economic development and emissions reduction. 2) The white label partner can control costs along the entire energy supply chain – from generation to supply. This means if they can realise any cost savings from the local generation (e.g. by supporting developers to get through planning or by offering targeted financial support for getting through feasibility studies) these benefits can be passed on directly to local customers. Here the decision of what to do with any benefits realised through this scheme is the decision of the Local White Label Partner. As OVO communities is only offered to municipalities and social landlords and community groups¹⁶⁰, there is significant potential to re-direct these revenues into fuel poverty programmes. However, this relies on the motivations of the local white label partner, and as an archetype broadly conceived there is no reason more heavily profit oriented

models could not emerge. It is possible that tariffs could be time-of-use tariffs to enable demand response but there are no examples of this to date. The local white labelling archetype is not currently thought to significantly re-localise energy value¹⁶¹.

4.3.3 The Local Aggregator Archetype

Under the local aggregator archetype there is significant opportunity to secure a better deal for local generation behind a virtual meter if this local production can be netted off against consumption behind the same meter. Here the community energy service company¹⁶² can decide how to allocate the benefits of being able to achieve a generation price closer to retail value. Further, this archetype is predominantly designed to enable cheaper tariffs by engaging both automated demand side response and behavioural demand side participation, moving the load curves of local consumers more into line with the times of day when energy is relatively inexpensive. By enabling half hourly settlement and local generation pooling, this archetype performs well in encouraging better routes to market for local generation and securing tariff reductions from the demand side. Theoretically, given the local, community based focus this model could also engage strongly in energy efficiency and retrofit but this has not been the focus of the development of the archetype to date. As for the re-localisation of energy value this depends on the beneficial ownership of the CESCO and the local generation, but this is assumed to incorporate an element of local equity (in the broadest sense) and therefore is held to be positive.

4.3.4 The Local Pool and Sleeve Archetype

There is limited evidence to suggest that local pooling and sleeving would result in lower energy prices¹⁶³, therefore the potential to contribute to tariff fairness or fuel poverty alleviation is limited. The main purpose of operating Licence Lite (to enable local pooling and sleeving) was to enable the direct supply of local generation to consumption, which could contribute to growing local energy generation projects. There has been no discussion to date of the role of local pooling and sleeving in demand reduction. Equally only weak potential for the re-localisation of energy value is seen beyond the growth of local generation.

4.3.5a The Municipal Utility Archetype

The establishment of a fully licensed municipal utility has the potential to incentivise strong gains in the procurement of local power from local independent generators and opens new avenues for outright local authority ownership of new generation and new partnership approaches. Thus a fully licensed municipal utility is likely to lead to stronger PPA's for local generation. On the demand response side, a municipal utility is better placed to engage with local consumers on basic time of use tariffs but is unlikely to enable the same sophistication of load shifting the local aggregator archetype may achieve. There remains the possibility for municipal utilities to contract with the DNO network in particular, to offer demand response services to constrained areas of the distribution network, given that consumers are likely to be aggregated geographically.

In this model, the potential for the re-localisation of energy value is high as the values of generation and supply are being re-localised. Municipal utilities would almost all be within a single GSP region (with some exceptions) and the re-localisation of the value in the supply market could underpin municipal revenues, which can then be redeployed into social programmes or retained within a broader strategic energy programme. Those in the primary sample cited the desire to offer fairer tariffs to the fuel poor as a core motivation in the decision to investigate the potential for a municipal utility. The value proposition will differ in each case based on which of the above opportunities are pursued, but in each case this is likely to lead to some measure of fuel poverty alleviation.

A critical message from this work however is that the establishment of a municipal utility, based on a units of energy sold model such as any national utility, does not get away from the disincentives to real energy efficiency gains. As a geographically constrained utility has a finite customer base, were that customer base to significantly adopt deep retrofit, there would be few opportunities to compensate by expanding market share. As such the municipal utility archetype is not likely to incentivise strong energy efficiency measures.

The municipal utility model then, may be suited to the proliferation of local generation, the pursuit of fairer tariffs, and the re-localisation of energy value, but fail to secure significant energy efficiency gains, perhaps more so than the national utility model.

4.3.5b The Municipal ESCo Archetype

The Municipal ESCo archetype offers a way of securing the same benefits of the utility model but with better efficiency outcomes due to billing based on the services energy provides, such as a warm home, effective appliances and lighting. The ESCo structure can pursue substantive energy efficiency gains without undermining the core business model and is therefore seen as a preferable archetype in theory, though this archetype faces more short and medium term barriers.

4.3.6 The Multi Utility Service Archetype

In a similar way to municipal ESCos, the MUSCo archetype is founded on energy efficiency so inherently incentivises demand reduction. The inclusion of multiple utilities means that the same service could be delivered with far less resource¹⁶⁴. However, there is no guarantee that this efficiency will lead to lower energy costs; reductions in resource use would pay for investment in energy saving measures. Therefore, despite delivering improved energy services as a result of installing efficiency measures, fuel poverty (as it is measured now) might not be affected because the cost of services may not go down. MUSCos would not automatically use local generation, although the combined provision of heat, hot water and electricity could be most effectively delivered by district heating with combined heat and power, which would be necessarily local.

4.3.7a Peer to Peer Archetype

The peer to peer archetype is a novel and positive archetype for the offer of better PPA's to independent generators. As formulated this archetype is best suited to operating within a single GSP group to secure full embedded benefits. Demand side management and participation are outside the scope of this model, as are energy efficiency improvements. Re-localisation of energy value is only weakly signalled by the generators and consumers receiving different deals for their power/consumption.

4.3.7b Peer to Peer with Local Balancing Unit

The peer to peer archetype with a local balancing unit would allow for the benefits of the P2P model but also make space for an aggregator to bundle consumers and operate demand side activities based on the location and load of several parties. Here the P2P model would need to operate within a single GSP group and would be more aligned with the definition of local supply adopted by this research. The addition of an aggregator and local balancing approach still requires a third party licensed supplier but offers the benefits of demand side engagement, and thus has a stronger value proposition to bring to said third party supplier. Deep energy efficiency gains are not clearly incentivised by this model. Tariff fairness and fuel poverty reductions are not clearly signalled either. The re-localisation of energy value would depend on the beneficial ownership of the junior supplier and aggregators.

4.3.8 Not for Profit National Supplier

The not for profit national supplier is included here as it may offer the 'intermediary archetypes' a contracting partner more compatible with the values and outcomes being pursued by local supply stakeholders. Within the written submissions to the Local Supply Working Group, the outputs of the Local Supply Workshop, and throughout the primary sample, local supply actors cited the need for any third party licensed supplier (TPLS) to be compatible with their own organisations vision and values. Whilst the fully licensed supply market is growing in the UK, there are still very few licensed suppliers that operate values driven business models¹⁶⁵.

Workshop participants were clear that a TPLS on a not for profit model, or at least on a values driven business model would be their preferred route to market. However, the justification for this non-profit TPLS was predominantly oriented towards gaining a route to market for local generation as opposed to pursuing demand side opportunities, re-localising energy value or engaging with substantive energy efficiency improvements. As such the non-profit TPLS, whilst seen as very positive by workshop

participants, may only substantively contribute to one of the four opportunities of local supply.

4.3.9 Opportunity Matrix

Each of the local supply archetypes identified above then, has different pros and cons. The opportunity matrix below assumes each of the archetypes above are broadly possible, and shows the theoretical ability of each archetype to secure each of the four opportunities of local supply.

Table 2: Archetypes and opportunities

Archetypes	Enabling Mechanisms	Opportunities of local supply			
		Better routes to market for local generation	Fulfilling the potential of the demand side	Real energy efficiency gains	Re-localising energy value
Current Archetype	Full Supply License	--	-	--	---
Local White Labelling	Third Party Licensed Supplier Partnership (TPLSP)	+	-	-	-/+
Local Aggregator	TPLSP	++	+++	+	+
Local 'Pool and Sleeve'	License Lite with TPLSP	+	-/+	-	+
Municipal Utility	Full Supply License	+++	+	---	++
Municipal ESCo	Full Supply License	+++	++	+++	+++
MUSCo	Full Supply License	+++	++	+++	+
Peer to Peer	TPLSP	+++	-/+	-/+	+
Peer to Peer with Local Balancing Unit	TPLSP With local settlement unit	++	++	-/+	++

Key ---strongly negative effect, --moderately negative, -weak negative, -/+ neutral or ambiguous effect, + weak positive, ++ moderately positive, +++ strongly positive effect.

Note the Not for profit national supplier archetype has not been included in this table as it was suggested as more of an enabling mechanism for the other archetypes, or at least those which require a TPLSP. In this way, and depending on how a not for profit national supply administrator were to operate, this mechanism could enable each of the four opportunities of local supply differently, depending on the relationship with their intermediary archetype.

4.3.10 Local Supply Synergies

In isolation each of these local supply archetypes offers a different proposition for securing the opportunities outlined in section 2.5. However, in some cases these archetypes could be strengthened by combining their relative merits. For example a Municipal ESCo may find partnering with a Community Energy Services Company a productive relationship as the CESCO could offer granular data and load control services to the ESCo which would be strongly incentivised to avoid imbalance charges. Similarly, a peer to peer platform with a CESCO model may allow larger generators outside the local pool to sell into the CESCO

as opposed the wholesale market. Given the early stage nature of much of the current archetypes, any further speculation on synergistic relationships between the archetypes is beyond the scope of this work. However it should be clear that as these

archetypes emerge, the common value sets of some local supply stakeholders may lead to natural partnership arrangements. As such Table 2 above cannot capture all the possible configurations of value capture that may be possible.

Footnotes

- ¹²⁷ DTI (2004) Class Exemption Order: Explanatory Memorandum. http://www.legislation.gov.uk/ukxi/2004/1776/pdfs/ukxiem_20041776_en.pdf.
- ¹²⁸ DTI (2004) Class Exemption Order: Explanatory Memorandum. http://www.legislation.gov.uk/ukxi/2004/1776/pdfs/ukxiem_20041776_en.pdf. Page 4.
- ¹²⁹ Clarity is required on whether these clauses are independent or must all apply
- ¹³⁰ Thorp, J.P., 2011. Delivering affordable and sustainable energy: the results of innovative approaches by Woking Borough Council, UK. In S. Lahlou, ed. System Innovation for Sustainability 4: Case studies in sustainable consumption and production - Energy use and the built environment. Greenleaf Publishing Limited.
- ¹³¹ In conversation with the regulator and several local supply stakeholders it has been extremely difficult to identify where these exemptions operate and their scale of use in the sector.
- ¹³² DECC (2013) Electricity generation, distribution and supply licence exemptions. Frequently asked questions.
- ¹³³ DECC (2013) Electricity generation, distribution and supply licence exemptions. Frequently asked questions. Page 8
- ¹³⁴ DECC (2012) Exemption from the requirements for a licence to supply electricity: proposal to make the electricity (exemption from the requirement for a supply licence) (MVV Environment Devonport Limited (England and Wales) Order 2012
- ¹³⁵ Ofgem 2015 Final proposals on the treatment of white label providers in the domestic retail market.
- ¹³⁶ Ibid.
- ¹³⁷ Such as OVO Communities http://www.ovoenery.com/energyplans/communities/?gclid=COv2pL0wr8QCFCXltAodJBUA_g&gclidsrc=aw.ds
- ¹³⁸ Energy Local (2014) Development of Local Energy Model Using Virtual Aggregation http://www.energylocal.co.uk/wp-content/uploads/More_About_the_Energy_%20Local_Concept.pdf
- ¹³⁹ Ofgem (2014) 'Licence Lite': proposed updates to the SLC11.3 operating guidance
- ¹⁴⁰ Ibid
- ¹⁴¹ <http://www.utiligroup.com/new-entrants/>
- ¹⁴² Government and Ofgem Action Plan: Challenger Businesses (Independent Energy Suppliers) https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/341310/Challenger_Businesses_-_Independent_Energy_Suppliers_FINAL_ACTION_PLAN.pdf
- ¹⁴³ Platt, R., Straw,W., Aldridge, J., Williams, J., (2014) City Energy: A New Powerhouse for Britain. IPPRR,London
- ¹⁴⁴ Roelich et al (2015) Towards resource-efficient and service-oriented integrated infrastructure operation. Technological Forecasting and Social Change 9 40-52
- ¹⁴⁵ Primary data from interviewees
- ¹⁴⁶ <https://www.openutility.com/>
- ¹⁴⁷ <https://www.openutility.com/pilot/>
- ¹⁴⁸ <http://www.npower.com/large-business/generating-energy/selling-power/third-party-netting/>
- ¹⁴⁹ <http://www.epowerauctions.co.uk/howitworks.htm>
- ¹⁵⁰ Cornwall Energy (2014) Creating Local Electricity Markets: A Manifesto for Change. Cornwall Energy
- ¹⁵¹ Cornwall Energy (2014) Creating Local Electricity Markets: A Manifesto for Change. Cornwall Energy
- ¹⁵² Elexon (2014) Encouraging local energy supply through a local balancing unit, Available at: https://www.elexon.co.uk/wpcontent/uploads/2014/08/Encouraging_local_energy_supply_through_a_local_balancing-unit.pdf
- ¹⁵³ Ibid
- ¹⁵⁴ Cornwall Energy (2014), Local tariffs and the BSC, July 2014 Nigel Cornwall
- ¹⁵⁵ <https://www.ofgem.gov.uk/publications-and-updates/charts-outlook-costs-make-energy-bills>
- ¹⁵⁶ Cornwall Energy (2012),The Energy Bill and its impact on Community Energy, A report for Cooperatives UK
- ¹⁵⁷ Hannon, M.J., Foxon, T.J. and Gale, W.F. (2013) The co-evolutionary relationship between energy service companies and the UK energy system: Implications for a low-carbon transition. Energy Policy. 61. 1031–1045.
- ¹⁵⁸ Realising Transition Pathways Engine Room (2015). Distributing Power: A transition to a civic energy future. Realising Transition Pathways Research Consortium. Available at: http://www.realisingtransitionpathways.org.uk/publications/FINAL_distributing_power_report_WEB.pdf
- ¹⁵⁹ Steinberger, J.K., van Niel, J., Bourg, D., (2009) Profiting from negawatts: Reducing absolute consumption and emissions through a performance-based energy economy, Energy Policy, 37, pp.361-370. doi: 10.1016/j.enpol.2008.08.030
- ¹⁶⁰ OVO Energy (n.d) OVO communities: A guide for local authorities, housing associations and community groups.
- ¹⁶¹ Platt, R., Straw,W., Aldridge, J., Williams, J., (2014) City Energy: A New Powerhouse for Britain. IPPRR,London
- ¹⁶² The definition of the community energy service company differs from the service oriented business model assumed for 'ESCo's' and 'MUSCo's' and is as yet unclear.
- ¹⁶³ Cornwall Energy (2014) Creating Local Electricity Markets: A Manifesto for Change. Cornwall Energy
- ¹⁶⁴ Roelich et al (2015) Towards resource-efficient and service-oriented integrated infrastructure operation, Technological Forecasting and Social Change, 92, pp.40-52. doi: 10.1016/j.techfore.2014.11.008
- ¹⁶⁵ Hall, S; Foxon, T.J; Bolton, R; The new 'civic' energy sector: implications for ownership, governance and financing of low carbon energy infrastructure. British Institute of Energy Economics, available at: <http://www.biee.org/wpcontent/uploads/Hall-The-new-civic-energy-sector.pdf>

5. Barriers

Each of the archetypes identified in section four offers various ways of securing the opportunities and realising the outcomes outlined in section 2. As each of these archetypes operates differently in the marketplace, they each face different barriers to adoption. Here these barriers are split into three groups, regulation, capacity/scale and uncertainty/risk. For each of these groups below a short explanation is given before detailing in Table 3 which of these barriers currently applies to which archetypes. It is important to note that much of the specification of these barriers has arisen from primary interview data, the analysis of the Local Supply Working Group Archetype submissions, and the output of the Local Supply Workshop of February 2015. As such the evidence base for these barriers is still emerging and citations from secondary literatures are uncommon.

5.1 Regulatory Barriers

Standard Licence Condition (SLC) 22B.2 prevents suppliers from making available more than four of its core tariffs (for each category of metering arrangement) to a domestic customer at any time, in any region. This could limit the tariffs that local suppliers could offer if they enter into an agreement with a licenced supplier. A temporary arrangement has been put in place that applies the tariff cap to white label supplier separately to their licenced supplier and does not set a limit on the number of white labels that a supplier can have. It is proposed that these arrangements be extended to apply to all new white labels, applying from July 2015¹⁶⁶. Paragraph 36 of SLC 22B does allow for suppliers to seek derogation from the four Core Tariff rule, however, it is not clear whether these arrangements will extend to other archetypes which rely on partnering with a licensed supplier, such as the peer-to-peer and local aggregator archetypes. This may act as a brake on new local supply archetypes outside the white label derogation, and is not compatible with the growth of the sector.

Current trading arrangements assume that contractual balance will be achieved at a national level which doesn't exclude local operators per se but puts them in a weak position, compared to national operators. Local operators pay a penalty with regard to cost of services or energy that takes into account the risk that the third party, with which they must contract, deems that they face in association with balancing¹⁶⁷. This has been shown to result in significant cost differences (up to 3.5p/kWh higher), which mean that it is very hard for local tariff offerings to compete with national suppliers¹⁶⁸. The lack of more representative local balancing arrangements with a local balancing unit presents a significant barrier to local suppliers.

The current system of new supplier registration requires new license applicants to enter a process of data choreography and systems testing that can take up to six months to approve and is charged to the newly licensed party after the license has cleared Elexon's performance assurance board. This process must be followed before new suppliers can process to controlled market entry. If local fully licensed suppliers are to proliferate this process may act as a bottleneck to new supplier registration. As new local supply actors have predominantly been accessing a very narrow suite of replicable technology and software options, there is scope for these platforms to be pre-accredited in order to speed the process of market entry for designated archetypes, for example the municipal utility model.

Until 31st July 2012, under condition 25A of the Standard License Conditions¹⁶⁹ licensed suppliers were unable to discriminate in their tariff offers on any basis including that of geography. This consumer protection measure was implemented to stop suppliers 'cherry picking' customers, but had the perverse effect of disabling any new fully licensed supplier from unambiguously offering tariffs only to customers within a defined geography. Indeed SLC22 sets out a supplier's obligation to enter into a domestic supply contract if it receives a request from a domestic customer. While there are exceptions (clause 22.7), this means that a licensed supplier cannot discriminate on the basis of the domestic customers it wants to supply. A restricted supply licence may be applied for (either a new licence or a restriction applied to an existing licence), although Ofgem will consider, amongst other things, whether any such request is justified in terms of public interest and will do so on a case by case basis. Interviewees cited a number of 'work arounds' which mean this condition can be nullified, however the state of play regarding this condition for local supply is unclear and acts as a barrier to designing new licensed business models to clearly serve a defined geography.

5.2 Barriers Based on Capacity and Scale

The costs associated with setting up and running a supply licence (even licence lite) are considerable. It is estimated that set-up costs for a small licence supplier are in excess of £500,000¹⁷⁰ though this figure is untested and other sources¹⁷¹ claim the license in a box route may be significantly less expensive. There are major costs for suppliers entering the market (such as developing IT systems for customer acquisitions, customer information, and billing). On-going costs for operation, including participation in trading arrangements, are also significant. More importantly, suppliers must post significant collateral to trade on wholesale markets, and when engaging with mandatory industry codes for energy balancing and use of networks. There will also be increasing collateral requirements from implementing Contracts for Difference (CfDs) and the Capacity Mechanism. For some participants, particularly community organisations, the costs and requirements of acquiring and maintaining a licence are prohibitive. However, no arrangements, other than class exemptions, exist to allow supply at this scale.

Many archetypes require a third party licensed supplier to deliver services on behalf of local suppliers. The unwillingness of many of the major suppliers to engage in this kind of arrangement or investigate the real costs of doing so has led to concern that the contractual relationships and costs involved between TPLSs and intermediary archetypes are unregulated and may undermine otherwise viable business cases for local supply.

5.3 Barriers Based on Uncertainty and Risk

The lack of replicable and tested business models is a significant barrier to local energy supply, especially for archetypes including demand reduction. This means that not only does each organisation have to navigate the complex regulatory environment themselves but also must produce all contractual documents from scratch.

The significant set-up, market testing and operation costs can be absorbed by large organisations with growing markets; the fixed costs can be spread across a larger revenue stream by expanding the market share. However; there is a great deal of uncertainty over how sufficient revenue could be generated to cover these costs in small scale operations matched against local needs, which are not designed to grow. This is a particular problem for archetypes which aim to reduce demand.

Uncertainty over codes, exemptions and rules is frequently cited as a major barrier to local supply. The complexity of the supply licencing regime and its focus on large suppliers makes it seem impenetrable to smaller organisations. The lack of clarity around exemptions, including class exemptions from the Electricity Act, the unbundling exemption from Directive 2009/72/EC, and the uncertainty over SLC 25A, further confuses smaller suppliers.

Many of the archetypes described above are founded on a different role for customers which requires them to engage more actively in their energy use and with the wider energy system. This could present a barrier if customers were unwilling to move to these new arrangements or if they moved but were unable to fulfil the new role required of them.

5.4 Barriers Matrix

Table 3 below summarises these barriers in terms of their strength in disincentivising local supply. This

is based on the data set built by the mixed methods approach described in section 3.

Table 3 Archetypes and Barriers Matrix

Archetype	Regulation	Capacity	Experience, replicability and risk
White Label	Low	Low	Low
Local Aggregator	Medium	Medium	High
Local Pool and Sleeving	Low	High	High
Municipal Utility	Medium	High	High
Municipal ESCo	Medium	High	High
Multi Utility Service	High	High	High
Peer to Peer	Medium	Medium	High
Peer to Peer with Local Balancing Unit	Medium	Medium	High

This analysis shows that whilst regulatory barriers are material, they are not the only, or indeed the main barrier to expanding the archetypes of local supply identified here. There are other issues which must be addressed alongside system regulation before the archetypes outlined above could begin to play a wider role in the UK's electricity supply landscape. Below, in section 6 the recommendations from this research are presented and conclusions drawn.

Footnotes

¹⁶⁶ Ofgem (2015) Final proposals on the treatment of white label providers in the domestic retail market.

¹⁶⁷ Elexon (2014) Encouraging local energy supply through a local balancing unit

¹⁶⁸ Ibid.

¹⁶⁹ <https://epr.ofgem.gov.uk/Content/Documents/Electricity%20Supply%20Standard%20Licence%20Conditions%20Consolidated%20-%20Current%20Version.pdf>

¹⁷⁰ Cornwall Energy (2014) Creating local electricity markets. A manifesto for change.

¹⁷¹ Personal communication with independent energy license consultant

6. Recommendations and Conclusions

This study has shown there are a number of real opportunities available in the UK's electricity supply landscape that are not being taken up due to a lack of suitable business model archetypes. This is because of incompatible system regulation, a lack of appropriate understanding of the real values these opportunities represent and the routes through which new entrants can begin to experiment with them.

Most of these opportunities are only available if new entrants take a specifically geographic approach. The stakeholders involved in exploring the geographic or 'local' supply approach have thus far been drawn from across local government, civil society and the private sector. For the most part these stakeholders did not begin as energy specialists and have engaged with the energy system in order to realise outcomes beyond building a simple private profit model. These outcomes are diverse but can be summarised as based on values of local economic development, socio-economic fairness, environmental protection, and self-governance. In practise stakeholders rarely identify these outcomes as mutually exclusive, and are often pursuing several via different routes; local supply being only one part of a wider strategy.

It is important to recognise that new archetypes for local supply can both benefit the energy system as a whole by taking up the opportunities identified in section 2.5 and secure the broader outcomes detailed in section 2.4. This can be encouraged by pursuing a range of strategic activities over the short, medium and long terms, most of which are within the capability of national government, the Department for Energy and Climate Change and the regulator Ofgem. These are set out below:

6.1 Short Term Recommendations

Short Term Proposal 1: Local supply innovation fund

Government should consider a Local Supply Innovation Fund to allow local supply actors to experiment, innovate and learn from each other in the local electricity supply space. This fund should be open to a wide definition of local actors drawn from across civil society. The fund should be open to community groups, charities, social enterprises and local authorities. Whilst these groups should be principal grant holders there should be scope for the flexible incorporation of private companies. It is important this fund be closely specified so that projects are designed to:

- Pursue one or more of the four opportunities outlined above in a defined geographic area

- Be flexible enough to foster real innovation
- Facilitate shared learning between local supply actors, and
- Have specific and substantial provision for assessment and evaluation throughout the process

There are similar extant examples of energy systems innovation funding. The £10m DECC Urban Community Energy Fund aims to underpin the generation element of the local energy system. Ofgem's £500m Low Carbon Networks Fund (LCNF) focusses on innovation in the distribution network. LCNF has been extremely successful in testing the theoretical values of smart grid innovations; such that the UK is becoming a market leader in the space. By specifying a fund aimed at innovative opportunities in local supply, Government could allow communities, municipalities, social enterprises and charities to access the four opportunities of local supply, which are currently uncaptured.

Short Term Proposal 2: A 'portal of power'

A key finding of this research was that the complexity of the sector and the novelty of all local supply archetypes mean even specialists are unsure about policy, regulatory and market aspects of local supply. As this sector inherently brings new actors into the market, a shared learning platform is essential for those at the early stages of engagement. One of the recommendations that arose from the Local Supply Workshop in February 2015 was the need for an online platform with clear policy and regulatory advice specifically generated by and tailored for local supply stakeholders.

The focus group generating this recommendation termed this a 'portal of power'. The delivery of this platform could commission clear, non-specialist content, aimed directly at providing accessible information on guidance on the options for local supply. Throughout the research even industry specialists admitted uncertainty over the regulatory, policy and market environment for local supply.

Rather than write this issue off as indicative of a complex sector it should be tackled head on, so all parties have a resource which can inform their engagement in the sector from an unbiased perspective. This is a reasonably 'quick win' and would require relatively little resource to curate in comparison to the benefit it would bring if delivered well.

Short Term Proposal 3: Resource the Local Supply Working Group or similar forum

Simply put, without expertise from across government, regulation, industry and civil society the four opportunities of local supply will continue to be missed for the want of a dedicated forum to address them. Continued resource for this group is crucial and is reliant on officer time from the Department of Energy and Climate change who should continue to chair the group. This research was enabled by identifying synergies between the research teams ongoing research council funded work and the aims of the working group, this relationship would not have been identified without the outward facing remit of the working group.

6.2 Medium Term Recommendations

Medium Term Proposal 1: Clarify the requirement for national supply

New fully licensed suppliers are looking to exploit the four opportunities of local supply by focussing on particular geographies, but regulation is not suited to this. New frameworks and mechanisms for customer protection for geographic supply may be needed if there is to be an amendment to the SLC conditions to allow for fully licensed suppliers to unambiguously offer geographically bounded tariffs. Currently these conditions are circumvented via bespoke derogations or 'work around' arrangements. This is neither necessary nor conducive to the growth of the sector. Consumer protection and ensuring geographic suppliers do not 'cherry pick' customers can be managed by requiring geographic suppliers to demonstrate how their business models are compatible with securing one or more of the 'four opportunities', with additional conditions on offering tariffs to all customers within a given area and ensuring said areas are broad enough to cover multiple customer types.

Medium Term Proposal 2: Amend the requirement for fully licensed suppliers to offer only four tariffs for those areas operating local supply archetypes.

Fully licensed suppliers looking to contract with 'intermediary archetypes' that need this relationship are being penalised by the need to offer only four main tariffs. This has been facilitated by a temporary arrangement for the 'local white labelling' sector but will need to be addressed as new local supply archetypes and intermediary relationships proliferate. For instance the peer to peer archetypes offer dynamic tariffs which are bespoke to each consumer's preferences within the software platform. Expansion of the local aggregator model has been shown to deliver numerous benefits but would require special treatment under these license conditions. This issue is easy to anticipate and should be dealt with before it acts as a break on new market entrants.

Medium Term Proposal 3: Allow for a 'local balancing unit' as specified¹⁷² or as a result of further development.

This would allow new local business models such as aggregators and junior suppliers to maximise the benefits of local supply and demand management, offering benefits to suppliers, network managers and system operators. These proposals have been developed in detail by Cornwall Energy and Elexon to the point where the specific license conditions that need to be amended have been identified¹⁷³. This model would enable the peer to peer archetype to take on a much more local focus and enable further demand side measures.

6.3 Long Term Recommendations

These measures represent more of a challenge to broader system operation and would require more substantial engagement from national government and beyond.

Long Term Proposal 1: Investigate the opportunity to allow local ESCo or multi utility models, which incentivise substantive efficiency gains, to be exempt from supplier switching legislation.

As a longer term activity the requirements on suppliers to ensure the domestic consumers right to switch supplier need reviewing to make space for domestic energy performance contracting that can be delivered where it is relevant, i.e. the household energy bill. New ways of securing consumer protection and local referenda could replace the

current model and allow for longer term domestic contracts. This would unlock new opportunities for energy efficiency in deep retrofit, micro generation and appliance efficiency. Whilst this option may need regulatory changes at a European level, and are therefore not in the gift of national partners, they are nonetheless necessary to realise the real gains available in the energy efficiency space.

Long Term Proposal 2: Investigate the opportunities for demand reduction centred business models and their treatment in regulation and policy.

Much more work needs to be done to investigate how energy demand reduction can be incorporated into markets and incentives. The opportunities for demand reduction can be delivered by new aggregator business models as framed in the archetypes above. However to date, demand reduction has been undervalued in favour of policy mechanisms seen to reduce unit prices as opposed to final bills. Local supply options can deliver demand side services that reduce final bills, deliver benefits to distribution and transmission system operators and reduce the need for centralised generation investments across the system.

6.4 The Need for Differentiation

This report has highlighted the missed opportunities in the energy sector that could be exploited by new, geographically specific local supply archetypes. Much has been made of the various outcomes beyond private gain that motivate the majority of stakeholders in the current local supply space. The authors argue, in the strongest terms, that the four opportunities of local supply are not readily divorceable from the community, municipal and social enterprise models currently looking to access them. Many of these archetypes rely on much closer relationships of consumer trust, engagement, and new ways of participating in the energy system. Without the participation of civic groups, realising the full value of these opportunities will be jeopardised. As such any move to relax or alter policy or regulation to facilitate local supply archetypes, or any funding to support them, should fundamentally include some form of civil society participation.

Footnotes

¹⁷² https://www.elexon.co.uk/wp-content/uploads/2015/03/Encouraging-local-energy-supply-through-a-local-balancing-unit_March2015.pdf

¹⁷³ Cornwall Energy (2014), Local tariffs and the BSC, July 2014 Nigel Cornwall

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