centre for sustainable energy

Energy networks in Scotland and their changing role with consumers

Report to Citizens Advice Scotland

Centre for Sustainable Energy with Changeworks

FINAL REPORT

April 2018

Simon Roberts

Nicky Hodges

Stephen Strachan

CONTENTS

DISCLAIMER

This is the report of a study commissioned by the Consumer Futures Unit at Citizens Advice Scotland (CAS). The report is based on a literature review undertaken on documents available by January 2018 and on stakeholder interviews undertaken between late January and March 2018. The views expressed here are those of the authors and should not be taken to represent the views or policies of the Consumer Futures Unit, Citizens Advice Scotland or any of the stakeholders interviewed for this study.

Executive Summary

The Consumers Futures Unit at Citizens Advice Scotland (CAS) commissioned the Centre for Sustainable Energy (CSE) and Changeworks to undertake a study into the energy network operators operating in Scotland –SP Energy Networks (SPEN), Scottish & Southern Electricity Networks (SSEN) and SGN (formerly Scotia Gas Networks). Energy network charges make up around a quarter of a typical household energy bill, warranting close scrutiny of network company services.

This study's particular focus was how the energy networks currently support consumers and how their role in Scotland can and should change in the future to ensure consumers, and particularly vulnerable consumers, are most effectively supported. The study involved a literature review (up to January 2018) and a series of ten in-depth interviews with senior representatives of the network companies and other key stakeholders and experts (undertaken January – March 2018).

Key findings and recommendations relating to current practice

Scottish DNOs are performing poorly on consumer vulnerability, so Scottish consumers lose out

Current practice by electricity distribution network operators (DNOs) in relation to engaging consumers is dominated by the Stakeholder Engagement and Consumer Vulnerability (SECV) incentive developed by energy regulator Ofgem for the current RIIO-ED1[1] price control.

The Scottish DNOs, SPEN and SSEN, have been performing poorly on this incentive, and particularly the consumer vulnerability aspect of it. As a result, vulnerable Scottish electricity consumers are, on average, likely to be getting a worse service than those in some other parts of GB. For example, a vulnerable household in one of Western Power Distribution's (WPD) licence areas (the best performing DNO on customer vulnerability) is perhaps 20 times more likely to receive support to manage their energy bills and improve their resilience than a similar household in SPEN or SSEN areas.

Both Scottish DNOs seem to be struggling to see how much less strategic, resourced and effective their work is compared with the top performing DNOs (e.g. WPD and UK Power Networks). Moreover, there seems to be very limited awareness amongst interviewed stakeholders of this 'postcode lottery' shortfall in service provision in Scotland; stakeholders appear instead to rely on isolated examples of good practice to inform their opinions rather than a more strategic assessment which reflects what other DNOs are now achieving.

- **The significant shortfall in performance on consumer vulnerability by the Scottish DNOs justifies a more deliberate intervention (ultimately by Ofgem) to ensure that they secure better outcomes for vulnerable households in Scotland.**

By contrast, SGN has been performing consistently well on an equivalent reward structure for gas distribution companies, with particular plaudits for how its work to extend the gas network to fuel poor

1 RIIO-ED1 is an abbreviation of Revenue=Incentives + Innovation + Outputs which represents the approach developed by Ofgem for regulating the performance of the gas and electricity transmission and distribution network companies in Great Britain. ED stands for Electricity Distribution and '1' refers to the fact that this is the first ED regulatory settlement since the RIIO approach was introduced (in 2015 for RIIO-ED1).

households (the Fuel Poverty Network Extensions Scheme or FPNES) engages with Scottish Government grant schemes to install heating systems and insulation at no cost alongside the new gas connection.

Key findings and recommendations relating to future practice

Significant changes underway in electricity networks need to reflect consumer interests better

Driven by UK and Scottish Government targets to cut carbon emissions, there are a number of very significant changes underway across Great Britain that will fundamentally alter the role of DNOs in what will become a much smarter and more flexible energy system.

These changes will be necessary to maintain network resilience and affordability while accommodating far higher levels of variable renewable generation and the growth of electric vehicles (EVs) and electric heating. To achieve this, the DNOs will become much more actively involved in supporting demand flexibility and peak demand reduction services at local level, enabling a 'smart and flexible' system. The DNOs have been tasked by the UK Government and Ofgem to develop the new function of Distribution System Operator (DSO). The DSOs will stimulate and manage a market in such services to meet local network operational needs and make more efficient use of existing and new network assets.

Associated with these significant changes, there will be new approaches to charging consumers for the use of electricity networks via their electricity bills. There will also be the potential for consumers to benefit from being paid to provide demand flexibility. In this context, both of the Scottish DNOs and other stakeholders interviewed for the study are concerned that:

(a) the new network charging methodology must be fair (so that those creating new costs for the network pay appropriately for doing so and more vulnerable customers are not disadvantaged), and;

(b) the widely endorsed principle that 'no one gets left behind' is actually realised in how the new 'smart' markets are designed, regulated and subsequently develop (so that more vulnerable consumers have genuine opportunities to participate in these new markets).

Amongst interviewed stakeholders it was widely felt to be important that both of these concerns were considered within the Scottish context, even though the key determinations are to be made by Ofgem and UK Government for GB as a whole. In addition, stakeholders pointed to the potential within these new markets for new service offerings to emerge from both community energy groups seeking to participate at local level or more commercial companies operating on a more GB-wide basis. In both cases, concerns were raised about the need for regulators to ensure from an early stage that these new service offerings include adequate consumer protections.

- The interests of Scottish consumers need to be represented in Scotland- and GB-wide deliberations on: (a) the fairness of future network charging methodologies; (b) the operationalisation of the principle that 'no one gets left behind', and; (c) consumer protections for services offered in the new DSO-operated flexibility markets (including within community energy projects).

The future of the gas network is uncertain so whole system thinking is required and the future of the Fuel Poverty Network Extensions Scheme (FPNES) needs careful thought

The Scottish and UK targets to cut carbon emissions also drive the need to decarbonise the heat we use in homes and businesses within the next 30 years. This brings into question the future use of the gas network (the principle source of fuel for heat) since the use of fossil fuel gas will not be feasible within legally binding carbon budgets.

The need to decarbonise heat also raises questions about the future of the current FPNES scheme to continue connecting fuel poor households to the gas network. As electricity shifts to renewable energy, gas will become a higher carbon heating option. Moreover, if, as part of the shift away from fossil fuel gas, fewer homes use gas for heating, those homes remaining on the gas network risk paying a far higher proportion of the costs of the network. This could make gas heating more expensive than alternatives well within the lifetime of new gas heating systems currently being installed and connected under the FPNES.

While these questions do not need to be resolved immediately, they do need to start being explored and with a particular focus on the Scottish context. Such exploration should take a whole system approach (so including electricity, gas, the heating system, the building fabric and the household) and look at how different policy drivers in Scotland interact, including whether there are regional differences to consider within Scotland. This should be able to build on the local heat and energy efficiency strategy (LHEES) work currently being done by each local authority in Scotland (though this would need to be expanded to incorporate consideration of local electricity networks).

- There needs to be a Scotland-wide consumer-oriented policy dialogue, informed by whole energy system thinking, on the decarbonisation of heat, the future of the gas network and, within that, the future of the Fuel Poverty Network Extension Scheme in Scotland.

Scotland may change quicker than other parts of GB so it needs to think and act sooner

Scotland has more ambitious and/or better funded targets and programmes to: increase renewable energy generation; accelerate the take up of EVs; tackle fuel poverty; expand the role of community and local authority-led energy action and asset ownership; encourage district/communal heating; improve the efficiency of the Scottish housing stock and decarbonise remaining heat supply. This creates what might be considered an accelerated context in Scotland for the anticipated energy system changes, affecting the network companies' Scottish license areas sooner than the rest of GB.

In addition to this more ambitious policy context, other characteristics of Scotland are relevant to this potentially accelerated context for the future of energy networks:

- the numbers of island and remote rural communities (which will tend to need smarter energy system solutions which involve domestic consumers sooner than other places where there may be more larger users to provide the required demand side flexibility)
- the number of community energy initiatives (raising issues of the adequacy of consumer protection)
- the high penetration of on-shore wind power which tends to create localised network challenges.
- The relatively high proportion of homes not connected to the gas network, relying on electricity for heat (mainly in storage heaters).

These characteristics and the potentially accelerated Scottish context for energy system change need to be reflected in policy and regulatory matters currently being decided at UK level. Without this, there is a risk that the arrangements put in place will be ill-suited to Scotland's circumstances and ambitions.

- The Scottish Government, the UK Government and other stakeholders need to recognise:
  - the critical role that will be played by energy networks (and DNOs in particular) in Scotland's policy ambitions
  - that Scotland has specific needs to represent within GB-wide decisions which relate to its circumstances and which may become critical sooner than other parts of GB.

1 Introduction

The Consumers Futures Unit at Citizens Advice Scotland (CAS) commissioned the Centre for Sustainable Energy (CSE) and Changeworks in November 2017 to undertake a study into the energy network operators operating in Scotland – SP Energy Networks (SPEN), Scottish & Southern Electricity Networks (SSEN) and SGN (formerly Scotia Gas Networks). Energy network charges make up around a quarter of a typical household energy bill, warranting close scrutiny of network company services.

This study's particular focus was how the energy networks currently support consumers and how their role in Scotland can and should change in the future to ensure consumers, and particularly vulnerable consumers, are most effectively supported. The study involved a literature review to (a) identify the policy and regulatory context in which network operators are engaging with consumers, including specific policy issues for Scotland and (b) reveal current practice and future intentions of each of the three Scottish network operators and how they compare with practice by energy networks elsewhere in Great Britain (GB). This literature review was undertaken between November 2017 and January 2018 and a list of documents reviewed can be found in the bibliography at the end of this report.

The study's main focus was a series of ten in-depth interviews with key stakeholders. These were designed to elicit their understanding, perspective and insights into current policy and practice in relation to consumers (and particularly vulnerable consumers) by the Scottish energy network companies and the potential implications for consumers of anticipated future developments, particularly the transition to a smarter, more actively managed electricity system.

The stakeholders interviewed included: senior leaders in both customer service and future strategy and innovation at both electricity distribution network operators (DNOs); the head of stakeholder engagement at the gas distribution company; a senior Scottish Government official with policy responsibility for energy markets and networks; Ofgem's Head of RIIO for electricity networks and Head of RIIO for gas networks; the Head of Regulation and the Head of Innovation and Development at the Energy Networks Association; the Energy Systems Manager at Local Energy Scotland; Citizens Advice England's Principal Policy Manager, Energy Regulation; a leading consumer expert on energy networks and regulatory practices. These interviews were undertaken between late January through to March 2018.

This report draws out the key issues emerging from the literature review and the stakeholder interviews. Informed by these, the study team has identified a set of recommended areas for advocacy to represent the interests of existing and future Scottish consumers (a) to influence positively the current and future practice of the energy networks and (b) to help shape the rapidly evolving policy and regulatory regimes affecting energy networks in Scotland and GB more widely.

Section 2 provides an overview of the role of network operators and how this is governed, including the policy context in Scotland and how this is changing over time. Section 3 reviews the literature in relation to SPEN, Section 4 in relation to SSEN and Section 5 in relation to SGN. Section 6 reviews the issues revealed by the stakeholder interviews. Section 7 details the areas recommended for advocacy to help address the issues identified. Section 8 provides concluding remarks.

2 Policy and regulatory context: literature review

2.1 Introduction

The electricity and gas distribution networks take energy from the wires and pipes of the transmission networks and convert it into lower voltages and pressures so that it can be delivered safely into homes and businesses. Scottish and Southern Energy Networks (SSEN) and SP Energy Networks (SPEN) are the two Electricity Distribution Network Operators (DNOs) serving Scotland. SGN is the sole Gas Distribution Network (GDN) serving Scotland.

These privatised networks operate as regulated monopolies, overseen by the energy regulator Ofgem, with standards set for performance and limits set on what the network operators can charge their customers. Network costs typically account for 26% of the average dual fuel energy bill[2]. GDNs and DNOs have operated under RIIO (Revenue=Incentives + Innovation + Outputs) 1 price control framework since 2013 and 2015 respectively. The framework governs their investment programmes and budgets to 2021 (for gas) and 2023 (for electricity). Ofgem is now consulting on the new RIIO 2 price control framework.

The UK government, through the Department for Business, Energy and Industrial Strategy (BEIS), and Ofgem are working together to plan the transition of the energy system towards achieving carbon emissions reductions, as set out in the government's *Clean Growth Strategy* (October 2017). This strategy sets out the government's current plan to meet legally binding long-term targets to reduce carbon emissions. BEIS and Ofgem have published *Upgrading our energy system: smart systems and flexibility plan* (July 2017), outlining specific developments in the energy system, and particularly the electricity system, to enable higher volumes of variable renewable generation through smarter operation and more demand side flexibility and management.

2.2 Consumer engagement and vulnerable customers

Ofgem's Consumer Vulnerability Strategy (2013) sets out a definition of vulnerable consumers in the energy market and a programme of work to identify and tackle vulnerability in the energy market. The Stakeholder Engagement and Consumer Vulnerability (SECV) incentive within the social obligations category of RIIO-ED1[3] encourages DNOs to maximise their role in addressing vulnerability. Network companies are rewarded financially under the SECV incentive for use of stakeholder engagement activities to identify and engage with customers in vulnerable situations and to deliver benefits for these consumers, in particular for those customers on their Priority Services Registers.[4] Gas distribution networks are also incentivised to connect fuel poor homes to the gas network under the Fuel Poverty Network Extensions Scheme (FPNES).

2 Ofgem, *Understanding your gas and electricity bills*. Information correct as of: August 2017

3 ED = Electricity Distribution

4 Priority Services Registers (PSR) are databases maintained by energy suppliers and network companies, recording details of consumers who may require additional support due to their circumstances (e.g. in the event of a power cut or in making direct contact about a payment issue or planned maintenance work)

DNOs report on their progress and plans on vulnerable customers in Part 3 of their an annual SECV submission to Ofgem. An independent assessment of each DNO's Part 3 submission prepared for Ofgem sets out where network operators have earned or lost points against an agreed assessment framework. This assessment is done across five dimensions:

- **Strategic understanding and commitment** to the role that network companies can play in tackling social issues relevant to vulnerable consumers;
- **Engagement with stakeholders to improve the data and information** that they hold on vulnerable consumers and what they do with it;
- **Approach taken to management and use of Priority Services Registers** and associated services;
- **Approach taken to develop and utilise partnerships** (e.g. referral networks) to identify and deliver solutions (both energy and non-energy) for vulnerable consumers;
- **Embedding their strategy** for addressing consumer vulnerability in their systems, processes and how they manage consumer interactions.

For the SECV incentive, the Scottish DNOs (SPEN and SSEN) score at or near the bottom of the Ofgem rankings (see Table 1 below). SSEN scored lowest in 2016/17, with a financial reward of £0.82m. SPEN scored next lowest, with a financial reward of £1.63m. For comparison, the highest scoring DNO (Western Power Distribution) received £6.17m. As demonstrated in Table 1, on a 3 year average score, the two Scottish DNOs are at the bottom of the rankings.

Table 1: Ofgem scoring and ranking for DNOs on SECV over three most recent years

	Ofgem SECV Scoring			3 year				
DNO	**2014-15**	**2015-16**	**2016-17**	**average**	**Ranking**	**2014-15**	**2015-16**	**2016-17**
Western Power Distribution	8.8	8.8	8.5	8.7	**1st**	WPD	WPD	WPD
UK Power Networks	5.9	7.5	7.5	7.0	**2nd**	NPG	UKPN	UKPN
Northen Power Grid	7.7	6.5	6.5	6.9	**3rd**	**SPEN**	ENW	NPG
Electricity North West	6.1	6.9	6.4	6.5	**4th**	ENW	**SPEN**	ENW
SP Energy Networks	6.5	6.8	6.3	6.5	**5th**	UKPN	NPG	**SPEN**
SSEN	5.0	5.7	5.2	5.3	**6th**	**SSEN**	**SSEN**	**SSEN**

By contrast, SGN ranked second amongst the GDNs in a similar reward scheme under RIIO-GD1, receiving £3.16m; it has been a consistently high performer in this scheme.

It should be noted that SSEN, SPEN and SGN all have licence areas outside Scotland and the performance assessments for DNOs and GDNs do not assess each licence area separately.

The difference in the scale and quality of performance between the Scottish DNOs and the best performing DNO (WPD) is noteworthy[5]. For example, on support for vulnerable customers delivered through partnerships in 2016/17:

5 These figures are sourced from each DNO's SECV submission Part 3 to Ofgem for 2016-17.
SPEN at https://www.spenergynetworks.co.uk/userfiles/file/SPEN_2017_Distribution_SECV_Part%203%20FINAL_2017.pdf
SSEN at https://www.ssepd.co.uk/WorkArea/DownloadAsset.aspx?id=13921
WPD at https://www.westernpower.co.uk/docs/About-us/Stakeholder-information/Stakeholder-reports/2017/WPD-SECV-Submission-2016-17-Part-Three.aspx

SPEN helped 304 vulnerable customers through a support programme (in partnership with a stated 130 local organisations). This produced benefits for these customers to the value of £116K and was the result of an investment over the year by SPEN of £37K.

SSEN's principal activity in relation to supporting such households (beyond registering them on their Priority Services Register) consists of paying for activities such as loft clearance which are not covered by government or energy supplier energy saving grants but which are necessary to enable energy saving measures (such as loft insulation) to be installed. Through a new scheme introduced in 2016-17, SSEN reports spending £10,750 through project delivery partners (such as Warmworks in Scotland), helping 34 customers. Those customers went on to have 49 energy saving and heating improvement measures installed (funded by government or ECO grants), saving each household an average of £607 a year.

WPD helped 11,766 vulnerable customers to save £3 million on their fuel bills. This was through a systematic programme of energy advice support provided to WPD PSR customers by four partner organisations and a number of additional affordable warmth schemes at a cost to WPD for the year of £834K.[6] This cost includes a spend of £90K on five innovative pilot schemes which together supported 1,043 vulnerable households on reducing energy bills and increasing their resilience, saving them £581K. [7]

On a different aspect of SECV performance (related to embedding an understanding of vulnerability across DNO staff practices), WPD trained 4,700 of its customer service and field staff in vulnerability. SPEN trained 1584, SSEN 'over 1300'.[8]

2.3 Smart energy systems and consumer issues

Over the next thirty years, UK energy networks require significantly increased levels of investment to maintain and replace ageing infrastructure, meet future demand and to connect new sources of low carbon energy to the grid. *"An analysis of electricity system flexibility for Great Britain"*, produced by Imperial College London and The Carbon Trust for the Smart Systems and Flexibility Plan shows that the UK could save £17- 40 bn across the electricity system by 2050 by deploying flexibility technologies. These savings should be experienced by consumers in the form of savings on their energy bills. The report indicates that a 'balanced' deployment pathway, with some deployment of demand side response (DSR), storage and flexible CCGT (Combined Cycle Gas Turbines) by 2020 and deployment of the current interconnector pipeline is the best way to avoid 'worst regret outcomes' in a future energy system transition.

In July 2017 Ofgem and BEIS jointly published *Upgrading our Energy System: Smart Systems and Flexibility Plan*[9] which, building on a call for evidence issued in late 2016, sets out the changes needed

6 In the interests of transparency, the study authors should disclose that CSE provides services to WPD for this programme.

7 WPD does have more than twice as many customers as either SPEN or SSEN, but this does not explain these differences in activity levels (WPD supported 0.15% of its customers, SPEN 0.009%, SSEN 0.0009%).

8 This difference cannot be explained by differences in size and therefore staff numbers between the DNOs. SSEN has trained one third of its staff, SPEN just over half and WPD nearly three quarters.

to enable a transition to an energy system which encompasses low carbon generation, distributed energy systems, new technologies such as storage and smarter energy technology. The Plan includes 29 actions the Government, Ofgem and industry will take to: remove barriers to smart technologies (such as storage and demand side response); enable smart homes and businesses and; improve access to energy markets for new technologies and business models. These actions are designed to reduce the costs of the energy system and help keep energy bills low for consumers. The responses to the call for evidence also identify potential consumer issues, including the nature of market restructuring and consumer protections that may be needed as these new technologies and business models emerge.

In this context, Dermot Nolan, Ofgem CEO, blogged in November 2017[10] about the limitations of the current regulatory framework, which only allows a licensed supplier to settle energy transactions on behalf of their customers (the so called 'supplier hub' model). This supplier hub framework effectively excludes companies with new business models from offering this service, for example using peer-to-peer trading platforms, without involving a licensed supplier. He identifies another important regulatory restriction which means customers cannot have more than one supplier. He suggests this is a barrier to customers exercising a choice to buying energy from several sources and selling back what they don't want to a range of buyers. Ofgem has issued a call for evidence[11] on future supply market arrangements, expressing interest in evidence on barriers to innovation, default supply arrangements for consumers that do not engage in the market and consumer protection associated with different routes to accessing their energy supply.

2.4 The Scottish Policy Context

The Scottish Government consulted on its new Scottish Energy Strategy in 2017. This identifies achieving better outcomes for consumers of energy and long-term sustained decarbonisation as key aims. It identifies themes of a managed energy transition and a smarter model of local energy provision. In articulating this, it identifies a vision of local energy plans to guide area-based investment and of local communities playing an active part in the future delivery of innovative, low carbon energy systems. Domestic heat consumption is identified as an important challenge for the future: heat consumption accounts for 90% of energy consumed by Scotland's homes, with requirements largely met from natural gas. The strategy looks to an increased role for renewable sources of heat in urban areas. The strategy builds on the findings of a consultation conducted earlier in 2017 on heat and energy efficiency strategies and regulation of district heating.

Driven by these policy concerns, the Scottish Government is part-funding every local authority to develop a Local Heat and Energy Efficiency Strategy (LHEES) based on an assessment of the building stock's potential to reduce demand (through improved energy performance) and options for decarbonising heat supply (including district heating and electric heating). It should be noted that the current and future status of the local electricity network (in terms of its capacity and constraints and need for load flexibility) is explicitly excluded from consideration in the development of these plans.

---

9 www.ofgem.gov.uk/publications-and-updates/upgrading-our-energy-system-smart-systems-and-flexibility-plan

10 https://www.ofgem.gov.uk/news-blog/our-blog/do-supplier-hub-market-rules-need-reform

11 https://www.ofgem.gov.uk/publications-and-updates/future-supply-market-arrangements-call-evidence

Whilst much energy policy is reserved (for the UK Government based in Westminster), new devolved powers included in the Scotland Act 2016 have seen the Scottish Government take on consumer advice and advocacy in the energy market: a stated priority for the Scottish Government is to ensure the market works for all consumers and particularly those vulnerable to fuel poverty.

2.5 Network innovation and consumer impacts

Network companies compete for innovation funding from Ofgem to trial new technology and different commercial and network operating arrangements. These trials are intended to generate knowledge of how the network companies can address the challenges they face in supporting the delivery of a low carbon economy, maintaining safe, secure and reliable energy supplies and evolving from DNO to DSO to deliver services fit for the future. The funding is intended to enable network operators to achieve environmental benefits and cost savings to energy customers in the future. Past rounds of funding were through the Low Carbon Network Fund (LCNF). The current funding pots are the Network Innovation Allowance (NIA) and the Network Innovation Competition (NIC). There are separate funds for gas and electricity.

Innovation projects include designs which trial how consumer behaviour interacts with new technologies, how this fits with future transitions and what are the potential benefits for consumers. Funding has also included trials with community involvement in innovation.

In 2015, Citizens Advice commissioned SE^2 Ltd to investigate the benefits achieved for consumers by innovation projects funded by the LCNF. The report, *Capturing the findings on consumer impacts from Low Carbon Networks Fund projects,* concluded that smart grid solutions should deliver extensive benefits for consumers where they are built into business as usual operations. Demand side response, storage and electric vehicle trials enabled consumers to benefit from lower bills. However, not all consumers benefitted, flagging a need for further work to understand why some consumers do not respond positively to the opportunities.

There is evidence of the influence of experience and learning from innovation trials in network companies' plans for the transition to DSO and their responses to government and Ofgem plans for whole system transition. Both SPEN and SSEN were successful in the 2017 Network Innovation Competition (NIC) funding round, as recently announced by Ofgem.

2.6 The transition from DNO to DSO and its relevance for consumers

An important change in improving flexibility is that of DNOs each establishing the function of a distribution system operator (DSO), to make greater use of storage, demand side response, energy efficiency, use of heat networks or other actions to deliver better value to consumers than traditional network reinforcement. DNOs also need to change the way they plan, operate and engage with others, including consumers, so that whole system costs are minimised. Recent plans and strategies published by the UK government, Ofgem, the Scottish Government and network operators all focus on this transformation. The official definition of DSO highlights how the consumer's role is expected to change from passive recipient of services to more active participants, including as a producer of power (e.g. from a solar PV system) or provider of storage facilities. The definition has a clear expectation that the transition will bring customer benefits:

Distribution System Operator Definition

A Distribution System Operator (DSO) securely operates and develops an active distribution system comprising networks, demand, generation and other flexible distributed energy resources (DER). As a neutral facilitator of an open and accessible market it will enable competitive access to markets and the optimal use of DER on distribution networks to deliver security, sustainability and affordability in the support of whole system optimisation. A DSO enables customers to be both producers and consumers, enabling customer access to networks and markets, customer choice and great customer service.

The BEIS/Ofgem Smart Systems and Flexibility Plan identifies the Electricity Network Association's (ENA) Open Networks Project as a key initiative whereby network companies can drive the necessary changes in how networks operate so that future network investment and management are in the best interest of consumers. Ofgem plans to continue with the RIIO regulatory framework, with appropriate incentives to bring any further needed changes to the role of network companies.

The Open Networks project is focused on enabling GB energy networks to move from a role of delivering electricity in one direction from centralised power plants to users, to a coordinating role that enables a range of new energy technologies to generate, consume and manage electricity, with an increased emphasis on local network management, requiring new services and interactions. The project aims to identify what changes are needed so that enabling regulations can be drafted and implemented.

The Open Networks project has identified a set of customer categories against which project activities will be tested to understand how they satisfy the requirements of different types of customers. Residential customers are identified as potentially being:

- Active participants engaged in the energy market through timing of EV charging, use of heat pumps, solar PV or storage and having contracts with aggregators (to provide demand response services).
- Passive participants with customised Time of Use Tariffs
- Passive consumers with a basic supplier tariff contract, including customers on standard dual rate tariffs and storage heaters.

Network operators, including SPEN and SSEN, have now published visions or strategies for their transition from DNO to DSO. These vary significantly in their attention to the consumer benefits brought by planned activities. SSEN's strategy (see Section 4.5 below) has a strong consumer focus, though light on attention to addressing challenges of enabling vulnerable customers to participate. SPEN's strategy (see Section 3.5 below) is much weaker on consumer focus – a point picked up in consultation responses to their draft strategy.

2.7 Future role of aggregators

Following on the publication of the Smart Systems and Flexibility Plan, Ofgem has set out views on the future role of aggregators. Aggregators are companies who combine the actions of many different customers – to, for example, reduce demand at peak times – to create a sufficient scale of action to participate in national (or, in future, local) markets for such services which are not typically designed

for participation by individual consumers. The role of aggregators is an issue raised in network company responses to BEIS/Ofgem and Scottish Government consultations. Ofgem consider that independent aggregators' access to additional markets can deliver benefits to the consumer, subject to arrangements to protect consumer interests. Ofgem identifies topics of concern being access, measurement, cost reflective pricing and balancing responsibility and delivery risk.

The network operators' responses to the Smart Systems and Flexibility Plan recognise that aggregators will have a new role. They are assertive in claiming that DNOs are best placed to act as a whole system operator offering a level playing field for others to engage and raise concerns about the need for regulation of aggregators in a future energy network.

3 SP Energy Networks: literature review

3.1 Consumer engagement and vulnerable customers

SPEN's SECV incentive Part 3 report to Ofgem sets out the company's strategy for consumer vulnerability and reports on its activities in 2016/17, whilst an independent assessment produced for Ofgem provides explanation for the scoring of their performance. SPEN scored second lowest, with a financial reward of £1.63m. For a contrast with the performance of the top scoring DNO, Western Power Distribution, see Section 2.2 above.

3.1.1 Identifying and understanding vulnerable customers

SPEN's report highlights its new use of social indicator mapping as a tool enabling them to better understand their customer base in terms of different forms of household vulnerability. It also references feedback from consumers across 11 categories to understand their support needs and priorities and any barriers to their accessing services and information.

3.1.2 Priority Services Register

The report states that SPEN achieved a 38% increase in numbers of Priority Services Register (PSR) customers (169,463 new customers) from the previous year. They now have systems in place for enabling temporary registration to the PSR (e.g. for people with temporary incapacity, following an operation).

SPEN have undertaken a wide variety of different ways to reach different customers, with new digital advertising, new trusted partners network and newly appearing on key council websites, alongside expansion of a mobile exhibition, shopping mall events, planned call-backs and community gatekeepers. A diverse approach is recognised as appropriate to reach different target groups. The report identifies number of customers reached, though it does not consider which approaches have translated into increased PSR sign-up or other benefits.

Future targets are: to close the gaps on their PSR between those identified as eligible and numbers registered, and; to double the volume of referrals through their PSR schemes.

3.1.3 Support services offered to vulnerable customers

SPEN has rapidly expanded its network of partners, from 10 to 130 partners to cover their entire customer base. However, the independent assessment notes that there is some double counting of partners across areas. The assessment also criticised SPEN for not having a short-medium term partnership strategy.

Support services offered include energy efficiency advice, debt advice, tariff switching support, maximising income, fire safety visits, befriending services and home visits for people with dementia. The independent review found that staff do have flexibility to do the right thing for consumers.

The report demonstrates that SPEN is trying to improve its performance with better data enabling them to get an improved understanding of the scale of needs. Their targets for 2017 are framed in

procedural terms rather than in terms of outcomes for consumers. The reporting suggests that SPEN is not yet able to make mature judgments on how well their various communication channels are working or to understand how impactful their various consumer support schemes.

The independent assessment criticised SPEN's targets as lacking in detail for how they will improve performance and increase impact. The assessors noted that, at their site visit, SPEN did not demonstrate the impact and extent of investment driven by vulnerability needs. The assessors also noted that, whilst the vulnerability tracking against 26 indictors is a technical solution, SPEN did not demonstrate that they have processes in place to review its use. The assessors also noted that SPEN was not using the data to assess future risk of vulnerability amongst communities.

3.2 Support to community energy initiatives

SPEN's website includes a page on additional help for communities, which includes a Community Guide for groups looking to establish a community energy project. The site includes links to Community Energy Scotland and Local Energy Scotland for further help, as well as to Community Councils for Scotland for community councils. The site includes a list of local contacts but does not appear to have a dedicated community connections manager. There are no case study examples on the page.

3.3 Smart energy systems and consumer issues

3.3.1 Response to Smart systems and flexibility consultation

SPEN's response to the BEIS/Ofgem consultation 'A Smart Flexible Energy System' gives some insights as to its position on this transition. SPEN welcomes the plan and demonstrates that it is already actively developing and using innovative solutions in response to growth in distributed generation, with 3GW of distributed generation connected to their networks and a further 3GW contracted to connect. They are making use of Active Network Management to respond to the challenge of new connections in areas of low local electricity demand, claiming estimated customer and wider societal benefits valued at £18m.

SPEN flags that a smart, flexible system will require more advanced communication network capabilities which will increase network company operating costs. SPEN also notes the need for appropriate measures to protect against the greater security risks of cyber-attack associated with a more integrated network. The response particularly cautions that growth in decentralised energy will not remove the need for transmission interconnection and national-scale network balancing. It recognises storage technologies as important but questions whether there will be sufficient market incentive in all instances, pressing for network operators to be able to own and operate storage in order to run a reliable network at lowest cost to customers. The response expresses opposition to amending the innovation mechanism managed by Ofgem, as providing demonstrable value towards smart network innovation. The response supports the transition from DNO to DSO, arguing that DNO companies are best placed to undertake the coordinating role of reducing system balancing costs and enabling customer use of low carbon technologies.

3.3.2 Response to Scottish Energy Strategy consultation

SPEN's response to the consultation on the Scottish Energy Strategy is again broadly supportive but raises concerns about key challenges requiring further attention. For example, it considers that there is a need for greater investment in the electrical network to prepare for the uptake of Low Carbon technologies, with innovative technologies considered insufficient mitigation alone to address this. The response draws attention to learning from SPEN's Accelerating Renewable Connections project to offer flexible connections, along with other innovative practices.

The response states the need to achieve a transition to a diverse energy mix and a DSO model that addresses system balancing requirements with least cost implications for consumers. It highlights the potential increased value of electricity supply to customers in a future where transport and heating solutions are increasingly electricity-powered. It seeks revisions to the tariff regime that encourages customers to adopt behaviours that are desirable for network management.

3.4 Innovation trials

SPEN references innovation trials that have enabled it to find new ways to accelerate renewable connections and to make use of active network management in areas faced with challenges of very high generation from new connections and low demand as part of its transition.

SPEN has recently been awarded Network Innovation Competition (NIC) funding by Ofgem for Fusion (up to £5.3m), a project that will trial a market framework called the Universal Smart Energy Framework. This will demonstrate an approach for DNOs to harness flexibility to manage networks. Ofgem considered it will provide carbon and financial benefits for consumer, quoting SPEN estimates that the GB-wide rollout out could provide net financial savings of £236 million to network customers by 2050.

SPEN was also awarded NIC funding for its LV Engine (£7.3m) project to develop and trial 'Solid State Transformers' on the network to make better use of capacity within existing low voltage distribution networks. This will facilitate the increasing uptake of Low Carbon Technologies. Ofgem considered this project will provide carbon and financial benefits for consumers.

3.5 Transition to DSO

The SPEN DSO Vision, published in October 2016, foresees a transition towards a full DSO "which will facilitate an open and inclusive balancing services market at the Transmission/Distribution interface. The DSO will also carry out local system balancing, efficiently utilizing the distribution network". SPEN states an intention to improve the level of customer service and to continue to offer value for money to customers with the expansion of their role to DSO. SPEN promises a more transparent and a non-discriminatory balancing market, with extended use of active system management and supervision, control and signaling of Distributed Energy Resources.

The document emphasizes SPEN's direct experience of a changing generation mix and recognizes BEIS and Ofgem's scenarios of growth of electric vehicles and next generation electric heating, with a commitment to invest in line with such scenarios.

SPEN's DSO vision quotes extensively from the House of Commons Energy and Climate Change Committee's Low Carbon Networks Report to set out its understanding of key challenges for networks:

1. Accommodation of new energy sources which require connections to, and reinforcement of, the grid.
2. New sources of energy are variable in output and system operators must therefore employ new tools to balance supply and demand.
3. Networks' efforts to overcome these obstacles must not be impeded by outdated and inflexible regulation and governance.

SPEN references 7 key drivers of 'new or significantly extended functionality' identified by Future Power System Architecture (FPSA) project as integral to SPEN's DSO vision:

1. The flexibility to meet changing but uncertain requirements.
2. The change in mix of electricity generation.
3. The use of price signals or other incentives will enable customers to save money by becoming active participants in the power sector.
4. The emergence of new participants such as smart cities, groups of technology users, aggregators and social enterprises.
5. The active management of networks, generation, storage and demand.
6. The recovery from major outages will be far more challenging as the power system becomes more decentralized.
7. The need for some coordination across energy vectors.

SPEN presents its roadmap for transition to DSO as an evolutionary process that has already started. Their tabular summary of the transition roadmap is very technical and does not spell out the consumer benefits of these activities. A published summary of consultation responses to their vision is helpful in giving a sense of perspective on what is otherwise a fairly impenetrable document for non-technical specialists. As one respondent noted, the technical language makes it hard to give a useful opinion, excluding some stakeholders from being able to provide a meaningful response. Consultation responses include the following critiques:

- Implied overreliance on Active Network Management by suggesting the need for additional solutions alongside Active Network Management in the transition to a DSO;
- questioning of whether Virtual Power Plant (VPP) or Virtual Balance Mechanism Units (VBMU) are the most appropriate way to balance the network;
- challenges to SPEN's choice of trial areas for the testing of DSO enabled network areas, as potentially inappropriate to anticipate national and whole system level impacts. One respondent felt that domestic scale activities and consumer participation would be better addressed by a trial carried out in a more challenging urban environment.
- Challenge to SPEN's stance, suggesting that ultimately aggregators may be able to ensure energy can be managed safely and securely in the future.

A majority (82%) of respondents were broadly in agreement with SPEN's vision for developing towards becoming a DSO, but feedback included criticism of a lack of detail of the customer aspects of DSO or for the potential requirements relating to the role of DSO in optimizing energy efficiency.

Another comment was that a one size fits all approach might not deliver outcomes in the best interests of consumers.

The list of technology enablers was praised as being comprehensive, but with feedback that the next level of detail should consider the specific capabilities required to deliver these, including people, process, technology, data, commercial, governance and performance management. Improved customer engagement, involvement and community empowerment were also identified as enablers.

4 Scottish & Southern Energy Networks: literature review

4.1 Consumer engagement and vulnerable customers

SSEN scored lowest of all DNOs in 2016/17 for its work under the stakeholder engagement and consumer vulnerability (SECV) incentive, with a financial reward of £0.82m. For a contrast with the performance of the top scoring DNO, Western Power Distribution, see Section 2.2 above.

SSEN's Part 3 submission document reports their use of vulnerability mapping to improve understanding of their customer base. They have undertaken staff vulnerability training and developed resilience plans. SSEN has partnered with University of Dundee to improve SSEN understanding of vulnerable customers, rollout training to front line staff, work more with local partners to engage hard-to-reach customers and develop resilience plans.

The independent assessment acknowledged the value of SSEN's vulnerability tracking against 24 indicators, from work with Dundee University and CSE. However, as with SPEN, the assessors noted the company does not have processes in place to review its use or value to SSEN and is not using the data to assess future risk of vulnerability amongst communities.

4.1.1 Priority Services Register

SSEN's Part 3 submission document for the SECV incentive in 2016-17 notes that they have achieved 8% net growth in PSR, after data cleansing, with a doubling of direct sign ups, though the majority were in its Southern England licence area. SSEN has put in place data sharing agreements with SGN and is working with NHS Highland and providers of electricity-dependent medical equipment to target electricity-dependent households. The independent assessors were critical of SSEN's mainly non-targeted approach to advertising its PSR.

4.1.2 Support services offered to vulnerable customers

SSEN is able to report on numbers of customers that received help and had measures installed, as well as report customer feedback on packs provided and sessions run. Total costs for specific activities are reported, as well as staff time. The independent assessors were critical of SSEN for not being specific enough about services offered, target group of customers, or rationale for offering services.

SSEN have achieved BSI standard for Inclusive Service provision, which places an emphasis on customer focus, understanding of key consumer vulnerability processes, and appropriate behaviours. The summary of partnerships presents the logic for each one and also sets out future development, including planned future assessment of the value of initiatives for potential wider rollout. However, the range of partnerships is limited, suggesting there is significant scope for both scaling up projects and expanding the partnership network. The independent assessors identified SSEN's partnership strategy as weak, with too much focus on awareness rather than on services to support vulnerable customers. The assessors were also critical of a focus on fuel poverty without a clear rationale for why or how this links to PSR (a criticism also levelled at WPD).

SSENs' website promotes a Resilient Communities Fund, focused on projects which help vulnerable or isolated people living in the north of Scotland, by supporting projects that enhance individual resilience and improve community participation and effectiveness or that enhance community facilities, services and communication specific to support the local response in the event of a significant emergency event (including an unplanned power cut).

4.2 Support to community energy initiatives

SSEN's website includes a 'community' page, which includes links to a downloadable Community Connections Guide Scotland, as well as links to ENA Community Innovation Guide and ENA Storage Guide, produced in collaboration with energy consultants Regen and other DNOs. The connection guide (2015/16) states that they have a community connections manager to look after all community projects in the SHEPD area. It shows step-by-step what is involved in different types of schemes. The website includes a community case study at Donside Hydro Generation Station: the experience from this project led to SSEN appointing a dedicated Community Contract Manager to give additional support to community projects seeking network connections for their generation projects.

4.3 Smart energy systems and consumer issues

4.3.1 Response to Smart systems and flexibility consultation

SSE made a group-wide response to the 'Smart systems and flexibility plan' call for evidence (so including its generation and retail businesses as well as SSEN). It highlighted regulatory barriers to energy storage and raised concerns about the need for regulation of aggregators.

SSE's response has strong rhetoric on consumer focus: it opens by identifying that a new framework 'needs to put the interest of customers at its heart' and to send effective price signals and cost reflective charging to increasingly 'smart' and agile customers. The response refers to lessons from innovation trials that indicate that smart meters and better information about energy consumption patterns are important for customer take up of innovative new tariffs and services.

The response acknowledges that vulnerable customers may pay more as other customers taking advantage of new demand flexibility services avoid fixed costs. SSE recommends that there is a need for a review of charging arrangements to avoid the creation of market distortions. It identifies existing non-cost reflective charging structures which can occur 'behind the meter' as: avoidance of low carbon levies, Warm Home Discount and avoidance of transmission and distribution network charges. SSE argues that these structures disadvantage otherwise economically viable storage projects, resulting in higher societal costs and higher customer bills. SSE revisits this in its response to the Scottish Energy Strategy.

4.3.2 SSE response to Scottish Energy Strategy consultation

Again, SSE made a group-wide response. SSE challenged plans for a government-owned energy company, arguing that financial incentives for locally owned and run projects may be more costly than supporting community involvement and ownership in larger scale renewables projects.

It highlights SSEN's innovation projects in Shetland and Orkney regarding active management of Distributed Energy Resources (DER) and supports this as a platform to realise the large untapped DER resource in Scotland, to the direct benefit of communities.

SSE's response also challenges the Scottish Government vision for giving increased importance to local energy networks, outside of remote areas, where it recognises that a flexible and tailored approach to network development and management may be appropriate. SSEN supports a GB-wide transmission and distribution systems as enabling better price distribution and access for all residential customers.

SSE argues that it is in the interest of consumers that storage of all scales should be considered relevant to the development of a smart, flexible energy system, with barriers needing to be removed to encourage investment, based on principle rather than technology specific approaches.

4.4 Innovation trials

SSEN references innovation trials, including Active Network Management and development of Constraint Managed Zones (CMZ) in its responses to Smart Systems and Flexibility Plan consultation. It also references innovation projects which illustrate links between SSEN and communities, namely 'Assisting Communities to Connect to Electric Sustainable Sources (ACCESS), where SSEN has worked with an aggregator and a community group to test the use of smart electric heating to balance low carbon generation and optimise thermal comfort of customers.

For SSEN, a common learning from trials is that interaction between communications infrastructure, customer behaviour and local economics intertwine to create unexpected outcomes, even in straightforward projects. These are factors which need to be considered in the implementation of the far more complex and dynamic DSO role.

SSEN has recently been awarded NIC funding by Ofgem for Transition (up to £13.1m), which will design and demonstrate some of the tools needed to deliver the market models being considered by the Open Networks Project. The project involves other DNOs and if successful, will save network customers an estimated £292 million, as well as reducing carbon emissions by 785 ktCO2e and releasing 0.5 GW of network capacity by 2050 if rolled out across GB.

4.5 Transition to DSO

SSEN published its vision for transition to DSO in November 2017. The foreword acknowledges explicitly that they do not know entirely what the future holds and so they have identified guiding principles for their transition, with the intention that this will be phased, customer focused, cost-efficient and collaborative. Their first two principles are customer focused and recognise the need to protect the interests of vulnerable customers:

Principle 1 'A DSO must work for all customers. We want greater choice and opportunity for customers, whilst ensuring the service we provide remains reliable, efficient and resilient, particularly for vulnerable customer.

Principle 2: Learning by doing will give the best outcomes for customers. SSEN has a wide portfolio of innovation projects that test the credentials of new technologies and solutions with respect to de-carbonisation, resilience and affordability. The best outcomes for customers will be realised through listening to their needs, practical evaluation and scaling up success.'

Other principles are for transition to be co-ordinated and cost-efficient, as a DSO to provide neutral facilitation and to unlock local solutions. The document states that the DSO role will be to facilitate new commercial services, not to develop its own.

SSEN's vision of the emerging electricity system includes residential, with electric vehicles, smart control and smart appliances, home display units, energy storage and smart metering relationship with their supplier. It identifies that customers will increasingly have a choice between whether they are willing to trade their flexibility for rewards or sustain their current practices but potentially pay more.

SSEN identifies the Open Networks Project as very important in shaping the transition to DSO. The document identifies 'planning', 'procurement', and 'operation and dispatch' as three stages in the process to operate their network efficiently. In their view, getting decisions right at the first two stages could result in significant cost savings for customers by enabling network reinforcement to be deferred or avoided all together. SSEN challenges the argument for system operation to be separated from network operation at the distribution level on the grounds that this would delay customers getting the benefits of a smarter, more flexible system.

SSEN's document has a dedicated chapter on 'What DSO means for customers'. It includes a boxed case study on the Orkney Smart Grid, which was the first example of Active Network Management being used as an alternative to traditional reinforcement.

It states the role of DSO in relation to customers is to:

- protect customers by ensuring their data is secure and network resilience remains uncompromised;
- provide new visibility by developing platforms that show available network capacity and create a level playing field for customers to actively engage in the energy market;
- improve connectivity by ensuring that customers can access the network and markets in an efficient way that suits their needs. (eg peer to peer trading, or 'eBay for electrons'), and;
- provide new revenue streams for customers who are willing to offer flexibility.

SSEN describes activities already underway including updating IT systems, Work and Asset Management systems, and Geographical Information Systems (GIS).

SSEN uses visuals that include household and local community activity as consumers and as producers and as interacting with other actors, including between neighbours using peer-peer platforms. This includes an illustration of the customer benefits of different scenarios, using SSEN innovation trial case studies, to show how these fit with SSEN's stated DSO transition principles. Compared with

SPEN's DSO vision (published 2016), SSEN makes the most of its innovation case studies to illustrate what it can do to benefit customers and the relevance to the DSO transition. It frames the continued DNO role in terms of maintaining network resilience.

SSEN acknowledges the importance of protecting vulnerable customers, those in fuel poverty and those isolated from modern communication infrastructure. It identifies mapping, an improved PSR database and new smart meters as likely to help SSEN improve its services.

SSEN's action plan commitments, which cover what has already been delivered, 2017-18, 2019-20 & 2020 & beyond includes a column 'How does it benefit customers?', alongside 'How does it improve efficiency?'. However, on closer scrutiny, many of the reported benefits for consumers are system-level, rather than benefits that a consumer could have a choice about or experience directly (though these may make for a better system or save money for customers for reduced network costs). The more direct consumer benefits identified include:

- reductions in the customer cost and time to implement flexible connections throughout our network;
- information for our customers and stakeholders on the opportunities that whole system planning can provide allowing preparation for the transition to DSO;
- customers will have clarity at offer stage on whether their site will have a transmission impact and the associated costs and timescales of works;
- customers will benefit from an informed RIIO-ET2 plan that maximises the savings achievable from flexibility and the opportunities for customers to trade energy in new ways, and;
- flexibility becomes a valuable commodity with means to access the markets for all. New third-party market models are available allowing genuine customer choice.

Despite SSEN's recognition that there are issues for vulnerable customers potentially being excluded from benefits and even paying more, the action plan does not include any specific actions to address the identified risks to vulnerable customers.

5 SGN: literature review

5.1 Customer engagement and vulnerable customers

SGN's Stakeholder Engagement Incentive Scheme Submission 2016/17, titled 'Dedicated to keeping our customers safe and warm' identifies five aims:

- Keeping energy affordable
- Improving our service
- Keeping the gas flowing safely
- Supporting our communities
- Sustaining our future

Part One of the document is very much stakeholder engagement focused. It lists out very broad categories of stakeholder in stakeholder mapping. Under 'consumer' it lists: domestic gas user; fuel poor customer; new gas customer; vulnerable customer; consumer group. It also has 'local interests' as a broad category, which includes 'community energy group, local authority, parish council, registered social landlord', along with emergency and health service. There is brief mention of activity to engage with hard to reach ethnic communities in London through culturally diverse social networks.

Part two sets out outcomes achieved which are valued by stakeholders. In the section on resilience, they identify benefits for customers of better co-ordinated responses to incidents, better preparation for incidents and better community support from a network of trusted partners, particularly for vulnerable customers. There is an example of staff training and accreditation to protect customers from cyber threat. A section on keeping energy affordable is about increasing gas connections to fuel poor households (through the Fuel Poverty Network Extensions Scheme – FPNES) and taking households out of fuel poverty, via work in partnership with third parties (and particularly its work to leverage Scottish Government programmes to improve home insulation and provide new heating systems). There is mention of initiatives to increase awareness and sign up of PSR, carbon monoxide detector research, staff dementia awareness training and carbon monoxide awareness training campaign for school children.

5.2 Innovation trials

In 2016-17 SGN was also awarded funding for a project to develop robotics for use during excavations. Ofgem considered it provides environmental and financial benefits to gas consumers by reducing the time needed for street works.

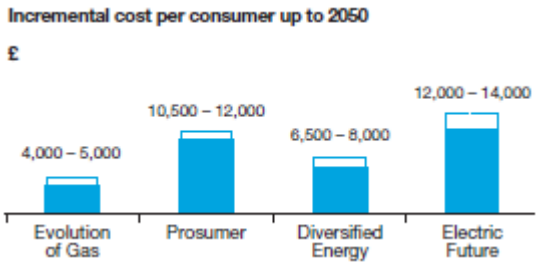
5.3 Smart energy systems and consumer issues

SGN's response to the BEIS/Ofgem *Call for Evidence: A Smart, Flexible Energy System* notes that the call largely focuses on the electricity system and points out that the issues for gas networks in adapting to a smart energy system are different to those for electricity. It criticises Ofgem for mainly looking at electricity network innovation examples. It points out that innovation challenges for gas

concern introducing new sources of gas, maintaining safety and moving towards decarbonisation of heat. It refers to SGN innovation in the areas of bio-methane and hydrogen to demonstrate the importance of the gas network in the future of heat and decarbonisation. The response has little to say about customers.

SGN's response to Scottish Energy Strategy welcomes the government's support for SGN to demonstrate a 100% hydrogen network in Scotland. It provides data on the greater potential cost savings for consumers of evolution in gas for heating, with claims that it is the most acceptable solution to customers and society, with consumers valuing the convenience and reliability of how their heat is currently provided. SGN urges the Scottish Government to work more closely with the UK government to re-assess the best value option to decarbonise heat, including to better understand the impacts on customers. The response expresses some concern about localised strategies which may not make for optimal least cost decarbonisation across Scotland.

Figure 1: Taken from SGN response to Scottish Energy Strategy Consultation



SGN reports findings from research commissioned through the Energy Networks Association (ENA)[12] which showed that even in the long run, district heating and electric heat pumps would not be able to compete economically with mains gas heating and would therefore result in an unwelcome increase in costs for consumers.

12 http://www.energynetworks.org/assets/files/gas/futures/Delta-ee_ENA%20Final%20Report%20OCT.pdf.pdf

6 Stakeholder interviews: key issues and insights

This Section reviews the issues and insights arising from the stakeholder interviews. While it is not possible to capture here all of the issues raised during the in-depth interviews, we have drawn out those areas which are of most relevance to the existing and future role of Scottish energy networks in relation to consumers, and particularly vulnerable consumers.

The stakeholders interviewed included: senior leaders in both customer service and future strategy and innovation at both electricity distribution network operators (DNOs); the head of stakeholder engagement at the gas distribution company; a senior Scottish Government official with policy responsibility for energy markets and networks; Ofgem's Head of RIIO for electricity networks and Head of RIIO for gas networks; the Head of Regulation and the Head of Innovation and Development at the Energy Networks Association; the Energy Systems Manager at Local Energy Scotland; Citizens Advice England's Principal Policy Manager, Energy Regulation; a leading consumer expert on energy networks and regulatory practices. These interviews were undertaken between late January through to March 2018.

Due to the small number of interviewees from any 'sector' and a commitment made to protect interviewee anonymity as much as possible, we have not provided verbatim quotes.

6.1 Current practice on vulnerable customers

- DNOs are defensive of current practice on vulnerable customers (and blame the process)

The DNOs were generally defensive of their consistently poor performance on the consumer vulnerability aspect of the SECV incentive. Confirmed by another (non-DNO) interviewee, the DNOs have a tendency to concentrate on failings in the assessment process rather than the limited nature of their own programmes.

Concerns about weaknesses about the assessment process are, in the view of the study authors, legitimate and shared by other DNOs, including the better performing ones (see also Section 7ii below). However, the Scottish DNOs provided little evidence that they are (a) reviewing the detail of what the consistently better performing DNOs (like Western Power Distribution and UK Power Networks) are doing or (b) acknowledging the strategic clarity of their approaches, their programmes and their funding levels and priorities (see Section 2.2 above for some examples of these differences).

Both DNOs have now undertaken more detailed vulnerability mapping of their licence areas to help them understand the scale, nature and distribution of different types of vulnerability amongst the households they serve. This approach potentially provides the basis for each DNO to develop a more strategic approach to their work under the SECV. Indeed, there are signs, certainly at one of the Scottish DNOs, that this may be emerging.[13]

13 This will become more evident in the detail of SSEN's and SPEN's Part 3 submissions to Ofgem under the SECV incentive for 2017-18 and the subsequent assessment by Ofgem and its assessors (due late summer 2018).

However, as another interviewee confirmed, there are limited signs of either DNO taking a particularly strategic approach to the design of, and investment in, these programmes. Such an approach would, for example, justify levels of investment based on the significant funding that can be 'won' under the SECV incentive (which offers potentially high returns on that investment).

Some interviewees also questioned the current approach by Ofgem of still offering some financial reward even when performance was relatively poor (currently all DNOs receive some funding from the SECV). This "money just for turning up" is seen as distorting the investment-reward assessment mentioned in the previous paragraph.

- Limited awareness of the relatively poor performance on vulnerable customers by the Scottish DNOs

Beyond those with direct responsibility in Ofgem and with one other exception, awareness amongst the interviewees of the relatively poor performance of SPEN and SSEN on the SECV incentive was low. This is in spite of SPEN and SSEN being at or near the bottom of the SECV 'league' both currently and over recent years.

Interviewees could usually provide examples of interesting projects (which were undoubtedly individually of merit) by one or other DNO. However, interviewees appeared to have given little consideration to either the scale or impact of those projects or the extent to which they were embedded in an adequately strategic approach.

Moreover, interviewees were not really considering the performances of SPEN and SSEN in the wider context of how well other DNOs are doing (generally much better) or the scale of the programmes which other DNOs were undertaking (see Section 2.2 above for some examples).

No interviewee was translating that poorer performance into an understanding of what vulnerable consumers in Scotland are missing out on in terms of support and service quality, simply because of which company is their DNO.

As indicated in Section 2.2 above and adjusted for customer numbers, a vulnerable household in one of WPD's licence area is perhaps some 20 times more likely to receive support from WPD or one of its partners than a household in a similar situation in Scotland from one of the Scottish DNOs. In other settings, such variation in service quality would be termed 'a post-code lottery'.

That said, the relatively high quality of SGN's performance with vulnerable customers, and particularly on integrating their FPNES work in Scotland with grants and support funded by the Scottish Government, is widely recognised.

6.2 The need for a new approach to charging for network services

There is widespread recognition amongst interviewees that the shift to a smarter electricity network will require significant changes in how the costs of the network are recovered from customers.[14]

14 That said, it was not clear that the Scottish Government was particularly engaged with this issue, in spite of its obvious importance for Scotland's wider energy policy objectives.

Interviewees believe charging methodologies will need to change from the current one. The current network charging methodology largely socialises costs associated with individual domestic consumers across a whole network licence area so that all domestic consumers pay at a similar rate, irrespective of their actual demand profile and its impact on the network.[15] The current charging methodology largely reflects the lack of high resolution data (such as will be available when smart meters are ubiquitous) on when different households were using energy and the peak demand they were creating at different times.

The expectation amongst interviewees is that there will be shift to a charging methodology that more accurately reflects the costs being imposed on the network (short-term and long-term) by each consumer. That in turn will have a local dimension (because the costs imposed by each consumer are dependent on what else is happening on the network at that location).

This is unavoidable if the network is going to get smarter (and considered desirable so the network can get smarter). As one network stakeholder put it, if all costs are socialised and there are no localised and cost-reflective aspects to network charges, there will also be no financial value to 'extract' by smarter and more flexible behaviours on the network and thus no smarter services would emerge.

Current charging arrangements for domestic consumers do not take account of the demands each household puts on the network which is largely down to the scale and timing of its peak demand. Stakeholders interviewed who were considering this – including the network companies – anticipated (and were promoting) a shift from charging on a volumetric basis (where network costs are recovered per kWh used) to one based at least in part on the capacity required by a consumer (i.e. their peak demand). This is likely to result in fairer outcomes (since low income consumers currently contribute to the cost of the capacity required by higher consuming better off consumers – the TESLA owner's EV charging being subsidised by fuel poor households was an example mentioned).

As expert interviewees pointed out, alongside new charging regimes to recover network costs, there will also be benefits on offer to those who provide services which reduce or avoid network costs (for example by routinely shifting demand to balance local renewable energy generation and avoid the need for additional network capacity or back-up generation). The value of these benefits will also be significantly shaped by the design of the new network charging methodology. The ability of different households to participate in these benefits may vary greatly (depending on whether participation requires investment in technology and/or flexibility in when energy can be used in the home) (see Section 6.3 below).

All interviewees recognise that these changes will cause winners and losers but also highlight the need for the new arrangements to be clear and, above all, obviously fair. No interviewee had the answer to how this could be done. But several cited the notion of a company's social licence to operate being under threat if the basis on which they were doing business appeared to be unfair,

15 A individual customer's 'impact on the network' is, particularly for electricity, largely driven by their peak demand (i.e. the maximum amount of power they draw), though the timing and duration of this peak and underlying levels of consumption will also be influential.

particularly on the most vulnerable and for a service as fundamental as electricity. A phrase which came up in one interview was the "need to choose the right losers".

Along these lines, interviewees pointed out the considerable risk to public trust from third parties being involved in selling network services (such as demand flexibility) on a largely unregulated basis. While any new network charging methodology will be embedded in regulation (having been subject to much analysis and scrutiny), those selling these smart system services could potentially be setting prices to suit their markets and commercial risks. Underlying network costs may be regulated and 'fair' but these potentially unregulated service providers will make their own choices about the prices faced by consumers, resulting in different distributional impacts than those assessed in setting the new methodology.

It will also be important to ensure that those consumers that provide the flexibility through such projects see a fair share of the benefits of doing so. Without strong and meaningful competition and well-informed consumers in these markets (both widely considered by interviewees to be highly unlikely), there will need to be careful management and control (a) of third party providers offering these services and (b) of the potential risk they pose to public trust in network companies in particular and the transition to a smarter energy system in general through their pricing strategies and quality of customer service.

On gas, interviewees were aware that decisions over future use of the gas network (as fossil fuel gas is phased out to meet legally binding carbon emission targets) will raise questions about how the network is paid for in future. There is a risk that a smaller and smaller group of households, without the means to invest in new electric heating, will be left carrying the cost of the whole network. This issue is 'long term' but relates to the decarbonisation of heat and the future of the FPNES (see Section 6.5 below).

6.3 How to ensure 'no one gets left behind' in the transition to a smarter electricity system

A consistent theme of network sector interviewees was the need to ensure that all consumers have access to the potential benefits of the smarter electricity system and are protected from the costs of transition if they are unable to do so. The Scottish DNOs were particularly strong advocates of what they each separately described as a 'principle' that 'no one gets left behind'. Like others, they were unable to define in detail what approaches might result in ensuring this principle is realised in practice, either across GB in general or in Scotland in particular.

That said, there is evidence of some thinking being done on this issue by the DNOs themselves (and DNO interviewees demonstrated good insight on this subject), aided by inputs from Citizens Advice's team in London.

For example, interviewees suggested that specific efforts will need to be made to enable more vulnerable households to participate in flexibility services and other 'value-earning' smart energy activities on their networks. They argued that the costs of such enabling activities should be socialised (and will therefore need to be included in future regulatory settlements). And they called for detailed consideration by a wide range of stakeholders of which other costs should be socialised and which

should be recovered from those causing the need for system management or reinforcement (e.g. whether reinforcement for EV charging should be funded only by EV car owners). One suggested that vulnerable consumers who were unable to participate (or be supported to participate) should be protected from the costs they may otherwise carry. As others 'avoid' costs as a result of their more flexible behaviours, non-participants risk being left paying far more of the total cost of the network.

As with future network charging methodologies discussed above, given DNOs (and DSOs hereafter as 'neutral market makers') may not be fully in control of what smart services are offered to whom at what prices, there are some considerable risks associated with any approach which does not embed this 'no one gets left behind' principle in how the markets for smart 'flexibility' services are set up, regulated and policed.

Above all, interviewees were keen for this 'no one gets left behind' principle and how it might be realised to be considered alongside the development of future network charging. That way, the likely impacts of any proposed charging regime could be considered in the light of specific understanding of how participation by vulnerable consumers in the benefits of smart energy services could be secured and what proportions of such consumers may not ever be in a position to participate.

6.4 Consumer protection issues in community energy and new 'smart' services

Some interviewees expressed a view that there needs to start being some thought applied to how more vulnerable consumers are protected within local community energy projects, particularly where they involve supply relationships (such as local energy markets and peer-to-peer trading). Interviewees were concerned that community groups were not actively considering the need for consumer protection, even though they were increasingly involved in initiatives which involve 'people they don't know' as customers (rather than just members of their community group) and where more formal practices and procedures may therefore be appropriate and necessary.

The same consumer protection issues need considering in relation to future providers of flexibility services to domestic (and SME) customers where regulatory arrangements remain opaque (see comments in Section 6.2 above). Interviewees perceived significant potential risks of consumer detriment. Ofgem is well aware of these regulatory challenges though was not yet able to articulate their proposed approach to resolving them.

These are both GB-wide issues but (as explored in Section 6.7 below) it was thought that it may emerge earlier in Scotland as a result of: (a) the need for (or value of) flexibility within island and remote communities where network constraints already exist, thus inevitably involving domestic consumers, and; (b) the extent of community energy activity, actively supported by the Scottish Government, meaning that community energy groups were likely to be 'ready to move' sooner in Scotland that other parts of the UK where there is no such support.

6.5 Decarbonisation of heat, the future of the gas network and the future of FPNES

The need to decarbonise heat is well understood by interviewees in the context of legally binding carbon emission reduction targets. But no one is clear exactly what the options to do so will be or how the relevant decisions will be made (or how or when). Given the localised nature of heat demand and supply, interviewees anticipate this is an area where Scotland will need to develop its own approach that suits its particular conditions and options and its government's wider policy objectives.

SGN gets widespread (and deserved) plaudits from interviewees for its work on the Fuel Poverty Network Extension scheme (FPNES), particularly in terms of how it leverages funding for heating systems and insulation available from different Scottish Government-funded programmes (not available in England).

However, some interviewees were starting to question the long-term future of the FPNES. This is because, while gas central heating remains the most affordable whole home heating option, it is fast becoming higher carbon than electric alternatives. Moreover, depending on the future of the gas network, the affordability of gas may become an issue within the lifetime of current heating systems. This creates questions for the future of the scheme and whether it risks stranding vulnerable households on heating systems which are high carbon and running on what will have become an expensive fuel at point of use.

Interviewees who are aware of these issues acknowledge that, while these questions do not need to be resolved immediately, they do need to start being explored. As outlined below, they believe that such exploration should take a whole system approach (so including electricity, gas, the heating system, the building fabric and energy using equipment, and the household), examine how different policy drivers in Scotland interact (e.g. high renewable generation targets, decarbonisation of heat planning, home energy efficiency, local energy planning etc), and whether there are regional differences to consider within Scotland. Options for hydrogen, green gas and electric heating will all depend on locational factors. A few interviewees pointed to the Scottish Government's Local Heating and Energy Efficiency Strategy (LHEES) programme as a potential starting point for some of these discussions at local level, though this would need to expand to take account of the conditions in the local electricity network (see Section 6.6 below).

6.6 The need for whole system thinking (and to think about that differently)

Interviewees were keen advocates of the need for whole energy system thinking in examining key issues for the future of energy networks, particularly the decarbonisation of heat. However, a number also identified a tendency for whole system thinking to continue to be bounded by electricity or by gas. While it is a step forward for the electricity system to consider generation, transmission, distribution and use (and the equipment and people driving that use) as a 'whole system', it remains rare for the thinking to consider all of the systems which provide and use power, heat and mobility. Interviewees mentioned as areas requiring this wider conception of the 'whole' energy system: the decarbonisation of heat; the rise of EVs; the need for short and long-term storage to maximise the

potential to use renewable energy generation and maintain system resilience, and; local energy planning.

Several interviewees identified as a major oversight the failure of the Local Heat and Energy Efficiency Strategy process (in which local authorities are part-funded by Scottish Government to develop strategies) to include electricity networks. This risks the development of strategies for decarbonising heat which take no account of the local electricity network status and the constraints and opportunities it offers. One stakeholder speculated that this was because the Scottish Government does not have explicit powers in the context of electricity networks. Whatever the truth of this speculation, several interviewees were of the view that this failure needed to be addressed as a matter of urgency.

6.7 Particularly Scottish issues

Interviewees identified the need to consider the future of energy networks in Scotland firmly in the context of Scottish Government's various targets and plans to: increase renewable energy generation; accelerate the take up of EVs; tackle fuel poverty; expand the role of community and local authority-led energy action and asset ownership; encourage district/communal heating; improve the efficiency of the Scottish housing stock and decarbonise remaining heat supply. Many of these are more ambitious and/or better funded than efforts elsewhere in the UK, creating what might be considered an accelerated context for the Scottish energy networks for their Scottish license areas.

However, it was not obvious from the stakeholder interviews that the Scottish Government recognises (or is seen as recognising) the critical role that will be played by energy networks (and DNOs in particular) in their policy thinking; indeed, they were seen by some as somewhat detached from these issues (potentially because of the lack of devolved powers specific to this domain).

In addition to this more favourable and ambitious policy context, interviewees also cited other characteristics of Scotland that were relevant to the role and future of energy networks:

- the numbers of island and remote rural communities (which will tend to need smarter energy system solutions involving domestic consumers sooner than other places to address system constraints but which may also struggle with the smart meter communications and data flows required);
- the number of community energy initiatives, and the likelihood that these would start to be actively involved in providing network services, and in local energy markets and peer-to-peer trading (raising issues of adequate consumer protection);
- the high penetration of on-shore wind power which tends to create localised network challenges (for example, when the wind is strong and the sun shining Dumfries and Galloway has twice as much supply as it has demand – with more supply in the pipeline), and;
- the relatively high proportion of homes not connected to the gas network, relying on electricity for heat (mainly in storage heaters)

As outlined below, these particular characteristics need to be reflected in all relevant policy and regulatory matters being decided at UK level to ensure that the arrangements put in place are suited to Scotland's circumstances and ambitions.

7 Recommended areas for advocacy on consumers and energy networks in Scotland

Drawing on the literature review, the stakeholder interviews and insights from the study team, we have identified a number of issues where we believe (a) there would be value in more advocacy activity to represent Scottish consumer interests (and particularly the interests of more vulnerable consumers) in policy and regulatory development in Scotland and/or (b) such advocacy could potentially help the Scottish network companies (and other stakeholders) improve current and future practice to serve better the interests of consumers.

These recommended areas for advocacy are outlined below, together with, where relevant, a reiteration of the rationale for their inclusion based on the findings of this study.

i. Scottish DNOs are lagging behind other DNOs on vulnerable customers (and stakeholders don't appear to know)

Vulnerable Scottish electricity consumers are, on average, likely to be getting a worse service than those in some other parts of GB. A vulnerable household in one of WPD's licence areas (the best performance DNO on customer vulnerability) is perhaps 20 times more likely to receive support than one in SPEN or SSEN areas.

In spite of the Scottish DNOs routinely coming at or towards the bottom of the league in the Stakeholder Engagement and Customer Vulnerability (SECV) Incentive under RIIO-ED1, both of them seem to find it difficult to see how much less strategic and effective their work is compared with the top performing DNOs (Western Power Distribution and UK Power Networks).[16]

This shortfall in service provision in Scotland – that would be called a 'postcode lottery' in many other settings – seems not to be widely known amongst stakeholders. With the exception of Ofgem and one other interviewee, stakeholders interviewed for this study tended to be unaware of this difference. Instead of comparing with practice elsewhere in the GB and reviewing Ofgem's assessment results, they seem to be relying on individual examples of Scottish DNO practice (e.g. a specific project) to justify what appears to be their own relatively rosy assessment of the DNOs' performance.

That said, both Scottish DNOs have taken some steps (such as commissioning vulnerability mapping) which has the potential to provide them with the foundations for each to develop a more strategic approach in future. However, with such a significant shortfall now evident, there is a case to be made that, rather than be left to the DNOs, there should be a more deliberate intervention (ultimately by Ofgem) to ensure that the Scottish DNOs secure better outcomes for vulnerable households in Scotland.

ii. Confidence is dropping in the RIIO-ED1 SECV incentive scheme (which rewards good DNO practice on vulnerable customers)

DNOs (including, but not only, the Scottish ones) seem to be losing confidence in the SECV incentive scheme due to (a) what they feel is an inconsistent approach to the assessment process (with a high

16 Examples of the scale of these differences in performance are described in Section 2.2 above

turnover of relevant Ofgem staff and panel members creating a lack of continuity) and (b) the inability of anyone involved in the assessment to provide a clear articulation of the reasons why the scoring of different companies is as it is (or what improvements would make what difference).

The SECV incentive has driven significant improvements in recent years in DNO activities in relation to vulnerable customers, including for the Scottish companies, at very low cost to consumers. It can continue to do so if it is administered consistently and well (and the scheme moves towards dropping rewards for 'turning up' – all companies currently receive some funding, however weak their practice). Ofgem will need to take steps to re-establish confidence in the assessment process (by establishing more continuity in staff/panel involvement, greater consistency in its approach and improved feedback) if DNOs are to continue to be stimulated to improve by the SECV scheme. Given the current status of the Scottish DNOs in the scheme, this is likely to be key to seeing their performance improve over the next few years.

iii. Potential for a multi-utility approach to vulnerable customers

While it was not a specific line of enquiry in interviews for this study, there was only fleeting reference to vulnerable customer work being done by another utility (Scottish Water). In other parts of GB there is active work to create more integrated approaches across water, electricity and gas networks to simplify the experience for vulnerable customers encountered by any of the companies – and to create more unified support services. This simplifies the experience for vulnerable customers and reduces 'search' costs for each utility (in terms of 'finding' vulnerable households qualifying for or needing support). Progress is generally quite slow, but in each case it has usually required an external organisation to act as a catalyst to bring the utilities together and encourage joint working. Given it was not mentioned by interviewees, it may be that Scotland needs such a catalyst to initiate action in the interests of vulnerable consumers.[17]

iv. Fuel Poverty Network Extension Scheme (and how it might change)

SGN gets widespread (and deserved) plaudits for its work on the Fuel Poverty Network Extension Scheme (FPNES), particularly in terms of how it leverages funding for heating systems and insulation available from different Scottish Government-funded programmes (not available in England). While gas central heating remains the most affordable whole home heating option, it is fast becoming higher carbon than electric alternatives. Moreover, depending on the future of the gas network and the potential for bio-methane or hydrogen to substitute for fossil fuel gas, the affordability of gas may become an issue within the lifetime of current heating systems. This creates questions for the future of the scheme.

While these questions do not need to be resolved immediately, they do need to start being explored. Such exploration should take a whole system approach (so including electricity, gas, the heating system, the building fabric and the household) and look at how different policy drivers in Scotland interact (e.g. high renewable generation targets, decarbonisation of heat planning, home energy efficiency, local energy planning etc) and whether there are regional differences to consider within

17 CAS is currently (Spring 2018) undertaking some market research into customers' experiences of signing up to PSRs across different utilities which should shed further light on this issue.

Scotland. This should be able to build on the local heat and energy efficiency strategy (LHEES) work currently being done (though see vi below) and contribute to a wider consumer-oriented policy dialogue about the decarbonisation of heat in Scotland.

v. Vulnerable consumer protections within community energy projects and for new flexibility services

With a strong interest in community energy and local energy planning in Scotland (from community groups and the Scottish Government) (particularly when compared with England), there needs to start being some thought applied to how more vulnerable consumers are protected within local energy projects, particularly where they involve supply relationships (such as local energy markets and peer-to-peer trading). The evidence available suggests community groups involved are not really engaging with this issue. Community energy groups need to develop their understanding of the need for and nature of consumer protection and what is required to achieve it, particularly for more vulnerable consumers.[18]

The same consumer protection issues need considering in relation to providers of flexibility services where regulatory arrangements remain opaque. This is a GB-wide issue but may emerge earlier in Scotland as a result of the need for (or value of) flexibility within island and remote communities where network constraints exist, thus inevitably involving domestic consumers. To catch and address poor practice early, monitoring is needed of the development of flexibility services and their providers' approaches to consumer protection.

vi. Local Heat and Energy Efficiency Strategies (LHEES) as whole system planning (that currently ignores electricity networks)

The Scottish Government is requiring (and part-funding) every local authority to develop a local heat and energy efficiency strategy, with a view to shaping future heat demand reduction and heat decarbonisation programmes. While the strategies are required to consider electric heating, the status of the local electricity network is explicitly excluded from consideration. The DNOs feel that it is important that they are involved (and Ofgem agreed), not least to avoid decisions being made without considering network impacts (or network opportunities – such as using new smart storage heating as a local system balancing facility).

A more whole energy system approach to LHEES would reduce the risks of such planning without sight of local energy network capacity, constraints and opportunities. It would also significantly improve local and national (Scotland) understanding of the interaction at local level between heat demand, electricity and gas networks and building energy performance.

vii. Network charging regimes

How the costs and benefits of the transition of electricity networks into smart systems are to be distributed is creating complex challenges. These are well understood by Citizens Advice in London and are provoking much thinking by the network companies and Ofgem.

---

18 For a more detailed exploration of this issue, see Hodges, N et al (2017) *Consumer protection in community energy schemes*. Report to Citizens Advice by the Centre for Sustainable Energy

Both SSEN and SPEN are raising concerns within GB-wide policy-making processes about the potentially negative impact on vulnerable customers – and non-participating customers more widely. Both advocate the need to move from volumetric charging (based on kWh consumed) to capacity charging (based on peak demand 'bandwidth') as a significant part of future charging arrangements. This should generally be quite progressive. As one interviewee put it, a TESLA EV owner's additional impact on the network is currently being subsidised by fuel poor households. The same would currently be true of a household installing an air source heat pump or a hot tub or a PV system.

The shift from largely socialised network costs (across whole network licence areas) to more localised and cost-reflective charging methodologies will inevitably create winners and losers compared with current arrangements (which may, in themselves, not necessarily be 'fair'). But the changes to more cost reflective pricing can't be altogether avoided (otherwise there are no financial signals to stimulate smarter behaviours).

These distributional effects will potentially be quite local and need to be considered specifically for Scotland. The distributional impact will also depend on who is able to participate in the smart markets and therefore benefit from the value on offer. It will therefore be important to understand what participation depends on (e.g. investment in technology, minimum usage levels, a flexible-enough lifestyle etc) so that it is clearer who can participate and who can't (see viii below).

viii. Ensuring no one gets left behind in the transition to a smarter electricity network

There is widespread support for the principle that 'no one gets left behind' in the shift to a smarter electricity network, not least (from companies and regulators) because of concerns about what a failure to deliver this might do for the social licence to operate of the DNOs. If it starts to look unfair, the public will call the arrangements in to question. Given DNOs (and DSOs hereafter as 'neutral market makers') may not be fully in control of what smart services are offered to whom at what prices, there are some considerable risks associated with any approach which does not embed this principle in how the markets for smart 'flexibility' services are set up and policed.

There is little clarity at present on what this principle means in practice anywhere or in the particular Scottish context (e.g. islands, remote rural communities potentially with smart meters that don't communicate well, high penetration of renewables etc). The main thinking appears to be being done by the DNOs themselves (albeit done with some insight, aided by inputs with Citizens Advice team in London) rather than wider stakeholder groups or with the Scottish Government.

That said, it is reasonable to conclude that, to realise this principle in practice, specific efforts will need to be made to enable more vulnerable households to participate in flexibility services and other 'value-earning' smart energy activities. The costs of such enabling activities should be socialised (and will therefore need to be included in future regulatory settlements). In addition (and recognising the lack of easy answers) there needs to be detailed consideration of which other costs should be socialised and which should be recovered from those causing the need for reinforcement (e.g. whether reinforcement for EV charging should be funded only by EV car owners).

ix. **What will the market in DNO/DSO services look like for customers?** (and what protections will be in place?)

There were serious concerns raised during interviews that the proposed role for DSO of 'neutral market maker' for network services (like flexibility and local system balancing) will leave the actors in that market (potentially aggregators, community energy projects, suppliers, and other third parties) largely unregulated and free to charge what they can get away with, rather than charging what the future network charging methodology has carefully worked out is fair. This issue is 'in play' (in that a number of stakeholder interviewees raised the issue and consider it important) but it appears to be getting far less attention than new charging methodologies.

That these issues may come to the fore in Scotland more rapidly than in other parts of GB (for reasons outlined in Section 6.7 above) suggests that Scottish stakeholders may need to take a lead in exploring and resolving some of the challenges involved. The fact that many of the market regulations and consumer protections are likely to be determined by Ofgem and the UK Government on a GB-wide basis does not diminish the importance of ensuring that the needs and interests of Scottish consumers are fully represented in the associated policy development.

8 Concluding remarks

The literature review and stakeholder interviews undertaken for this study reveal a number of key areas where there is a need for effective consumer advocacy representing the interests of Scottish consumers to have a positive impact on policy and regulation and on the practices of network companies. These recommended areas for advocacy are described in Section 7 of this study.

Several of the issues identified are relatively short-term opportunities for successful advocacy. These include: the post-code lottery for DNO support which Scotland's vulnerable consumers are currently losing; the need to improve the RIIO-ED1 SECV assessment process; the need to develop consumer protection thinking in community energy initiatives (and more widely for flexibility services involving domestic consumers), and; the value of including consideration of electricity networks within the LHEES programme.

The other issues for advocacy identified here will require a more sustained programme of work, building expertise, commissioning analysis and convening debate and dialogue, developing a particular Scottish dimension alongside work being undertaken on a GB-wide basis by other organisations. Within these, there is a particular need to understand how different approaches to new network charging methodologies would impact on Scottish consumers and to explore what the principle 'no one left behind' (in a smarter energy system) means in a Scottish context.

There are strong policy drivers in Scotland supporting the growth of renewable electricity generation, tackling fuel poverty, promoting community energy, and enabling local heat and energy efficiency strategy planning. As a result, Scotland may encounter many of the consumer issues identified here in relation to energy networks sooner than other parts of GB; it has therefore never been more important to ensure that the existing and future roles of Scotland's energy networks are actively and purposefully shaped to best serve the interests of Scottish consumers.

Bibliography: documents reviewed for this study

Carbon Trust & Imperial College, London (2016) *An analysis of electricity system flexibility for Great Britain*

ENA (2017) Electricity network operators commit to creating new energy markets to help deliver £17bn smart energy opportunity. Press release http://www.energynetworks.org/news/press-releases/2017/december/electricity-network-operators-commit-to-creating-new-energy-markets-to-help-deliver-%C2%A317bn-smart-energy-opportunity.html

ENA (2017) *ENA Open Networks Project*. Factsheet.

ENA (2017) Open Networks Project - - Opening markets for network flexibility 2017 achievements and future direction http://www.energynetworks.org/electricity/futures/open-networks-project/open-networks-project-overview/

ENA Open Networks Project Workstream 2: Customer Experience Product 7: Statement of Works Customer Journey Maps
http://www.energynetworks.org/assets/files/electricity/futures/Open_Networks/ON-WS1-P7%20SOW%20Customer%20Journey-170925%20Published.pdf

HM Government / Ofgem (2017) *Upgrading our Energy System – smart systems and flexibility plan*
https://www.ofgem.gov.uk/system/files/docs/2017/07/upgrading_our_energy_system_-_smart_systems_and_flexibility_plan.pdf

HM Government & Ofgem (2017) *Upgrading our Energy System – smart systems and flexibility plan: Call for Evidence Question Summaries and Response from the Government and Ofgem*

National Audit Office et al (2017) *Vulnerable consumers in regulated industries*.

Ofgem (2013) *Consumer vulnerability strategy – final decision*.

Ofgem (2017) *Decision on the RIIO-ED1 Stakeholder Engagement and Consumer Vulnerability Incentive 2016-17 – Electricity Distribution Network Operators*. Letter
https://www.ofgem.gov.uk/system/files/docs/2017/11/decision_on_riio-ed1_stakeholder_engagement_and_consumer_vulnerability_incentive_2016-17_-_dnos.pdf

Ofgem (2017) *Decision on the RIIO-T1 and GD1 Stakeholder Engagement Incentive 2016-17 – Transmission and Gas Distribution Networks*. Letter
https://www.ofgem.gov.uk/system/files/docs/2017/11/decision_on_riio-t1_and_gd1_stakeholder_engagement_incentive_2016-17_-_tos_and_gdns.pdf

Ofgem (2017) *Network innovation competition 2017 funding decision*.

Ofgem (2017) Network Innovation Competition Governance documents https://www.ofgem.gov.uk/publications-and-updates/version-30-network-innovation-competition-governance-documents.

Ofgem (2017) Ofgem seeks views on reforms to 'supplier hub' market arrangements) https://www.ofgem.gov.uk/publications-and-updates/ofgem-seeks-views-reforms-supplier-hub-market-arrangements

Ofgem (2017) *Ofgem's view on the design of arrangements to accommodate independent aggregators in energy markets*. Letter. https://www.ofgem.gov.uk/system/files/docs/2017/07/ofgem_s_views_on_the_design_of_arrangements_to_accomodate_independent_aggregators_in_energy_markets.pdf

Scottish Government (2015) Scottish Government Community Energy Policy Statement Final Version

Scottish Government (2017) *Draft Scottish Energy Strategy: The Future of Energy in Scotland* http://www.gov.scot/Resource/0051/00513466.pdf.

Scottish Government, 2017*, Consultation on Heat & Energy Efficiency Strategies, and Regulation of District Heating* http://www.gov.scot/Resource/0051/00513244.pdf

SIA partners (2017) *Independent assessment of SECV part 3 submissions*.

SPEN (2016) SPEN DSO vision and SPEN (2017) SPEN DSO vision consultation responses https://www.spenergynetworks.co.uk/pages/dso_vision_consultation.aspx

SPEN (2017) *Making a Difference: our strategies and outputs for consumer vulnerability*. Ofgem Electricity Distribution Stakeholder Engagement and Consumer Vulnerability Incentive Scheme Part Three https://www.spenergynetworks.co.uk/pages/stakeholder_reports.aspx

SPEN (2017) *SP Energy Network's Response: A smart, flexible energy system* and covering letter from Frank Mitchell to Greg Clark

SPEN (2017) *SP Energy Network's Response: Scottish Energy Strategy: The future of energy in Scotland.* Scottish Government consultation

SSE (2017) *Scottish Energy Strategy: SSE group response to the Scottish Government's draft energy strategy consultation*.

SSE (2017) *SSE group response to A smart, flexible energy system: a call for evidence*. https://www.ofgem.gov.uk/publications-and-updates/smart-flexible-energy-system-call-evidence

SSEN (2017) *Part 3: Consumer vulnerability*. Distribution submission document. https://www.ssen.co.uk/Library/StakeholderEngagementPublications/

SSEN (2017) *Supporting a smarter electricity system* https://www.ssen.co.uk/SmarterElectricity/

.

OFFICE St James Court
St James Parade
Bristol BS1 3LH

PHONE 0117 934 1400

EMAIL info@cse.org.uk
WEB cse.org.uk
TWITTER cse_bristol

CHARITY 298740
COMPANY 2219673
FOUNDED 1979