
DNV·GL

Solent Achieving Value through Efficiency (SAVE) Regulatory Report

DNV GL and Energy Savings Trust
For SSEN
April 2019



1	EXECUTIVE SUMMARY	2
2	INTRODUCTION.....	4
3	INTRODUCTION TO CURRENT REGULATION, POLICY AND OBLIGATIONS	5
3.1	Licence Conditions	5
3.2	The RIIO Regulatory Framework	5
3.3	The 2017 Smart Systems and Flexibility Plan	8
3.4	November 2018 Speech by Greg Clark	10
3.5	The ENA Open Networks Project	11
3.6	The Carbon Plan	12
3.7	The Low Carbon Transition Plan	13
3.8	Energy efficiency and time of use pricing schemes	14
3.9	General Data Protection Regulation	19
3.10	BEIS Call for evidence on building a market for energy efficiency	19
4	OVERVIEW OF SAVE METHODS	20
4.1	LED installation	20
4.2	DNO price signals	21
4.3	Enhanced engagement campaign	22
4.4	Community coaching	23
5	WIDER RESEARCH AND BEST PRACTICES	25
5.1	Literature review	25
5.2	Stakeholder research	27
6	OVERVIEW OF CURRENT POLICY/REGULATORY IMPACTS ON SAVE	32
6.1	Interactions with Electricity Distribution Standard Licence Conditions (SLCs)	32
6.2	Interactions with RIIO	34
6.3	Interactions with the Smart Systems and Flexibility Plan	34
6.4	Interactions with the ENA OPEN Networks Project	34
6.5	Interactions with the November 2018 Speech by Greg Clark	35
6.6	Interactions with the Low Carbon Transition Plan	35
6.7	Interactions with national energy efficiency schemes	35
6.8	Wider EE and TOU schemes	36
6.9	Interactions with BEIS call for evidence	36
7	OVERVIEW OF POTENTIAL CHANGES TO REGULATION OR THE SAVE METHODS	38
7.1	Mitigating limitations with 'Asset Ownership'	38
7.2	Mitigating limitations with 'Activities'	39
7.3	Guidance from energy efficiency schemes	41
7.4	Guidance from time of use tariffs	42
8	CONCLUSIONS AND RECOMMENDATIONS.....	43
8.1	Regulatory barriers and recommendations	43
8.2	Social barriers and recommendations	44

1 EXECUTIVE SUMMARY

The Solent Achieving Value through Efficiency (SAVE) project is a Low Carbon Network Fund project that aims to robustly trial and establish to what extent energy efficiency and behaviour change measures can be a cost-effective tool for managing peak demand, specifically as an alternative to traditional network reinforcement. If these methods do prove to be an effective alternative to network reinforcement, SSEN may choose to deploy them to a wider audience after the conclusion of the SAVE project. However, before doing this, SSEN must investigate the current regulatory landscape and its possible impact on the SAVE methods if deployed post trial.


This document reports the result of that investigation. The project included a literature review of current regulations, policies and other energy efficiency schemes that may impact or inform the deployment of SAVE methods in a business as usual scenario. It also interviewed stakeholders to understand barriers and strengths of similar schemes and their thoughts on how a DNO may best implement SAVE methods into business as usual.

From this information, we were able to determine existing barriers due to current regulation or government policies and any interactions or impacts from other energy efficiency schemes if SAVE methods were deployed in a business as usual scenario. The main barrier to SAVE exists in the license conditions, as all other reviewed policies and regulations were generally favourable to energy efficiency schemes like SAVE.

Potential barriers relate specifically to the installation of an electricity monitor behind the meter for the LED installation, DNO Price Signal and Enhanced Engagement Campaign methods. The ownership and usage of such a monitor by DNOs is subject to limitations from the license conditions, and we recommend the following steps to mitigate such limitations:

- We recommend that in the future deployment of SAVE Methods (and any similar methods or solutions), DNOs limit the methods to include only the assets required to deliver the method's objective. For example, we consider the functionality offered by the household electricity monitor may only be required for the DNO price signal method, but may not be essential for the LED installation and Enhanced Engagement Campaign methods as these could utilise substation monitoring instead of monitoring at the household level.
- Where a particular asset or functionality is essential, DNOs should consider how this requirement is met in the most efficient manner.
 - We consider DNOs are not uniquely placed to unlock or maximise the benefits of DSR and therefore they do not need to own and operate behind the meter equipment, such as household electricity monitors.
 - We therefore do not consider DNOs seeking licence derogations to mitigate potential barriers from market distortion or customer discrimination to be a successful course of action.
 - We recommend DNOs work with 3rd parties, such as suppliers or independent aggregators, to provide behind-the-meter assets and data services.

In accessing the benefits of EE and DSR solutions (such as the SAVE methods) whilst satisfying licence requirements and maximising returns under RIIO, we consider DNOs will always have to ensure that (1) a particular solution delivers net benefits to connected customers, and (2) the solution is delivered so that its potential benefits are maximised. From reviewing other energy efficiency schemes and interviewing stakeholders, the report also uncovers barriers to energy efficiency schemes in general. Lack of understanding of energy use and energy efficiency was identified as a barrier in much of the literature reviewed. It is essential that future energy efficiency programmes aim to increase consumer



customer understanding of energy. It is necessary to demystify home energy use and provide clear advice on the energy efficiency options available to households.

Overall, the report concludes that if the SAVE methods are to be deployed successfully in the future, they should be deployed by third parties and/or partnerships with trusted local organisations. Third parties will not be subject to the same license conditions that a DNO would be and thus third party delivery overcomes the key regulatory barriers. Working with a local organisation can also help foster trust with potential participants.

2 INTRODUCTION

The Solent Achieving Value through Efficiency (SAVE) project is a Low Carbon Network Fund (LCNF) project that aims to robustly trial and establish to what extent energy efficiency and behaviour change measures can be a cost-effective tool for managing peak demand, specifically as an alternative to traditional network reinforcement. The project aims to understand the demand side response (DSR) capability of residential customers through four approaches: installation of LED lighting, price signals, enhanced engagement and education, and community coaching. These are collectively known as the SAVE methods and are described in more detail in Chapter 4.

If these methods do prove to be an effective alternative to network reinforcement, SSEN may choose to deploy them to a wider audience after the conclusion of the SAVE project. However, before doing this, SSEN must investigate the current regulatory landscape and its possible impact on the SAVE methods if deployed post trial.

This report forms the basis of that investigation. It seeks to:

- Through a literature review, provide an overview of selected current regulations, policies and other energy efficiency schemes that may impact or inform the deployment of SAVE methods in a business as usual (BAU) scenario. (Chapter 3.)
- Provide an overview of the SAVE methods deployed. Chapter 4 outlines the methods as they were actually delivered and does not hypothesise about the various ways they may be deployed in a future scenario. (Chapter 4.)
- Review other published sources and interview stakeholders to understand barriers and strengths of similar schemes and their thoughts on how a DNO may best implement SAVE methods into BAU. (Chapter 5.)
- Outline any barriers from current regulation or government policies and any interactions or impacts from other energy efficiency schemes if SAVE methods were deployed in a BAU scenario. (Chapter 6.)
- Outline possible changes, either to regulations or to the way SAVE methods are deployed, that could be made to address these barriers and interactions. (Chapter 7.)
- Detail which changes are recommended to allow for better alignment between the two. This report generally recommends whichever (either regulation changes or changes to the SAVE methods) is simpler. (Chapter 8.)

This report and its associated research were undertaken by DNV GL and the Energy Savings Trust (EST). DNV GL is an international consulting firm that provides expert advice across the energy value chain. DNV GL brings intimate knowledge of the SAVE project and its history, as DNV GL has been involved in the SAVE project since its inception and was responsible for designing and implementing the SAVE methods. EST continues to be a leader in providing independent and trusted knowledge of the domestic energy sector to customers and businesses in the UK. EST has been able to build a unique and unrivalled insight into consumer behaviour and the energy landscape that supports it.

3 INTRODUCTION TO CURRENT REGULATION, POLICY AND OBLIGATIONS

This section provides a high-level background of the broad policy, regulatory and market context in which GB DNOs operate their networks.

3.1 Licence Conditions

Electricity distribution is a licensable activity under The Electricity Act 1989, meaning that DNOs operate under a set of license conditions that govern their ownership and operation of the distribution network in their license area. All DNOs must comply with the Electricity Distribution Standard Licence Conditions (SLCs)¹ as well as any Special Conditions that may apply to A DNO individually.

The Electricity Distribution SLCs define (activities within) the scope of the distribution business as follows (emphasis added):²

"a business of the licensee (or, in relation to either of sub-paragraphs (a) and (c), a business of any Affiliate or Related Undertaking of the licensee) which, except to the extent otherwise specified by the Authority in a direction to the licensee, comprises any of the following activities:

*(a) the **distribution of electricity** through **the licensee's Distribution System** (including any business in providing **connections** to that system);*

*(b) the provision of **Metering Services and Metering Equipment** (including the service of providing Legacy Metering Equipment within the meaning of standard condition 34); and*

*(c) the provision of **Data Services**, and in each case includes any business that is ancillary to the business in question."*

The SLCs also set out general obligations, requirements and arrangements for the provision of (public) services, and specify compliance with industry codes and agreements, including the relevant price control framework.

3.2 The RIIO Regulatory Framework

3.2.1 RIIO-ED1

The 14 GB electricity DNOs currently operate under the first iteration of the RIIO price control framework (RIIO-ED1), which runs from 1 April 2015 to 31 March 2023. RIIO places importance on DNOs' justification of future business plans specifying activities and associated costs to deliver defined 'Outputs', operating under a set of 'Incentives' and deploying 'Innovative' solutions, which determine allowed 'Revenues'. A DNO's annual revenue allowance constitutes the maximum revenue it may collect from connected customers through distribution use of system charges (DUoS), which cover the cost of maintaining, repairing, replacing and reinforcing network assets (but exclude the cost of new connections which are directly paid for by customers). In calculating DUoS tariffs for specific customers, DNOs apply the Common Distribution Charging Methodology (CDCM; for LV and HV connected customers) and the EHV Distribution Charging Methodology (EDCM; for EHV connected customers).

1

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

2

Gas and Electricity Markets Authority, Standard conditions of the Electricity Distribution Licence, 25 August 2017, Condition 1.

The RIIO model was designed to allow DNOs flexibility in how they operate their networks, so long as they can demonstrate that they deliver value for money to current and future customers, and facilitating deployment of new (smart) solutions:

*"DNOs will need to set out how they plan to accommodate uncertain levels of low carbon technologies onto their networks. The package of outputs and incentives will ensure they do this at efficient cost, using smart grids tools and techniques whilst providing good service to new and existing customers."*³

Table 1 below provides an overview of the relevant outputs and incentives for DNOs under RIIO-ED1, reflecting DNO licence obligations translated into company-specific deliverables as well as incentivised service improvements.

Table 1: Outputs and Incentives under RIIO-ED1

Output category	Outputs and Incentives
Safety	Compliance with the legislative and regulatory framework regulated by the Health and Safety Executive (HSE).
Environment	<p>Losses Discretionary Reward (LDR): Obligation to manage losses.</p> <p>Business Carbon Footprint (BCF)</p> <p>Limiting emissions of Sulphur Hexafluoride (SF6)</p> <p>Fluid filled cable leakage.</p> <p>Noise Pollution.</p> <p>Visual impact allowance for undergrounding overhead lines in Areas of Outstanding Natural Beauty (AONB) and National Parks.</p> <p>Environmental report: obligation to inform stakeholders about the activities they have undertaken in relation to environmental matters, including their role in the transition to a low carbon economy.</p>
Customer satisfaction	<p>Customer satisfaction survey: a survey under the Broad Measure of Customer Satisfaction (BMCS) of three customer types (connections, interruptions, general enquiries) to drive DNOs to deliver good customer service.</p> <p>Complaints metric: part of the Broad Measure of Customer Satisfaction measuring DNOs' complaint handling procedures to drive DNOs to deliver good customer service.</p>
Social Obligations	Stakeholder engagement and customer vulnerability: annual panel assessment with reward for DNOs who demonstrate strong engagement with all stakeholders and address customer vulnerability issues.
Connections	Time to Connect Incentive (TTC): reward for reducing average time taken to connect smaller and less complex customer connections.

³ Ofgem, Strategy decision for the RIIO-ED1 electricity distribution price control- Final Decision, 04 March 2016, p5.


	<p>Incentive on Connections Engagement (ICE): penalty where DNOs fail to engage effectively with, and understand requirements of, customers seeking larger and more complex connections.</p> <p>Connections Guaranteed Standards of Performance (GSOP): direct payment to customers of fixed amounts if DNO fails to deliver specified minimum levels of performance regarding connections.</p> <p>Customer satisfaction survey: connection customers are one of three customer types in the Broad Measure of Customer Satisfaction survey.</p>
<p>Reliability and availability</p>	<p>Interruption incentive scheme (IIS): DNOs can receive a financial reward or incur a financial penalty depending on their performance against a target for both the number and length of their network supply interruptions.</p> <p>Guaranteed Standards of Performance (GSoP): direct payment to customers of fixed amounts if DNO fails to deliver specified minimum levels of performance.</p> <p>Worst-served customers (WSC): DNOs have access to funding to improve the reliability for a subset of customers whose supply has been repeatedly interrupted.</p> <p>Network resilience: proactive network investment for reducing the impact of disruptive events, such as floods or severe storms.</p> <p>Health, criticality and monetised risk: DNOs can receive a financial reward or incur a financial penalty depending on their performance against a target for the reduction in network risk that is delivered through specified asset replacement and refurbishment activities.</p>

In addition to the specific outputs and incentives listed in Table 1 above, all DNOs operate under a tailored Efficiency Incentive that is intended to encourage DNOs to seek ways to reduce the costs of delivering outputs over the price control period. It is a fixed and symmetric incentive, through which DNOs (investors) and customers share the cost saving when the company delivers outputs at a lower cost than agreed when the price control was set – but also share any additional costs if they turn out to be higher than agreed. Each DNO has its own incentive rate – the higher the rate, the more the DNO gains from cost savings or loses from cost overruns. The Efficiency Incentive is therefore facilitative of DNOs looking for economic alternatives to network reinforcement, but does not eliminate the potential risk of such alternatives failing to deliver.

Hence, in considering the potential deployment of smart solutions, including alternative solutions to network reinforcement, DNOs must consider the need to deliver on each of the output categories as well as the financial and/or reputational outcome of its performance against the Efficiency Incentive as well as the output specific incentives.

3.2.2 RIIO2

In early 2018, the Office of Gas and Electricity Markets (Ofgem) ran a public consultation on the future of the RIIO framework in advance of the upcoming collective (gas and electricity, transmission and distribution) price control reviews for the 2nd RIIO regulatory period. Ofgem’s decision of 30 July 2018 underlined the focus on ensuring networks deliver value for money for current and future customers, including mitigating environmental impacts and addressing issues with customer vulnerability, and specifying that networks “*should develop and maintain a reliable, safe and secure network that is flexible*”



*in supporting the transition to a low-carbon future.*⁴ Ofgem aims to achieve this objective by reforming the RIIO framework in the following ways:

- Giving customers a stronger voice in setting outputs and shaping and assessing business plans;
- Allowing network companies to earn returns that are fair and represent good value for customers, properly reflecting the risks faced in these businesses, and prevailing financial market conditions;
- Incentivising network companies to respond in ways that benefit customers to the risks and opportunities created by potentially dramatic changes in how networks are used;
- Using the regulatory framework, or competition where appropriate, to drive innovation and efficiency; and
- Simplifying the price controls by focusing on items of greatest value to customers.

In a number of areas, the RIIO2 review reflects upon ongoing changes in the way networks are being used, including the evolution of DNO responsibilities and the DNO-DSO transition in general, as well as the role of innovation. Ofgem has indicated work on these areas will be taken forward and tested in a sector-specific RIIO-2 methodology consultation, but provides the following considerations:

- Further work is needed to determine if the RIIO framework needs reform to enable, or remove barriers to, so-called whole-systems outcomes, which may inform the future roles for the electricity system operator and DSOs (as currently being explored in the ENA Open Networks project).
- Uncertainty in future levels of demand could lead to underutilisation of costly investment in infrastructure. Ofgem intends *"to ensure that network company business planning processes subjects new investment to higher hurdles (particularly testing network reinforcement options against alternative options such as demand-side measures and storage)."*⁵ Amongst others, Ofgem may consider different risk allocations for certain types of investment.
- Ofgem considers network companies' potential role in encouraging end-user energy efficiency in first instance to be a Government policy issue. Going forward it will consider this role jointly with Government, and has stated its intention that price controls facilitate a level playing field between demand and supply side solutions to network constraints. Moreover, Ofgem intends the upcoming distribution price controls to allow network operators flexibility to respond to changes in their roles.
- Ofgem is considering revisiting output measures and incentives for environmental and decarbonisation outcomes as well as for vulnerable customers.
- Future consultation (originally planned for December 2018, since delayed) will provide further insight into Ofgem's (and Government's) plans in these areas, but they are evidently recognising the changing role of distribution network operators and likely facilitating new solutions to network management (where economic).


3.3 The 2017 Smart Systems and Flexibility Plan

In July 2017, Ofgem and the Department of Business, Energy & Industrial Strategy (BEIS) published their Smart Systems and Flexibility Plan.⁶ The Plan set out how the Government and Ofgem plan to deliver a smarter, more flexible energy system through a series of actions to remove barriers to smart technologies,

⁴ Ofgem, *RIIO-2 Framework Decision*, 30 July 2018, p7.

⁵ Ofgem, *RIIO-2 Framework Decision*, 30 July 2018, p6.

⁶ Ofgem and BEIS, *Upgrading Our Energy System – Smart Systems and Flexibility Plan*, July 2017.



enable smart homes and businesses, and to make markets work for flexibility. The following summarises some relevant considerations and actions discussed in the Plan:

1) Remove barriers to smart technologies (including storage)

- The focus of this area of action is to facilitate the deployment of storage for networks, but provides useful insights for the potential deployment of other (smart) solutions or activities by network operators.
- Ofgem confirmed it views that network companies should not own or operate storage due to the potential impediment of a competitive market for storage and flexibility services. Ofgem stated that it would ensure that network companies cannot directly operate storage and that it would introduce reporting requirements for DNOs who own storage, as well as possible further action in the future.
- Ofgem also confirmed the go-ahead of the Targeted Charging Review (TCR)⁷ to create a level playing field for storage in terms of network charges for storage facilities, given the requirement for fair and proportionate recovery of network costs from user groups.

2) Enabling smart homes and businesses

- (DSR is seen as way of delivering customer energy bill savings as well as to improve the efficiency of the energy system. The challenge is to increase participation in DSR, which the Government and Ofgem are looking to increase through (among others) the smart meter rollout and by implementing mandatory half-hourly settlement.
- A key principle in enabling smart homes and businesses is that customer interests are recognised and protected so that customers are treated fairly, that they understand what they are buying, and that their privacy is protected.
- Regarding new customer offerings and customers' response, Ofgem and BEIS have stated that they *"will monitor the distributional impacts of a smart energy system to ensure that benefits are felt by consumers who choose to engage and for others as a result of the downward pressure on system costs that a smart system should deliver."*⁸ As part of this action, Ofgem in July 2017 published an analysis of Distributional Impacts of Time of Use Tariffs.⁹

3) Making markets work for flexibility

- In facilitating price flexibility (varying demand and/or generation in response to changes in the energy price and/or network use), the Plan highlights the need for network tariffs to provide an effective signal of the costs or benefits of network usage at different times and locations. Ofgem stated it would explore different options for effective signals in a (then) forthcoming working paper¹⁰ as well as through the TCR.
- Regarding the evolution of roles and responsibilities in the energy market, Ofgem considered that the RIIO framework provides the necessary condition for DNOs, TOs and the SO to evolve to deliver the required changes in the near term. However, Ofgem and Government also highlighted the ENA Open Networks project as a key initiative (see section 3.4) to facilitate the deployment of new solutions (e.g. storage, DSR) as economic alternatives to network reinforcement. Ofgem also confirmed it would consider further reform of the RIIO framework to incentivise longer-term changes where required.


The Smart Systems and Flexibility Plan confirmed that the Government and Ofgem are looking to facilitate alternative, economic methods of network management to deliver value to customers. Although the Plan

⁷ <https://www.ofgem.gov.uk/electricity/transmission-networks/charging/targeted-charging-review-significant-code-review>

⁸ Ofgem and BEIS, *Upgrading Our Energy System – Smart Systems and Flexibility Plan*, July 2017, p16.

⁹ <https://www.ofgem.gov.uk/publications-and-updates/distributional-impacts-time-use-tariffs>

¹⁰ https://www.ofgem.gov.uk/system/files/docs/2017/11/reform_of_electricity_network_access_and_forward-looking_charges_-_a_working_paper.pdf



focuses on storage and demand side response, it highlights some key areas of relevance to the deployment of SAVE methods, such as the principle that regulated networks should not interfere with competitive markets, the potential need for charging reform, customer protection (including fair distribution of costs and benefits) and facilitating effective markets.

In October 2018, the Government and Ofgem published a progress update¹¹ on the 2017 Plan, among others confirming progress to facilitate half-hourly settlement in the second half of 2019 through the Significant Code Review (SCR) as well as publication of the Smart Meters Act 2018.¹²

3.4 November 2018 Speech by Greg Clark

On 15 November 2018, Business Secretary Greg Clark delivered a speech on the future of the energy market, entitled "After the trilemma - 4 principles for the power sector,"¹³ which set out government thinking and response to Dieter Helm's Cost of Energy Review.¹⁴ The speech provides valuable insight into the direction of the Government's energy strategy going forward, with potential implications for deployment of the SAVE methods.

The Secretary outlined four key principles as the basis for Government energy policy:

- *the market principle*, endorsing the use of market mechanisms to take full advantage of innovation and competition;
- *the insurance principle*, meaning that the Government must be prepared to intervene to provide insurance and preserve optionality in the face of uncertainty;
- *the agility principle*, referring to the need for energy regulation to be agile and responsive to reap the great opportunities of the smart, digital economy; and
- *the "no free-riding" principle*, meaning that customers of all types should pay a fair share of system costs.

The Secretary also made some specific comments regarding the future role of networks and the regulatory framework, underlining the public obligation from network companies to operate economically efficiently, as well as the importance for networks to effectively access the benefits from EE and DSR:

- *"Network companies need to satisfy the public that they are structured in such a way as to provide infrastructure at the lowest cost;"*
- *"We need to ensure that innovative businesses of the present and future can capture the system and network benefits of persuading customers to reduce their energy demand. Sometimes that will mean consumers becoming producers. Smart meters, data access, smart networks and the right rules and incentives are necessary for this transformation. The distinction between supplier and distributor may no longer hold in this new world;"*
- *"The current system that Ofgem operates allows for some flexibility in investment and incentivises companies to try better solutions. However, in a world of technological transformation, there are other diverse solutions that should be explored through competition. For example, at any location, a demand-side-management scheme might be better than a network reinforcement, or a big battery might be better still. During this period full of technical opportunity and uncertainty, open competition is our friend;"*

¹¹ <https://www.ofgem.gov.uk/publications-and-updates/upgrading-our-energy-system-smart-systems-and-flexibility-plan-progress-update>

¹² <https://services.parliament.uk/Bills/2017-19/smartmeters.html>

¹³ <https://www.gov.uk/government/speeches/after-the-trilemma-4-principles-for-the-power-sector>

¹⁴ <https://www.gov.uk/government/publications/cost-of-energy-independent-review>

The Secretary also highlighted the importance of fairness in the future systems, stressing that the Government aims for "a fair distribution of costs, with good incentive properties, to ensure that we are actually minimising system costs and not just shifting them from one person to another."

We consider the Secretary's speech endorses the general direction indicated by the RIO2 review and confirms the government commitment to fairness and effective, competitive markets set out in the SSFP. Moreover, we note that, to underline the Government's commitment, the Secretary highlighted the Government's potential willingness to intervene in the energy market, announcing that Government and Ofgem will undertake a review of industry codes and code governance, and will consider reinforcing any necessary changes through legislation.

3.5 The ENA Open Networks Project

In the Smart Systems and Flexibility Plan, the Government and Ofgem referred to the Energy Network Association (ENA) OPEN Networks (ON) Project as a key initiative to inform the changing roles and responsibilities of energy market participants (principally network operators) in deploying new solutions as alternatives to network reinforcement, as well as to inform the coordination between transmission and distribution to maximise the benefits of such solutions.

The ENA ON project brings together 9 of UK and Ireland's electricity grid operators, respected academics, NGOs, Government departments and Ofgem to deliver the following objectives:¹⁵

1. Developing improved processes between Transmission and Distribution, particularly around connections, planning, shared services and operation.
2. Improving customer experience and looking to improve information available to customers to enable their decisions for connection and services.
3. Developing a more detailed view of the required evolution from traditional network operation to new Distribution System Operator functions. This includes a definition of how this will work, the roadmap to implementation and how existing network operators can make the organisational transformation to support new markets and functions.
4. Considering the charging requirements of enduring electricity transmission/distribution systems; what barriers and anomalies might exist for customers; and how network operators deliver value for money to customers.
5. Effectively communicating the output to a wide range of stakeholders.

Reflecting these objectives, the ENA ON project consists of four work streams: T-D Process, Customer experience, DSO Transition and Charging. DSO Transition (WS3) and Network Charging (WS4) work streams are the most pertinent to considerations regarding network reinforcement or deployment of alternative solutions:

- **WS3 - DSO Transition**

- WS3 has so far culminated in the publication of a report setting out DSO Functional and System Requirements in May 2018.¹⁶ The report sets out high level descriptions of future functions of DSOs, maps future DSO competences to these functions, and scores current DNOs in their capability of these future competences.

¹⁵ http://www.energynetworks.org/assets/files/electricity/futures/Open_Networks/14574_ENA_Open%20Networks%20Report_AW_v9_Web.pdf

¹⁶ <http://www.energynetworks.org/assets/files/ON-WS3-P2%20DSO%20Functional%20Requirements.pdf>

- Future DSO functions, according to, the ENA ON include:
 - Investment planning: identifying capacity requirements and securing the most efficient means of providing capacity, including commercial DER options as well as distribution network investment.
 - Service optimisation: including understanding network requirement and limitations as well as the provision of network access to flexibility services from smart solutions and DER services.
 - Charging: including setting distribution use of system charges for the local network.
- **WS4 - Network charging**
 - In August 2017, the ENA ON project published a report identifying a number of key charging issues requiring further work, on which it may support the Charging Futures Forum and/or the TCR. The issues cover charging considerations relevant to the future DSOs, including (among others):¹⁷
 - The requirement for a common charging methodology for the costs associated with Active Network Management;
 - The development of future compensation arrangements for distributed energy resources; and
 - How should network charges be calculated for Community Energy and Local Generation and Supply?

The ENA ON work streams are only of indirect relevance to the question of network reinforcement versus economic alternatives but do provide broad confirmation of future DSO considerations and responsibility in this area, as well as potential considerations around charging providers of alternative solutions.

3.6 The Carbon Plan

The Government's Carbon Plan sets the way the country will be decarbonised. The transition to a low carbon future needs to maintain energy security and minimise costs to households, in particular those are vulnerable and in fuel poverty. The plan stresses that a low carbon economy is more sustainable, less dependent on imported fossil fuels and less exposed to future volatile energy prices. The Carbon Plan states that more efficient use of energy is required in all sectors: the electricity grid needs to be more capable of balancing supply and demand, residential heating needs to be decarbonised, and transportation and industry need to switch to electric technologies, biofuels or hydrogen.

The Plan notes that buildings account for 38% of the UK's carbon emissions as result of space heating and appliances.¹⁸ Buildings need to be better insulated, and utilise smart controls and more efficient lighting and appliances to decrease energy demand. The document highlights key actions (Table 2) in order to achieve the fourth carbon budget (Table 3).

¹⁷ http://www.energynetworks.org/assets/files/electricity/futures/Open_Networks/ON-WS4-P1%20Charging%20Issues-170816.pdf

¹⁸ UK Government, The Carbon Plan, page 15.
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47613/3702-the-carbon-plan-delivering-our-low-carbon-future.pdf

Table 2: Key actions

2010s	2020s
<ul style="list-style-type: none"> • Green Deal: start in 2012; • Smart Meters roll-out: completion by 2019; • All new homes zero carbon from 2016; • All new non-domestic buildings zero carbon from 2019. 	<ul style="list-style-type: none"> • All remaining lofts and cavity walls are retrofitted; • Between 1 million and 3.7 million additional solid wall insulation by 2030; • Between 1.9 million and 7.2 million other energy efficiency installation (e.g. improved glazing) by 2030.

Table 3: Carbon Budget

	Carbon Budget			
	1 st (2008-2012)	2 nd (2013-2017)	3 rd (2018-2022)	4 th (2023-2027)
Percentage reduction from 1990 level	23%	29%	35%	50%
Legislated budget [MtCO₂e]	3018	2782	2544	1950

The power sector is accounted for 27% of the total carbon emission, and by 2050 the power sector needs to be close to zero emissions.¹⁹ With the electrification of heating, industry and transportation, electricity demand will likely rise. Under this perspective, the grid will likely need to be reinforced and will need to overcome geographical barriers and capable of balancing demand and the intermittent renewable electricity supply.

3.7 The Low Carbon Transition Plan

The UK Low Carbon Transition Plan (LCTP) is considered the first transition plan to a low carbon future and targets all the sectors of the economy. It aims to cut CO₂ emissions by 18% (of 2008 levels) by 2020, produce 15% of all the energy from renewable sources and produce 30% of electricity from renewables.²⁰ In addition, it sets to make homes greener via the increase in energy efficiency and the rollout of smart meters.


The Plan dictates that the capacity of the electricity grid must increase and be able to manage fluctuation of both supply and demand. To allow the transition, power stations, transmission and distribution networks will all require upgrades and reinforcement.

The Plan aims to transform homes and communities to reshape demand. In the short term, the Plan aimed to increase energy suppliers' obligations to help households to save energy and cut carbon emissions. In the long term, the Plan aims to install smart meters, enhance the understanding of energy

¹⁹ UK Government, The Carbon Plan, page 9.

²⁰ UK Government, The UK Low Carbon Transition Plan.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/228752/9780108508394.pdf



use and maximise the opportunities for energy savings. Additionally, the UK government pledges to develop new models of financial support, such as 'pay as you save' and clean energy 'cash back' schemes. The Government sets to raise energy standards in every home and create awareness of energy efficiency among communities (especially in low income areas) in order to speed up the transition to a low carbon future. Funding for these types of projects is discussed below.

3.8 Energy efficiency and time of use pricing schemes

The Energy Company Obligation and the Green Deal are the UK Government's two main schemes for promoting domestic energy efficiency and micro-generation in the UK. However there have been smaller pilot programmes on energy efficiency and time of using pricing.

3.8.1 Energy Company Obligation

The Energy Company Obligation places an obligation on large energy suppliers to provide funding to support households to install energy efficiency measures; it has been in operation since 2013 (replacing previous obligation schemes) and is currently entering its third phase. The obligation requires suppliers to deliver a set amount of lifetime bill savings through measures installed under the scheme. The overall target for the third phase (which runs until March 2022) is £8.253bn, this target is then divided amongst medium to large-scale energy suppliers according to market share. Which suppliers are obliged under the scheme is determined by a customer threshold, currently set at 250,000 customers, but set to decline over the course of phase three (200,000 from April 2019 and 150,000 from April 2020). Under ECO3, all funding provided under the scheme is focused toward Affordable Warmth, meaning it needs to be spent on low-income and vulnerable households which are at risk of being in fuel poverty. There are also restrictions on the number of boilers that can be repaired or replaced under the scheme, a rural sub-obligation and an option to invest in innovative technologies. 87% of ECO measures were installed in properties which have mains gas as their primary fuel type.

ECO only covers Great Britain, and is uniform across the country, there is no specific targeting of ECO towards certain regions, however historically ECO has seen greater delivery of measures in less affluent parts of the country (see Figure 1), a trend which would be expected to increase now that the scheme is focused entirely on Affordable Warmth.

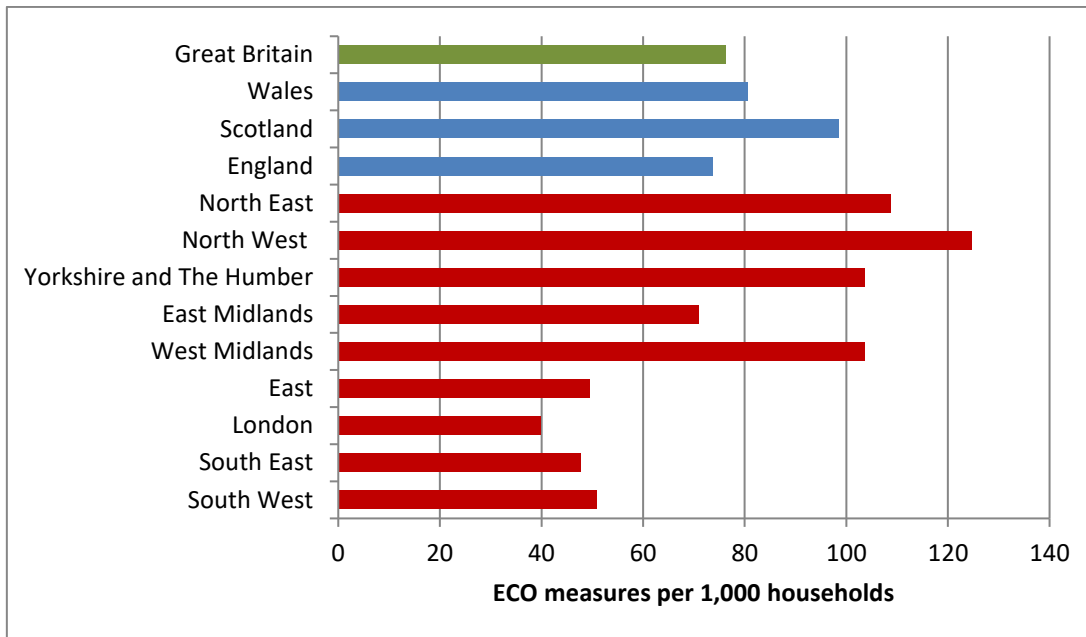


Figure 1: Total ECO measures by region, up to December 2016. The green bar shows the proportion of ECO measures for all of GB, the blue bars the proportion for the three countries of GB, and the red bars the proportion for the regions of England.

After recent changes to the scheme, local councils can become involved in the delivery of ECO through flexible eligibility. Flexible eligibility (ECO Flex) allows local authorities to set their own criteria for identifying households in fuel poverty, and energy companies can then install measures in the properties identified. Up to 25% of an energy supplier’s obligation (i.e. 25% for a suppliers lifetime bill savings target) can be delivered in homes identified through ECO Flex flexible eligibility. This allows local authorities to direct ECO funding to homes under their jurisdiction that they deem to be in need of it, even if these properties are not necessarily affordable warmth eligible. The extent to which local authorities engage with ECO Flex varies considerably, some local authorities have identified numerous properties for ECO support while others have not engaged with the scheme at all.

Further discussion of the benefits and drawbacks of ECO and the impact it has had on customer perceptions of energy efficiency schemes is provided in section 5.1.

Table 4: ECO measures as a percentage of total installations up to January 2018.^{21, 22}

ECO Measure	Percentage of installations
Cavity Wall Insulation	35%
Loft Insulation	24%
Boiler repair/replacement	22%
Solid Wall Insulation	7%
Heating Controls	8%
Other measures	4%

²¹ <https://www.gov.uk/government/statistics/household-energy-efficiency-national-statistics-detailed-report-2017>

²² Other measures include micro-generation, district heating, electric storage heater repair/replacement, and other insulation such as draught proofing and glazing.

3.8.2 Green Deal

The Green Deal was also launched in 2013, and provides loans to homeowners to install energy efficiency and low carbon generation. These loans are paid back through levies on the home's energy bills, which are guaranteed to be lower than the anticipated savings that the measures provide. It has seen limited uptake to date, and in 2017 only 51 households received Green Deal finance (down from a peak of 43,000 households in 2015).

A report on the Thames Valley vision project identified the key criticisms of Green Deal which may have led to limited uptake; these include high interest rates, low probability of achieving a positive return on investment, inbuilt preference for middle class customers, and increased cost and bureaucracy for home improvements. Additional critiques of the Green Deal programme is available in from the literature review in section 5.1.

Table 5: Green Deal measures as a percentage of total installations up to January 2018.^{23, 24}

Green Deal measure	Percentage of installations
Boiler replacement	31%
Cavity Wall Insulation	2%
Lighting	2%
Loft Insulation	6%
Solar PV	29%
Heating Controls	9%
Solid Wall Insulation	15%
Other measures	4%

3.8.3 UK Power Networks Low Carbon London


Low Carbon London was a four year project run by UKPN examining the impacts of a variety of low carbon technologies on London's electricity distribution network. One of the trials in this project²⁵ was of residential customer attitudes to time-varying pricing, and their willingness to engage with time of use tariffs. The trial made use of dynamic time of use tariffs, with day ahead notification of how and when tariffs would change.

The trial found a very positive reaction to dynamic time of use (TOU) tariffs (though the recruitment process was opt-in, and households were heavily incentivised to sign up), which shows support for cost-effective pricing if it is viewed as fairer and/or promoting energy efficiency. Customers did not experience dynamic-TOU to be complex, indicating that transparency and communicating reasons for rate changes may be more important than simplicity. The trial found that explanation of the reasons behind TOU pricing is essential and will increase engagement; as does linking TOU tariffs to renewable energy, more efficiency energy use or the civic relationship with the electricity grid. The report

²³ <https://www.gov.uk/government/statistics/household-energy-efficiency-national-statistics-detailed-report-2017>

²⁴ Other measures include solar water heating, electric storage heaters and other insulation such as draught proofing and glazing.

²⁵ [https://innovation.ukpowernetworks.co.uk/innovation/en/Projects/tier-2-projects/Low-Carbon-London-\(LCL\)/Project-Documents/LCL%20Learning%20Report%20-%20A2%20-%20Residential%20consumer%20attitudes%20to%20time%20varying%20pricing.pdf](https://innovation.ukpowernetworks.co.uk/innovation/en/Projects/tier-2-projects/Low-Carbon-London-(LCL)/Project-Documents/LCL%20Learning%20Report%20-%20A2%20-%20Residential%20consumer%20attitudes%20to%20time%20varying%20pricing.pdf)



recommended that, in addition to the above, future trials should promote awareness and debate about the energy system; and, when recruiting participants, should minimise exclusion criteria, minimise the effect of incentives on behaviour and recruit participants directly onto the TOU trial.

The trial of TOU tariffs found that a large majority of participants modified their behaviour in response to price signals, with 95% saving money compared to a flat rate tariff. The average reduction in peak demand was approximately 10%. This trial also found that demand reduction was greater during the winter months and that socio-economic factors had little influence on response to TOU tariffs. It should be kept in mind that given how recruitment to the trial was conducted, the group is likely to be early adopters and not necessarily representative of the general population.

3.8.4 UK Power Networks Energywise

UK Power Networks²⁶ have run a trial involving social housing tenants in parts of East London (many of whom are in fuel poverty), examining the impacts of smart meters, energy efficiency devices and TOU tariffs/rebates. The Energywise project conducted two trials involving low-income households, trial 1 focused on the installation of smart meters and energy saving devices, while trial 2 focused on energy shifting. This project provides some useful insights on how to engage the fuel poor with energy efficiency and TOU tariffs.

The project found that face-to-face engagement and support is critical to recruiting and maintaining engagement, 82% of signups to the project were the result of door-to-door engagement following an initial invitation letter. The project also found that contact should come from a trusted local organisation, and that it was essential for advisors to have local knowledge. To that end the project developed teams of dedicated, locally based, community-centred customer field officers to engage participants. These teams were kept small with regular refresher training and meetings to share learning and best practice. Other key learnings for initial engagement were to use clear, short and simple messages and to communicate the potential of smart meters and TOU to help manage energy use and bills, without overpromising in that area.

The Energywise project also found that streamlining the customer journey and making installation of devices as straightforward and hassle free as possible is essential, as well as providing clear demonstrations of how to use devices at the point of installation. The trial encouraged ongoing engagement through participant panels, regular newsletters, action to mitigate identified risks, vouchers, and advice on energy shifting.

Trial 1 saw an average 5.2% reduction in the evening peak, while smart meters made it easier for those on prepayment to top up. Households saved an average of £14 annually and reduced their energy consumption by an average of 3.3%. Trial 2 offered prepayment customers a rebate for reducing energy use at peak times, whilst offering credit customers free electricity during either Saturday or Sunday 9am-5pm. Prepayment customers saw an average reduction in evening peak demand of 1.5%. The rebates earned were in the range of £3 to £111 per annum with an average saving of £37 per annum. Credit customers saw an average shift of 0.92 kWh from paid time to free time, with the highest shift being 8kWh. On average there was a 2.2% reduction in evening peak demand, but a 22.2% rise in weekend day demand. The report on the trial notes that if this was widely deployed many secondary substations could be subject to an increase in peak demand centred around a new peak during the free electricity period. The trial also found that 95% of participants were satisfied or very satisfied with the TOU tariffs.

²⁶ <http://innovation.ukpowernetworks.co.uk/innovation/en/Projects/tier-2-projects/Energywise/>

3.8.5 Ceredigion Area Keep Cosy Changing Behaviours

The Keep Cosy Changing Behaviours²⁷ trial targeted electrically heated homes with low energy efficiency and provided them with in-depth advice on how to manage their energy use through a series of home visits from advisors. The trial was run by Ymlaen Ceredigion, Ceredigion County Council and Aberystwyth University, and comprised of 39 households in the Ceredigion area. The report examines the cognitive barriers to engaging with energy use and how these can be overcome. Uncertainty of how energy is used in the home and a perception of risk associated with experimenting with energy use or trying to change energy providers among those on low incomes are the key barriers. It is essential to demystify home energy and to create a learning experience and encourage practice of engaging with energy use. Scarcity of resources and information on energy use is also a key barrier. It is essential to make information as visible and relevant as possible and frame messages in a way that they can be easily understood. It is also important to understand that multiple home visits may be necessary to get some customers to understand and engage with energy saving behaviours. Also, the individuality of each situation, due to the interplay between a householder's circumstances, the nature of the building itself and intra-household relationships, necessitates that energy saving advice is tailored to the household in question. The trial found that energy coaching and behavioural advice reduced energy use by an average of 16%, with some households reducing consumption by as much as 40%. However, this was focused on households with electric heating.

3.8.6 Northern Powergrid Consumer Led Network Revolution

The Consumer Led Network Revolution (CLNR) was a project run by Northern Powergrid in partnership with British Gas, Newcastle University and Durham University. The project ran several trials of low-carbon and energy saving technologies and practices, including a static TOU tariff²⁸. Under this tariff electricity was more expensive between 4-8pm and less expensive at other times. Homes in the trial reduced electricity consumption at peak times by an average of 11.3% and the average peak demand was reduced by 12.5%. However, electricity demand during the maximum peak demand half hour was unchanged for homes in the trial. As with other trials, recruitment for this was through an opt-in process so it too may be subject to an early adopter effect.

3.8.7 TOU models

Ofgem developed a model²⁹ to assess the distributional impact of time of use tariffs, examining the proportion of households in a variety of socio-demographic categories likely to take up such tariffs and the likely change in consumption. It compared a flat tariff with static and dynamic time of use tariffs. They found that only 8% of customers would adopt such tariffs, though many more could save money under them. Middle income customers were predicted to be the most likely to adopt TOU tariffs. Vulnerable customers were found to be more likely to remain with existing engagements. The model indicated that many vulnerable customers would be better off under TOU tariffs, but would need targeted support to make the switch, it also found that some vulnerable customers would be worse off and may need protection from making such a choice.

Citizens Advice³⁰ also undertook a model-based study examining the value of TOU tariffs. This study found that one in four customers would switch, and that static TOU tariffs would be more popular than dynamic TOU. Though automation of demand side response may increase the uptake of dynamic TOU


²⁷ https://changingbehaviours.files.wordpress.com/2016/06/relationship-experts_final-report.pdf

²⁸ <http://www.networkrevolution.co.uk/wp-content/uploads/2015/01/CLNR-L093-Insight-Report-Domestic-Time-of-Use-Tariff-Recovered.pdf>

²⁹ <https://www.ofgem.gov.uk/ofgem-publications/119455>

³⁰

<https://www.citizensadvice.org.uk/Global/CitizensAdvice/Energy/The%20Value%20of%20TOU%20Tariffs%20in%20GB%20-%20Volume%201.pdf>



tariffs. The study recommended that: customer engagement and communication and engagement is essential, critical peak rebates should be given serious consideration and should be tested through a field trial, and options for making automating technologies accessible to low-income customers should be explored.

3.9 General Data Protection Regulation

Regulation (EU) 2016/679, also known as General Data Protection Regulation (GDPR), regulates the processing by an individual, a company or an organisation of personal data relating to individuals in the EU. Personal data is any type of information that relates to an identifiable or identified living individual. Encrypted, de-identified or pseudonymised data are considered personal if they can be used to re-identify a person. Processing is referred to a wide range of operation performed on personal data including: collection, recording, storage, disclosure and destruction. SAVE trials involve the collection and use of personal data such as, name and surname, address, email address. Energy consumption is also considered personal data because, with additional pieces of information, it can lead to the identification of a particular person. The collection and the processing of such data is not prohibited by the GDPR unless the data subject express to not consent them. Therefore, consent from individuals is needed whenever data are collected during SAVE or similar trials. Future trials or projects should be developed with GDPR in mind, however GDPR does not present a direct barrier.

3.10 BEIS Call for evidence on building a market for energy efficiency

The call for evidence describes potential barriers to energy efficiency investment on supply and demand side and aims to gather evidence on 'the widest range of options'. The document aims to explore the role of the Government and possible ways to overtake barriers. Generally, the document proposes that market needs to be stimulated with direct intervention. It outlines a range of potential solutions from both industry and businesses.

From the demand side perspective, the document recommends actions are undertaken in the following areas:

- New methods for financing energy efficiency measures must be developed in order to meet different customer groups and deploy low cost financing routes.
- Evidence on price signals as tied to the energy efficiency of properties need to be gathered. Potentially, more efficient properties might become more financially attractive and, at the same time, awareness on the importance of having energy efficient homes would be improved.
- Enhance awareness of energy efficiency products and technologies, their benefits and advice to customers.

From the supply side perspective, the document recommends actions are undertaken in the following areas:

- Enabling those who derive value form energy efficiency to be key players in the market, for example incentivising DNOs to deliver energy savings.
- Incentivise innovative energy efficiency services and products.
- Improve data quality to enable new investments in the market.
- Improve the capabilities of the supply chain.

4 OVERVIEW OF SAVE METHODS

The SAVE project included four treatment groups with three trial periods each, spanning 2016 to 2018. However, for this report we are only focusing on the following four treatment approaches:

- LED installation (trial period 2)
- DNO price signals (trial period 3)
- Enhanced engagement campaign (trial period 1 and 2)
- Community coaching (trial period 1, 2 and 3)

The following sections describe each of these methods and break them down into their core underlying activities, to identify precisely what actions are taken and by whom, which informs any potential barriers (particularly where the DNO undertakes an action).

All participants were recruited by a third party organisation on behalf of the DNO. Participants in the first three methods also had electricity monitoring equipment installed in their homes by a third party (paid for by the DNO) at the beginning of the trial. Smart meters were not used for these trials and are not addressed at length in this report as DNOs do not have access to individual customers' data. Participants were randomly assigned into treatment groups; they did not have a choice in the treatment(s) they received during the trial.

4.1 LED installation

4.1.1 Description

The SAVE project offered to install LED bulbs in participants' homes at no cost to the consumer. This trial tested a 'opt-out' approach and participants' willingness to accept or reject this free service.

All participants were sent a letter to inform them of the offer. Project staff followed up with phone calls and site visits to schedule an appointment when they could install the bulbs. While on site, staff installed the new LED bulbs in the most used areas of the home and aimed to replace the least efficient bulbs. The project allowed for up to 10 bulbs per household. Project staff removed the old bulbs from each property to prevent them from being reused. Project staff recorded the number of bulbs installed, installation location, previous bulb type and wattage for each house visited. The project opted to acquire bulbs in regular smaller orders (as opposed to a few bulk orders) to minimise wastage and costs. Install rates of each bulb type informed subsequent orders.

LEDs were installed in two phases: an initial pilot and the main rollout. In the pilot, project staff contacted 100 households and installed 580 LED bulbs at 80 households. This equates to an average of 7.25 bulbs per house. Final take of the main rollout was similar to the pilot, with 76% accepting the LED bulbs (as compared to 80% in the pilot). In total, the project installed 6,135 bulbs across 882 properties for an average of 7 bulbs per household.

The project staff visited homes and installed LEDs from August 2017 to January 2018.

4.1.2 Core activities

The SAVE LED installation method can be broken down into the following core activities:

- A third party recruits participants to the SAVE trial, assigns them to a treatment group and installs an electricity monitor;
- A third party visits and engages with connected customers about the SAVE LED rollout solution to secure participation;

- The third party gives away free LEDs, paid for by the DNO, to connected customers who decide to accept the LEDs;
- A third party installs LEDs in the customer premises; and
- A third party collects and disposes the replaced light bulbs.

4.2 DNO price signals

4.2.1 Description

In this trial, the SAVE project wanted to explore response to a variable pricing schedule, something similar to time of use pricing. However, because SSEN is not an energy supplier, the project could not implement a direct time of use pricing schedule. The project developed a banded pricing model, with customers receiving an incentive for every hour (during the peak period) they were able to keep their consumption below a target level.

Having a single target for the entire trial population would prove very easy for some households and near impossible for others, as energy consumption varies greatly based on house size and number of occupants. Therefore, the project developed three different targets and assigned each household their target based on past energy consumption. This provided households with a motivating, but possible, target to aim for. For every hour a household was able to keep their energy consumption below the target, they were paid £0.10, for a maximum payment of £20.00 at the end of the trial. In order to explore multiple price levels, this went up to £0.30 per hour and a maximum of £50.00 for participants halfway through the trial.

This price signal trial was run with two groups:

- The first group was told of the price signal incentive trial and asked if they would like to opt in.
- The second group was automatically enrolled in the incentive trial and given the option to opt out if they did not want to participate.

Both groups were told that this was a 'incentive only' trial and that they could not lose money and this would not change their electricity bills.

The first group had an opt in rate of 38% and the second group had an opt out rate of 2%.

Participants in both groups were able to check their real time electricity consumption online and received weekly texts with their incentive balance. The project staff also sent participants a small booklet and a link to an online video that explained how the trial worked and showed them how they could save electricity to meet their target.

4.2.2 Core activities

The SAVE DNO price signal method can be broken down into the following core activities:

- A third party recruits participants to the SAVE trial, assigns them to a treatment group and installs an electricity monitor;
- A third party analyses metering data and evaluates and prices the participant's performance; and
- The DNO pays participants (by cheque) in respect of their verified performance against agreed consumption thresholds.

4.3 Enhanced engagement campaign

This trial explored how customer engagement techniques can be used to reduce energy consumption during the peak period or shift it to non-peak times. The engagement campaign was run in two stages. The first campaign asked customers to shift their consumption outside of the peak period while the second campaign showed customers ways to cut their consumption.

4.3.1 First campaign: shift

This campaign introduced customers to the idea of a peak period of 4 to 8 p.m. and explained why the electricity network is sometimes stressed at this time.

The engagement campaign started with an introductory booklet of information that asked customers to “help keep the power flowing”. The booklet introduced two SSEN employees and explained how they are working hard to keep customers’ power flowing. It also explained what SSEN does and the basics of how electricity gets to households. The booklet asked, “can it wait ‘till after eight?” and provided tips on simple ways to reduce pressure on the network. The booklet was followed up with one general knowledge postcard and five postcards with specific asks, such as:

- Waiting until after 8pm to do the washing or running it only with full loads
- Waiting until after 8pm to charge mobiles and tablets
- Waiting until after 8pm to use the tumble dryer
- Waiting until after 8pm to run the dishwasher or using its timer/delay function
- Waiting until after 8pm to watch television or turn the television off in rooms that are not being used

The campaign shared generic messages with participants and sought to facilitate change rather than simply telling participants to reduce their consumption. It ran from January to March 2017.

4.3.2 Second campaign: cut

The second campaign built on previously distributed messaging but with a focus of cutting energy use during the peak period (rather than shifting it outside the peak).

Since DNOs currently only have access to mailing addresses and cannot access more personal contact information (such as emails or mobile numbers), SAVE structured this campaign to test two realities. The first half of the trial (October, November and December 2017) utilised only printed materials sent through the post. While the first campaign mainly sent out booklets and postcards that are likely to get thrown away after reading (or sometimes before); the second campaign included more tangible items that were likely to stay in the home for longer periods of time. The postal mailings started with an initial ‘welcome pack’ that includes a small booklet with general information on reducing electricity usage and the peak periods as well as a selection of ‘post-it’ style notes, a spiral bound note book, and a pencil. The hope was these items are used within the house and serve as a more frequent reminder to cut energy consumption without being obtrusive. This portion of the campaign followed up with a handful of postcards throughout with tips on cutting energy consumption. Email and text messaging was not used during this time. This will reflect the methods of engagement currently available to DNOs.

The second half was digitally focussed and did not include any postal mailings. This portion of the trial encouraged people to use a web portal to view their energy use. The SAVE project team sent participants messages through email and the web portal. These messages included specific asks for customers to cut their consumption on a certain day and gave them a target reduction. A week after the ask, the SAVE project team notified participants if they met the ask or not. The ‘cut’ message was constant throughout both halves of this campaign.

4.3.3 Core activities

The SAVE enhanced engagement campaign solution can be broken down into the following core activities:

First Campaign:

- A third party recruits participants to the SAVE trial, assigns them to a treatment group and installs an electricity monitor;
- A third party engages and educates (through booklets and post cards) connected customers to secure participation in shifting energy consumption away from peak periods; and
- A third party analyses metering data and communicates any results to participating customers.

Second campaign:

- A third party engages and educates (through booklets and post cards and/or email and/or a web portal) connected customers to secure participation in reducing energy consumption in peak periods;
- A third party analyses metering data and communicates any results to participating customers.

4.4 Community coaching

4.4.1 Description

The Community Energy Coaching (CEC) trial was community based, with local substation level monitoring installed across 2 differentiated communities of approximately 1000 households each, one in Southampton and one in Winchester. The CEC trial focused on collaboration with the communities and other stakeholder agencies in delivering potentially deeper and more sustainable impacts in terms of peak demand reduction and contingent social benefits. The CEC trial delivered in several phases over the period January 2014 to June 2018.

The CEC trial first identified treatment and control communities and installed substation monitors to record electricity consumption. The trial developed community groups in both of the treatment areas to engage local residents. These groups developed local branding and strategies on energy efficiency and other issues deemed locally relevant by residents.


Instead of engaging with households directly, as in the enhanced engagement trial described above, the CEC trial used a community group to educate residents about energy efficiency and energy peak periods. The groups' agendas were set by its members but steered to include energy. The community groups also held 'switch off' events where communities were asked to consume less energy.

The CEC trial applied a co-design methodology to test an outcome-based theory of change, exploring different engagement and behaviour change techniques in the process. The trial endeavoured to attribute measured demand reduction at local substations to specific research interventions. It has also captured other positive social impacts linked to local community and wider stakeholder engagement with a view to evidencing replicable third party and business benefits as part of a potentially sustainable process of behaviour change.

The CEC method was successful in obtaining buy in from the relevant communities up front and developing strong community groups. The final campaign was a 'big switch off' event that resulted in a 10.6% reduction in peak (6pm to 7pm) consumption.

4.4.2 Core activities

The SAVE community coaching solution can be broken down into the following core activities:

- 
- A third party engages with local communities or organisations and develops groups to educate local residents about energy efficiency and energy peak periods; and
 - The DNO installs a monitoring system at substation level to record and analyse the aggregate electricity consumption of the community.

5 WIDER RESEARCH AND BEST PRACTICES

SAVE is not the only energy efficiency and engagement scheme in operation, and there are valuable lessons from other similar schemes implemented across the UK. For this reason, EST undertook a review of available literature on other UK energy efficiency schemes to determine the barriers and opportunities present in other similar schemes. The team also carried out stakeholder engagement research (via telephone interviews) to gather opinions on how a DNO could deploy SAVE-like methods in the future.

5.1 Literature review

In the last 20 years, there has been considerable investment into support schemes for the uptake of energy efficiency measures, which have generally been aimed at reducing the upfront cost to the customer and presenting energy efficiency measures as a sound economic investment. However, the response from the public has been lukewarm at best, with many schemes such as the Green Deal and the RHI, having much lower uptake than expected. This would suggest that the barriers to uptake of energy efficiency measures are not merely financial.

In 2016 Citizens Advice³¹ commissioned qualitative consumer research into the barriers and motivators relating to energy efficiency improvements. It found that the key barriers to uptake are cost, hassle, tenure and lack of awareness; whilst the motivators are comfort, savings and marketing messages. It also found that trust and confidence in the performance of installed measures and the installers themselves was a key factor, with trust being affected by family and friends, advisors, government/third sector and tradespeople. The research found that energy efficiency is not a primary concern for homeowners when considering improvements, it too lacks a tangible benefit and is not perceived to add value to the household, except in cases where there are heat problems sufficient to cause discomfort. Lack of understanding is also a barrier with many participants in the study not having a clear understanding of what can be done, having doubts over if they would ever see a return on their initial investment. The report recommended a four-step approach to optimise incentivisation, which included a comprehensive assessment of the property, with recommendations for measures to be installed; enablement of the upfront cost, through 'pay-as-you-save' or low cost loans; some sort of reward such as reduced council tax or some form of tax/bill rebate; and a penalty (such as increased council tax) for not making improvements. It also highlights that education, communication and a coherent narrative around energy efficiency are as important as the incentives themselves.


A paper by Howarth and Roberts³² (2018) also provided an analysis of the barriers and incentives, in the context of examining the role the Green Deal has played in shaping pro-environmental behaviours, through examining two case studies. They cite many of the same barriers and motivators that the Citizens Advice research does, as well as some of the criticisms mentioned in section 3.7.2 of this report, along with others such as acceptability, access to capital, future discounting, energy prices being too low to incentivise energy efficiency, lack of information, planning barriers, and energy efficiency not being a 'social norm'. The paper highlights that much of UK policy is based on the assumption that consumers make rational choices based on their individual best interest; whilst in reality people's choices are subject to a range of biases based on the barriers and motivations discussed above. For example, loft insulation has been highly subsidised and has a short payback period, yet 30% of homes (with lofts) have still not installed it.

31

<https://www.citizensadvice.org.uk/Global/CitizensAdvice/Energy/Driving%20Installation%20of%20Energy%20Efficiency%20Measures-%20Customer%20Research%20Findings.pdf>

32

https://dspace.lboro.ac.uk/dspace-jspui/bitstream/2134/33730/1/2018_Howarth%20Roberts_Role%20of%20UK%20Green%20Deal%20in%20shaping%20pro%20environmental%20behaviours.pdf



The case studies presented in the paper were two local Green Deal pilot schemes (in Cambridgeshire and Suffolk), where participants took a questionnaire assessing their experience of the schemes. Both pilots provided a free assessment of the home to participants. Such assessments are a requirement of the deal but homeowners are normally required to pay for it out of their own pocket. In both cases the free assessment provided the main motivation for participating in the scheme, with a secondary motivation being a general desire to improve energy efficiency. Many homeowners found the assessment helpful and received an increased understanding of potential energy efficiency improvements, though many would have been unwilling to participate if it had not been offered for free. Few participants in these trials went on to take up Green Deal finance to install energy efficiency measures (a trend reflected in the population as a whole). The paper argues that the Green Deal successfully removed barriers to energy efficiency through improving customer knowledge, providing up to date information and improving trust through the involvement of local authorities and certified installers, however it did not overcome barriers such as loans affecting property value or the hidden costs and hassle of installing measures. The Green Deal may also have created new barriers in the form of high interest rates, which may have put off homeowners.

Both the papers discussed above have highlighted the importance of informing customers of the benefits of energy efficiency, the impacts of available energy efficiency measures on household fuel bills and comfort, and trust in installers and products. This analysis is supported elsewhere in the literature. Deloitte³³ have undertaken research that indicates that the potential gains to households have to be presented in a clear, transparent and easily understandable way. They argue that measuring precisely what end users consume and what they can realistically save could encourage uptake of energy efficiency, and that the rollout of smart meters can be an enabler of this approach.

The Energy Company Obligation scheme recently underwent changes resulting in it being entirely focused on providing energy efficiency improvements to low income and/or vulnerable households at risk of being in fuel poverty. One of the main issues with the scheme is the regressive funding system, where the costs of the scheme are recouped through higher energy bills for all customers, negatively impacting those on low incomes who have not received support under the scheme. A potential unfortunate side effect of ECO, is mentioned in by Energy-UK³⁴ which argues that a top-down approach through supplier obligations has led to an expectation that energy efficiency measures should be provided free of charge, undermining willingness to invest in them.


The biggest way in which energy efficiency investments benefit households is through reduced energy bills and increased comfort. A report by Frontier Economics³⁵ estimated that as of 2017 energy efficiency improvements were saving households an average of £490/year. Other potential benefits of energy efficiency improvements have not been as extensively examined or quantified. Research by the Energy Saving Trust³⁶ indicates that there are a range of ways in which energy efficiency can improve the health and wellbeing of households. Warmer homes can help improve physical health, especially among vulnerable customers and those with long term health conditions, and that mental health can similarly be improved through greater home comfort and reducing the stress associated with high energy bills. It also claims that, through creating comfortable homes, energy efficiency can reduce absenteeism from work and school, reduce family tension, provide better nutrition (through avoiding cases of having to choose

³³ <https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Energy-and-Resources/energy-efficiency-in-europe.pdf>

³⁴ <https://www.energy-uk.org.uk/publication.html?task=file.download&id=6531>

³⁵ https://www.e3g.org/docs/FE_Energy_efficiency.pdf

³⁶ http://www.energysavingtrust.org.uk/sites/default/files/reports/1-424-15_Payne.pdf



between 'heating and eating'), as well as reducing social isolation. However, they do recognise that quantifying these impacts remains difficult.

Demand side response in the domestic sector has been considered for many years. A report in 2012 by Frontier Economics and Sustainability First³⁷ provided a review of the major trials up to that point, finding they focused on two types of DSR, either aimed at reducing day-in-day-out peaks or at reducing exceptional 'critical peaks' in electricity demand. Their key findings were that customers do shift their energy use, but the size of the shift can vary considerably; that interventions to automate DSR responses deliver the greatest and most sustained shift; that after automation, economic incentives and enhanced information delivers the greatest DSR; and that customer feedback has been generally positive. They found that there was inconclusive evidence on: the response of vulnerable and low income customers (which may be lower); the results of real-time pricing; the impact of non-economic signals; how energy use is shifted (i.e. which devices are turned off/operated at different times); and on how DSR persists over time if not automated or directly controlled.

A study of public acceptability of DSR³⁸ found that there were concerns over loss of control. It found that direct load control of large loads such as electric heating and air conditioning was the most acceptable option (provided there were tight bounds and the ability to override). Static time of use tariffs were found to be more acceptable than dynamic time of use tariffs, unless automated DSR is available. Another review of DSR³⁹ found that customer acceptance of tariffs depends on a perception of fairness between energy users and that it is important to strike a balance between reflective charging and simplicity.

5.2 Stakeholder research

EST undertook telephone interviews with twelve stakeholders to get an understanding of how a DNO led rollout of a scheme similar to that of the SAVE project could be delivered. Stakeholders interviewed included local authorities, consumer advice groups, charities, community delivery groups and an academic research group. These stakeholders were based in England, Scotland and Northern Ireland, and covered both urban and rural areas, as well as areas with different demographics.

In getting an understanding of what stakeholders feel have worked well and not so well in current or past energy efficiency schemes, SSEN can ensure that these lessons are fed into any future ways in which DNOs work with householders. Feedback was broadly the same for all geographic areas and demographics; where comments were specific to a particular area or demographic this is noted in the text.

5.2.1 Good practices


There were a number of themes that came out of the discussions on what makes a good engagement strategy. These are outlined as follows:

- Low income families are often in fuel poverty so any reduction in energy demand through improved energy efficiency of their home and behaviour change will be of benefit to them. Shifting energy demand through time of use tariffs and/or other incentives would be particularly welcomed as this allows them to reduce their energy bills without compromising on comfort levels. One successful way of engaging with these households was including leaflets in food bank boxes. However, many of these households include vulnerable working-class people who are educationally excluded or poorly educated with high levels of illiteracy

³⁷ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/48552/5756-demand-side-response-in-the-domestic-sector-a-lit.pdf

³⁸ <https://www.sciencedirect.com/science/article/pii/S2214629615300463>

³⁹ https://www.ofgem.gov.uk/system/files/docs/2017/03/cepa_tnei_international_review_of_cost_recovery_issues_final_report.pdf



and innumeracy. This has meant that face to face engagement often works well as they can be guided through the process of becoming more energy efficient and accessing available support.

- Organisations that have a track record or a specific expertise are generally better equipped than more generalist organisations, e.g. organisations that work to support vulnerable people understand the best ways to engage with those people. A lot of charities in the voluntary sector are in contact with people who might otherwise be socially excluded. This is, therefore, a more cost-effective way of reaching these people by building on existing relationships rather than energy companies addressing them via their marketing departments.
- In terms of rural communities that are off mains gas, those involved in projects with this demographic mentioned that contact is “done the old-fashioned way via telephone or face to face” (from a community delivery group). A lot of these households are not able to have smart meters as there is often poor mobile network coverage, and they have no broadband network – meaning they are still on dial up internet connections so there needs to be other ways of engaging them until technology improves in their area. One organisation mentioned they produce a brochure - a user friendly magazine - that goes out to households. This same organisation holds energy roadshows in places accessible to the community (and in many cases including socially excluded and vulnerable people) like village halls. The roadshows allow people to come along and be provided with face to face advice.
- Engaging households – schemes that have worked on a very localised basis, e.g. street by street or hotspot areas are often successful in engaging households. With energy efficiency measures there is a very visual way of showing that a scheme is active in an area as signs can be put up, and physical evidence such as scaffolding shows a neighbour is having work done, which in turn encourages neighbouring households to also ask questions and perhaps sign up. This is also the case for more behavioural projects as well – local projects can get people talking and a buzz around the scheme can help encourage others to get involved.

5.2.2 Barriers identified and potential solutions

There were a number of suggestions on how current/previous schemes have encountered difficulties and how these could be overcome:

- Any type of social exclusion is a barrier whether it is language and culture exclusion, different ethnic communities or rural fuel poverty. There is a need to provide a scheme/service through a number of different routes to ensure that it is as inclusive as possible.
- Many schemes are still offered over the phone, and whilst these are suitable for some people they can exclude others. For example, there is a declining number of people using the phone as their main way of finding out information. Instead, there is an increased use of the internet and therefore there is an increasing need to develop more internet-based tools and services. That said, the more vulnerable households do not necessarily want to pick up for the phone for support but equally have limited access and/ or limited knowledge of the internet.
- Vulnerable customers are less likely to fill out forms or keep paper records and are more likely to be protective of their data, so schemes need to bear this in mind and offer one to one support to guide them through the process.
- There is currently a complexity of different services/support mechanisms available. “There needs to be a type of ‘clearing house’ to help bridge the gap between getting advice and taking action” (from an energy efficiency delivery organisation).
- There needs to be better coordination between schemes to make it clearer for households on what is being offered: “at the moment there are lots of people doing overlapping things in areas without defined borders” (from an energy efficiency delivery organisation).

- Working with landlords, particularly private sector landlords, is a barrier to improving the energy efficiency of properties. Landlords currently do not see an advantage to such an investment as they do not pay the energy bills, and it is the tenants who benefit from the savings made. There especially needs to be more engagement with private sector landlords prior to the implementation of an energy efficiency scheme in order to persuade them to take part, and more investment to drive the decisions made by landlords, particularly with landlords who own multiple properties: “if there is a landlord with multiple properties, the landlord can only get a grant for one property; they then have to pay for all the other properties themselves. The landlord won’t want to do this and therefore stops the work for the whole block” (from an energy agency).

5.2.2.1 Legislation

A number of stakeholders felt that changes need to be made to help support initiatives aimed at reducing peak demand. It was noted that currently there are frequent changes to policy, which effect the energy market and how demand side management could work – not knowing what is going to be changed next leaves a level of uncertainty: “even if it was clear that any policy changes would always have the same end goal, that would help us know we’re going in the same direction” (from an energy efficiency delivery organisation). It was commented that Ofgem needs to sort out the rules with time of use tariffs and FITs (how does fitting a battery affect FITs, etc.?). Another change, which was specific to the rural community, was the need to extend the electricity network to small, isolated, hamlets. Getting funding for rural areas is more complex than urban areas as urban areas are often more cost effective, however this then leaves rural communities at a disadvantage.


5.2.3 Role of DNOs in energy efficiency

One of the main areas of interest for the stakeholder interviews was to explore the role of DNOs in customer energy efficiency and behaviour change, and if this was seen as an appropriate area for them to be involved in.

All stakeholders interviewed felt that DNOs have a part to play in encouraging energy efficiency in households. Due to the commercial nature of DNOs, however, stakeholders felt that DNOs should not be solely be relied on to do this but that they should be one of many actors involved.

In general, householders do not have much awareness of DNOs and what their aims are. Given that there are many different stakeholders involved in energy efficiency already, those interviewed felt that it may cause confusion by including another organisation. The lack of awareness of what the DNOs are and what they could potentially do makes it more difficult for householders to understand why they are getting information from DNOs. If householders can realise that a significant portion of their energy bill goes to the DNO, then they may see the link. Stakeholders also suggested that this level of detail is not something that householders should be thinking about. Outreach should be made as simple as possible and the householder should be provided with the solution, not the why and how: “an individual home owner is going to be bothered by all of this - what will drive them?” (from an academic research group). This suggests that whilst it may be appropriate for DNOs to be involved in this area, the way in which this is communicated to households needs to be clearly managed.

Stakeholders noted that it is important that the householders trust those involved with the scheme. Householders are much more likely to trust local organisations and charities than larger corporate organisations such as DNOs. To this end, all stakeholders felt that DNO partnerships with local or charitable organisations would be the way to go; almost all interviewed mentioned working on a local level would work best. Successful partnerships are often those that use existing community/local organisations to handle the engagement of householders. Local organisations are already engaged with the local community and so can bring in new projects relatively seamlessly – they know the ins and outs



of the local community, what any potential issues are, and what has worked well in the past. These local organisations are also likely to be aware of other local activities to avoid duplicate efforts or confuse householders. This may be particularly effective when working with vulnerable households as they commonly trust local organisations, and these organisations understand what this type of customer needs. A few stakeholders mentioned that partnerships with the energy industry (in most cases with energy companies, although relevant to DNOs as well) often work best when the energy company is not at the forefront of the marketing. Whilst still wanting to be transparent it is often felt that householders are less receptive when working with energy companies as they question their motives.

Whilst partnerships were felt to be the most appropriate route for DNOs, they do add a layer of complexity and can result in longer set-up times while partners agree on approach.


Stakeholders were asked about how they would feel if a DNO wanted to work in a specific area that the stakeholder was already working in and was restricted to a specific geographic area. Those organisations already involved in delivering energy efficiency schemes felt that they would be more than happy to work with DNOs to ensure that the schemes worked together, whether this would be branded as two separate schemes or by working together as one scheme. They confirmed they would be flexible in offering the scheme to the area that the DNO was interested whilst still offering their own service to a wider area if appropriate. When asked how they would respond if a DNO did not want to encourage energy efficiency in a particular area (for example if there was excess generation), stakeholders felt that this would be very counter-intuitive and would continue their work. Where there was a case of excess generation they would much rather work together with the DNOs and other actors to ensure that excess generation was captured, e.g. through battery storage. Ultimately the local delivery partners want to ensure the project is right and there is no conflict of interest: "It's all about bringing stakeholders together - if we did engage with them we would be very strict about their offering, strict with the communications they would offer and help customers feel they are not being railroaded one way by a private firm" (from an environmental charity).

When asked about barriers to potential partnerships only one comment was made. There was a concern that in past schemes, particularly with regards to ECO, energy suppliers stop the funding once they reach their target which can mean that the partners are then unable to continue delivering their schemes. Whilst it is understandable that there are always going to be funding restrictions, organisations will always be more willing to have a partnership where they have similar motivations. When asked specifically about any issues with data sharing, all recognised that this was a potential issue if done incorrectly but that as long as processes were put in place to adhere to GDPR then there should not be any issues.

5.2.3.1 Potential DNO projects

In terms of incentivising and providing payments direct to households for changing the time of their energy use, stakeholders did not see an issue with DNO involvement. However, there were a number of points raised around how this should be communicated and what else could be done as well as, or instead of, incentivising:

- The process (of encouraging energy efficiency and shifting the time of energy use) shouldn't be made more complicated by getting different organisations communicating with the householders.
- In the near future, there will be some smart systems that could automatically respond to demand signals – encouraging the development and use of these systems should be a priority. "People don't want to hang around looking at their meter and price of energy and making decisions" (from an academic research group).

- 
- A number of stakeholders mentioned the potential of battery storage as a way of reducing peak demand for energy use. “if you coupled [incentives] with PV and battery storage then there is definitely a route to go down there. Once you have the battery storage in your home then you have a power plant - this will take a huge demand off the DNOs” (from an environmental charity).

Stakeholders mentioned that DNOs could effectively be involved as part of the smart meter programme. It was suggested that they be “in the mix of obligator parties post 2022” (from an energy efficiency delivery organisation).

Linking with the smart meter deployment and showing householders the effect energy efficiency has on their bills should be encouraged – this is where smart meter advice projects could work well.

Stakeholders noted that customers respond well to seeing their own data, especially when they can see it in the context of others in their area.

Currently stakeholders felt there is little awareness of peak demand and why there is a need to reduce it: “Householders might understand...there is some sort of peak demand around tea time, [but] there needs to be more educational work to let them know that this is an issue. Your general vulnerable old person is still going to cook tea at the same time. You might have to start exploring smart appliances, smart controls” (from a community delivery group).

A couple of stakeholders mentioned that giving away something as part of a scheme is a good way to get interest from householders. However, while a free gift could be used as the ‘hook’, there should be a balance between giving away something and the impact and cost of doing so. Care should also be taken to ensure these products are actually installed, and not left in storage or sold.

Interviewers also explored whether a package of measures might be more effective than a single measure. Respondents felt that this was good in theory, especially in terms of an aggregator service (such as where on their own the measures might be too small to add value but collectively they could have an impact) however in some cases it was felt the scale to which this could be done is now limited as a lot of these measures have already been done⁴⁰ – “we need to move onto newer areas, looking into smart technologies” (from a community action group).

⁴⁰ While respondents felt that common energy efficiency measures (such as installing LEDs) are too mainstream to have an impact, this is not supported by research. Market penetration of LED lamps is still low in the UK. For additional details, see SAVE SDRC 8.3

6 OVERVIEW OF CURRENT POLICY/REGULATORY IMPACTS ON SAVE

This section maps the interaction of the SAVE solutions with each of the policies and regulation reviewed in Chapter 3 to identify any potential barriers or opportunities to the DNO deployment of SAVE methods in general, as well as, where relevant, to the core activities underling each method.

6.1 Interactions with Electricity Distribution Standard Licence Conditions (SLCs)

Based on the definition of distribution business provided in section 3.1 above, a distribution business owns certain assets, such as the distribution system and metering equipment, and provides certain services. Potential barriers to deployment of SAVE methods may therefore emerge under two circumstances:

- a) when a distribution business takes ownership of new assets, not covered by the definitions of “distribution system” and “metering equipment” under the SLCs (see section 6.1.1); or
- b) when a distribution business undertakes activities not covered by the services it is licensed to provide, as set out in the SLCs, or that could be in breach of licence requirements for how to carry out these services (see section 6.1.2).

In the case of asset ownership or activities not covered by SLCs, the consequence for the distribution business may be that it will not be able to recover the costs of assets or activities within the regulatory environment. In this case, the barrier posed by SLCs is indirect, in that its definitions are too narrow to accommodate new asset ownership or the undertaking of new activities. Although the SLCs do not actually prohibit either, DNOs may need to seek revision of the SLCs if they want the relevant costs to be recognised and recoverable, or alternatively seek derogations or special permission from Ofgem.


Where the adoption of a new activity results in a breach of service requirements, the distribution business risks a fine, or, in the extreme, the loss of its distribution licence. In this case, the SLCs pose a direct barrier to the adoption of new solutions, since the distribution business cannot adopt a solution without violating licence conditions.

6.1.1 Barriers to Asset ownership

SLC 1 provides the following definition of “distribution system” (emphasis added):

*“the system consisting (wholly or mainly) of **electric lines owned or operated by an Authorised distributor that is used for the distribution of electricity from grid supply points or generation sets or other Entry Points to the points of delivery to Customers or Authorised Electricity Operators or any Transmission Licensee** in its capacity as operator of that licensee’s Transmission System or the GB Transmission System, and includes any Remote Transmission Assets (owned by a Transmission Licensee within England and Wales) that are operated by that Authorised distributor **and any electrical plant, Electricity Meters, and Metering Equipment owned or operated by it in connection with the distribution of electricity**, but does not include any part of the GB Transmission System.”*

While the SAVE methods other than Community Coaching involve DNO purchase of assets (LED light bulbs and electricity monitors) which do not fall within the above definition of distribution system, this is not a barrier to implementation. DNO spend on operational and capital measures is treated equally under the Totex principle so there is nothing to prevent a DNO from spending on the SAVE methods



where it can be shown that this is the most efficient option to manage the network. There may be other practical issues regarding a DNO's ownership of these assets but the SLCs do not constitute a barrier to ownership.

6.1.2 Barriers to Undertake Activities

A principal limitation on activities that may be undertaken by DNOs in SLC4, which requires that DNOs "manage and operate the Distribution Business in a way that is calculated to ensure that it does not restrict, prevent, or distort competition in the supply of electricity or gas, the shipping of gas, the generation of electricity, or participation in the operation of an Interconnector." The SAVE methods all involve actions by, or on behalf of, a DNO to encourage connected customers to reduce (peak) electricity consumption and therefore affect the commercial outcome for implicitly affected electricity wholesalers and retailers and could therefore be seen as distortive.

The LED Lighting, DNO Price Signal and Enhanced Engagement Campaign methods involve a third party accessing the customer premises. SLC 9 specifies arrangements for DNOs and/or their representatives to enter a customer's premises, which DNOs must observe but do not form a barrier to deployment of any of the methods.

The same methods utilise an electricity monitor installed behind the meter, which collects customer-specific consumption information which is subsequently shared with a third party, and in the case of the DNO Price Signals is made available to the DNO.⁴¹ SLC10A places restrictions on DNOs obtaining and using data from smart metering systems, requiring that energy consumption data obtained by DNOs and relating to a period of less than one month may not be "capable of being associated with a Domestic customer at relevant premises", unless the customer has provided explicit consent or unless the collection of data is part of a trial approved by the Secretary of State.⁴² This condition may limit the gathering and use of customer-specific data by DNOs or representative third parties. The substation monitoring system deployed for the Community Coaching method is not subject to the same requirements since it does not monitor customer-specific data.


SLC 19 requires that in providing Use of System and Connections, DNOs must not discriminate between (classes of) persons and that DNOs "*must not make charges for providing Use of System to any person or class or classes of persons which differ from the charges for such provision to any other person or any other class or classes of persons, except insofar as such differences reasonably reflect differences in the costs associated with such provision.*" This condition may affect all SAVE methods in that (inter alia)

- Not all customers may receive free LED Lights from DNOs;
- Not all customers may receive DNO payments for providing peak demand response;
- Not all customers may have a DNO-financed electricity monitor installed in their homes; and
- Not all communities may receive DNO-financed energy efficiency coaching and/or a "dedicated" substation monitoring system.

All of the SAVE methods involve a DNO incurring cost on behalf of some connected customers, where the cost is borne by the total population of that DNO's connected customers. The deployment of SAVE methods by DNOs, and the costs and payments associated with these methods, could reasonably be considered a part of the DNO provision of Use of System. In this case, DNOs will need to ensure that the

⁴¹ Since the DNO pays specific customers directly based on their performance against a consumption threshold.

⁴² See SLC 10A.5, 10A.6 and 10A.8.



future deployment of SAVE methods is cost-effective so as to avoid any unreasonable cross-subsidisation between customers.

6.2 Interactions with RIIO

The RIIO framework does not specify detailed rules for DNOs regarding their potential participation in energy efficiency or demand side response activities. If RIIO is restrictive or facilitative of any of the SAVE methods, it is through encouraging DNOs to consider whether such activities provide a more economic way of delivering outputs and/or performance against specific incentives. Within RIIO ED1, the following interactions are relevant:

- The Efficiency Incentive mechanism encourages DNOs to look for economic ways of delivering outputs, hence places a test on a solution to be delivered only when DNO deems it is economic.
- The decrease in (peak) demand from installation of LED lights can contribute to financial results under Customer Satisfaction and Reliability & Availability outputs principally by reducing the time and duration of (un)planned outages. This may be true of enhanced engagement and community energy coaching methods as well, depending on their efficacy.
- An indirect benefit may lie in the performance against the Social Obligations output category in that the method has the potential to deliver benefits for any vulnerable customers that may participate, although the method is not explicitly targeted at vulnerable customers.

It is left to DNOs to test and evidence that the SAVE methods deliver benefits against the above outputs and incentives.

We note that Ofgem has considered DNO engagement in energy efficiency activities as part of its RIIO2 review, but considers this a policy issue that government has yet to explore. At the time of writing, government has not provided a view on this topic. At present, therefore, there are no formal barriers for DNOs to provide LED Lighting to customers, or to engage in Enhanced Engagement Campaigns or Community Coaching.

Ofgem also explicitly stated that it wants DNOs to formally consider demand response solutions as alternatives to network reinforcement in the business planning process. We expect Ofgem to set out a detailed approach in its forthcoming (December 2018) consultation on the RIIO-ED2 price control methodology. This approach has the potential to be facilitative of the DNO Price Signal method, but this will depend on the specifics of the methodology proposed.


6.3 Interactions with the Smart Systems and Flexibility Plan

The Smart Systems and Flexibility Plan is implicitly facilitative of DNO installation of LED lights with connected customers, as well as DNO Price Signals. It recognises the potential for DSR in reducing customer energy bill savings, but stresses the need to treat customers fairly, including a fair distribution of costs between active and passive customers in a smart energy system.

For both enhanced engagement campaigns and community energy coaching, there is no concrete interaction, but the Smart Systems and Flexibility Plan is, in spirit, facilitative of customer engagement activity.

6.4 Interactions with the ENA OPEN Networks Project

The ENA Open Networks Project is implicitly facilitative of DNO Price Signals for connected customers, since this method effectively is a demand response solution for DNOs. The DSO work stream recognises and seeks to develop an active DSO role in managing network capacity. The Network Charging work



stream is of potential relevance but effectively carried out outside of the ENA project through Charging Futures Forum and/or the TCR.

For the other SAVE methods, there is no concrete interaction but the ENA Open Networks Project is, in spirit, facilitative of customer engagement activity.

6.5 Interactions with the November 2018 Speech by Greg Clark

The Secretary's speech provides implicit endorsement of the SAVE methods in confirming the future importance of EE and DSR (flexibility) to DNOs, even going as far as to say that the lines between supply and distribution companies could blur in the future energy market.

Importantly, whilst the Secretary discussed EE and DSR solutions as potential tools to economise the distribution service, he also underlined the importance of market mechanisms and open competition to deliver these solutions in the most economic manner. The Secretary's comments on fairness, i.e. the requirement that new solutions save costs rather than shift them between persons, tie in with the need for economic efficiency and places delivery and design considerations upon the deployment (by DNOs) of solutions like the SAVE methods.

As a final observation, the Secretary has confirmed that the Government will not shy away from active intervention where it believes this is required and announced a further joint code (governance) review with Ofgem. From this, we conclude that the Government and Ofgem will be willing to consider proposed changes to codes (and potentially: licences) to facilitate, based on economic principles, EE and DSR solutions for the benefit of distribution networks.

6.6 Interactions with the Low Carbon Transition Plan

The Low Carbon Transition Plan facilitates the deployment and installation of efficient lighting to reduce carbon footprint and energy bills. No barriers are posed against the LED installation SAVE method.

The LCTP finds the grid will need to be smarter and more flexible and energy demand management in homes will be essential. This facilitates DNO price signals to be adopted in order to regulate the electricity use. The LCTP states that smart meters are strategic in the reduction and management of energy use. To date, the number of installations reached 12.51 million in domestic properties. Its completion is expected by the end of 2020 and any delay might constitute a barrier to the decrease energy demand.


The educational purpose of the enhanced engagement campaign is facilitated by the objectives of the Government stated in the LCTP: maximise energy savings via information and advice on energy use and peak demand.

The LCTP poses particular attention on action at community level as key aspect of the Government's strategy. The purpose of the community energy coaching method to educate customers and raise awareness on energy use and peak demand via community groups is facilitated by the LCTP.

6.7 Interactions with national energy efficiency schemes

6.7.1 ECO

ECO is primarily focused on improving the thermal efficiency of homes and reducing their heating use, which is unlikely to interact directly with SAVE, as the project is primarily focused on electricity use. If homes have electric heating then ECO could reduce electricity use in homes for heating, which would interact with DNOs and the SAVE project. The installation of micro-generation under ECO may have an



impact on DNOs, but since 2013 there have only been nine installations of micro-generation, all of which have been either ASHPs or biomass boilers. Ultimately ECO is unlikely to have a significant impact on DNOs or on any of the SAVE methods. If the delivery method of ECO were to change to oblige action from DNOs as well as energy companies then naturally it would have a significant impact on DNOs, though such a substantial change would not happen until after the current phase of ECO ends in 2022.

6.7.2 Green Deal

The Green Deal also funds thermal efficiency improvements through loans directly to households, but its measures also include energy efficient lighting and solar PV. Energy efficient (LED) lighting is a SAVE project, and solar PV can have a considerable impact on household electricity use. To date, 29% of installations have been solar PV, which can have a significant impact on distribution networks through local generation of electricity. However, the uptake of Green Deal support has been limited and has declined to very little in recent years (last year only 51 homes made use of Green Deal Finance to install measures). Given this low level of use of the Green Deal, it is unlikely to have an impact on any of the SAVE methods.

6.8 Wider EE and TOU schemes

The wider schemes can provide lessons for the general topics of energy efficiency, behaviour change and TOU pricing.

6.8.1 Energy efficiency and engagement

There are barriers around getting customers to actively engage with their energy use, namely uncertainty over how energy works and the perceived risk of experimenting with energy use. It is important that information is presented in a clear and relevant manner. The individuality of each property can be a barrier to encouraging changing energy patterns, and multiple home visits may be necessary to facilitate the necessary behavioural changes. When first making contact, it is best done through local community organisations, so the presence of a community coach could be an opportunity to enable this and to build community engagement in energy efficiency.

6.8.2 Price signals

Willingness to adopt and engage with time of use tariffs or other price signals can be a barrier to this SAVE method, with uncertainty in the literature over how many customers would accept such price signals, SAVE has tried to address this. However, evidence from other field trials indicate that those customers who have used such price trials have been satisfied with them, suggesting that it may be unfamiliarity with the tariffs that is a major factor in putting people off (it must be noted however the DNO led pricing trials have tended not to allow customer to be penalised which may skew these responses). Therefore, there is an opportunity for the SAVE method to normalise the presence of price signals. Dynamic time of use price signals have proved less popular than static ones, although the literature suggests that automated DSR could help make dynamic price signals more popular. However, the evidence is inconclusive, so there is an opportunity to test this further. There is a risk, seen in the UKPN Energywise trial, that encouraging energy shifting through static time of use tariffs could encourage new peaks in energy use at different times, which could be overcome by encouraging uptake of dynamic pricing.

6.9 Interactions with BEIS call for evidence

The call for evidence explicitly recommends exploring how DNOs may be incentivised to deliver energy savings, which is in line with the goals of the SAVE methods. Impacts on specific SAVE methods are also outlined below.



6.9.1 LED installation

The call for evidence notes that while lighting is responsible for 12% of electricity use in households, recent government schemes have been more focused on gas savings and heating. The SAVE LEDs rollout may be complimentary as lighting has not been a main focus in recent government schemes. However, the LEDs rollout is generally in line with the messages of energy efficiency.

6.9.2 DNO price signals

The call for evidence states that DNOs can benefit from effective demand side response and demand management. Particularly, demand side management actions might delay or entirely offset the need to upgrade the network. Additionally, small cashback or rewards can potentially “act as a spur to act” (p. 34). Under this perspective, the document does not pose any barriers to SAVE price signals.

6.9.3 Enhanced engagement campaign and community coaching

The document does not explore engagement at customer and community level (other than as described above in 6.9.2). However, the paper states that energy efficiency measures undertaken by DNOs can have positive impact. Potentially they might decrease the energy demand, reduce line loss, delay and offset upgrade investments and additional capacity for new connection. Additionally, DNOs could, as regional monopolies, roll out electricity saving schemes to specific areas and make savings from economies of scale.

7 OVERVIEW OF POTENTIAL CHANGES TO REGULATION OR THE SAVE METHODS

Of the regulations, programmes and schemes reviewed, we have not found any outright barriers that might prevent the deployment of SAVE methods. We have, however, identified limitations in the way SAVE methods may have to be deployed in the future. Summarising the findings of Chapter 6:

- Where they exist, limitations are imposed by standard licence conditions for electricity distribution, which provides rules for the assets a DNO may own and the activities it may carry out.
- The RIIO regulatory framework does not provide any barriers as such but places the deployment of SAVE methods in an economic context, which may affect a DNO's economic outcome from pursuing SAVE methods and therefore may determine a DNO's interest.
- Recent policy documents and industry initiatives are too broad to impact the SAVE methods directly but tend to be facilitative of the SAVE methods in general.

In addition to potential changes to energy policy or regulation, we consider changes in the ways in which the SAVE methods can be deployed without undermining the effectiveness of the methods. The following sections discuss different options to mitigate the potential issues we have identified.

7.1 Mitigating limitations with 'Asset Ownership'

As they have been delivered under SAVE, the LED installation, DNO Price Signal and Enhanced Engagement Campaign methods all involve the DNO installing assets behind the meter (on the customer premises), which the SLCs formally do not allow.

In the case of LED lights, it is reasonable to assume the DNO relinquishes ownership of the lights once installed, not only for compliance with SLCs, but also because continued ownership (or control) would mean the DNO would accept responsibility for the lights failing and the potential (health and safety) consequences associated with failure. Hence, assuming DNOs would treat LED lights as a business expense, the SLCs would not form a barrier. Under RIIO, the DNO is faced with the consideration of whether LED lights (or any other form of EE solution) truly are a cost-effective way of delivering its regulated outputs, and would make a decision that maximises its economic outcome.

The same reasoning might apply to an electricity monitor installed on the customer premises, but due to the nature of this asset it is less obvious that the customer should own it. The electricity monitor is not a device that the customer would actively use, or at least, active usage is not a requirement for the SAVE method to work. Rather, it is the DNO which relies on the monitor to provide confirmation of customer performance under the SAVE method. We consider that of the three SAVE methods, only DNO Price Signals truly relies on the monitor to inform specific payments to customers. For the other methods, assuming the SAVE trials provide empirical evidence that the methods work, a dedicated monitor may not be required for commercial roll-out, particularly if future smart meter systems will enable consumption monitoring (although not necessarily for DNOs). Alternatively, load monitoring at substation level may suffice for some solutions. Based on these assumptions, we provide the following considerations regarding DNO deployment of electricity monitors on customer premises:

- The ability to monitor customer demand on the premise may not be essential to the LED Lighting and Enhanced Engagement Campaign methods. Hence, a potential breach of SLCs may be avoided by changing the way these methods would be delivered. For instance, the average demand impact of LED Lighting can be informed by SAVE trials outcomes and can also be reasonably reliably estimated. Similarly, the effectiveness of Enhanced Engagement Campaign can be empirically assessed through trials, and where monitoring is deemed

beneficial, this could take place at substation level to gauge the regional effectiveness of engagement campaigns.

- On-site monitoring is essential for the DNO Price Signal method, however, DNO ownership of the monitor is not, so long as the DNO is effectively informed of customer performance under the method. This could be readily achieved by having the SAVE method delivered as a service by a 3rd party, such as a supply business or an independent aggregator, where the 3rd party takes ownership of on-site monitoring equipment.
- We do not consider DNO ownership of dedicated on-site electricity monitor as essential to any of the SAVE methods. However, if DNOs wished to pursue this course, they could seek a derogation of SLC1 to have such monitors recognised as being part of the distribution system. However, this would require a DNO to demonstrate that ownership of monitors would deliver benefits that they would not otherwise be able to deliver, and which would not be capable of being delivered by another party. We do not consider the latter to be factually correct, given that a 3rd party could deliver the service, for instance as a service procured from an independent aggregator or supplier, who might be able to leverage future smart metering systems or proprietary systems.
- If DNOs do not seek a licence derogation to legitimize ownership of on-site electricity monitors, they could opt to treat the cost of such monitors as a business expense, which may also include ongoing maintenance and replacement costs if DNOs retain ownership of such monitors rather than giving them to customers. This would be an economic decision under RIIO, not a breach of SLCs, but it would not address any of the SLC limitations on DNO activities.

Based on the above, we believe that in considering the future deployment of SAVE methods, DNOs will need to consider whether ownership of certain assets is essential to the effectiveness of the method (in terms of its outcome for DNOs), as well as whether asset ownership is desirable from an economic perspective. We do not consider that DNO ownership of LED lights or on-site electricity monitors is essential to the SAVE methods, or that it will unlock any unique benefits for customers. Seeking a licence derogation is unlikely to succeed. DNOs may opt to invest in the assets and treat the cost of ownership as a business expense, or alternatively, procure the SAVE method as a third party service, where the 3rd party owns the required assets.

7.2 Mitigating limitations with 'Activities'

In section 6.1.2, we discussed that the activities a DNO undertakes as part of the SAVE Methods are limited by SLCs as follows:

- SLC 4 requires that DNOs do not distort competitive markets, such as those for the supply and generation of electricity or gas;
- SLC 10A places restrictions on DNOs obtaining and using data from smart metering systems; and
- SLC 19 requires that DNOs must not discriminate between (classes of) persons in providing Use of System and Connections.

The following sections discuss how these limitations may be avoided.

7.2.1 Market Distortion

All of the SAVE Methods could be considered to involve a distortion of competitive markets by DNOs, since all methods aim to change customer demand through initiatives (EE or DSR) delivered by, or on behalf of, a DNO. As a result, the DNO initiative affects the commercial outcome for suppliers and generators connected to the customers participating in the initiative, but not for other suppliers or generators, and could therefore be seen as distortive. We note, however, that Ofgem has not yet taken a clear position on if and how SLC4 applies in this case:

- the RIIO2 consultation outcome clearly recognises DSR as a potential future tool for DNOs in the economic delivery of the distribution service, whilst also underlining the need to “extend the role of competition” to deliver better value for customers, but does not clearly specify that DNOs must competitively procure DSR services;
- the RIIO2 consultation outcome also identifies DNO engagement in EE activity as a policy issue, which Ofgem will explore with government in the future.

However, we consider that the future test for these activities would be for DNOs to demonstrate that DNO delivery of these methods would unlock new or additional benefits that cannot be unlocked if parties other than DNOs deliver them. This is not a test we consider DNOs would pass, since other organisations clearly can and do undertake EE initiatives and provide commercial DSR services. We are not aware of any evidence that suggests DNOs might be able to deliver such services more economically. Particularly for DSR services, we consider that suppliers and independent aggregators providing a range of flexibility or DSR services to multiple different customers, including networks, will be able to realise economies of scope that DNOs will not be able to.

We therefore do not consider seeking a licence derogation is a feasible route for DNOs, and that SAVE methods may only be available to DNOs where they are not directly involved. Specifically, for the DNO Price Signal method, which is a form of DSR, we consider that this should be procured (competitively) from a 3rd party to avoid a potential breach of SLCs due to distortion of a competitive market.

However, it is worth noting that some other utilities do offer devices or programmes that aim to reduce consumption (such as water utilities distributing low flow showerheads). There is not an official government position on this; in the future, Government will need to clarify policy in this area.

7.2.2 Obtaining and using customer-specific data

The on-site electricity monitor deployed in the LED lighting, DNO Price Signal and Enhanced Engagement Campaign methods is not clearly covered by the definition of “smart metering system” as defined in Condition 1 of the Standard Conditions of Electricity Supply Licence⁴³, which refers to a system being installed for the purpose of supplying electricity. However, we note that the functionality and purpose of the electricity monitor is to gather customer-specific data on energy consumption relating to a period of less than one month. For this reason, we consider there is a risk that a future interpretation of SLC10A might be that it applies to electricity monitors, and therefore that the SAVE methods would be subject to this condition.


Future deployment of these SAVE methods outside of a trial environment requires DNOs to gain customer consent or anonymising customer-specific data, although the latter would not be possible in the case of DNO Price Signals. Whilst gaining customer consent is by no means impossible (and seems implicit to any SAVE method in any case), we consider that this does constitute a new activity for DNOs when applied outside of a trial environment, although this activity may be appropriate for future DSOs under RIIO2. Hence, assuming DNOs would seek customer consent in obtaining and using customer-specific data, this potential barrier is comparatively easily mitigated, provided it is economic for DNOs to do so when deploying SAVE methods at scale.

7.2.3 Non-discrimination

As discussed in section 6.1.2, all SAVE methods require a DNO to incur costs for participating customers, which are socialised across all of the DNO’s connected customers, and which may unlock benefits for all

43

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



connected customers. Given that the SAVE methods are intended to encourage reduced and/or flexible energy consumption by connected customers to free up network capacity, the methods could reasonably be considered a part of the DNO provision of Use of System to customers, so DNOs would have to ensure the SAVE methods themselves are cost-effective solutions.

Firstly, this means that DNOs must demonstrate that the SAVE methods are more economic than the alternatives (e.g. network reinforcement) and would lead to lower network charges. If this condition would not be satisfied, non-participating customers would be “unreasonably” subsidising a solution that does not deliver a net benefit.

Secondly, DNOs must ensure that the SAVE method are delivered efficiently, i.e. without incurring unnecessary costs, lest non-participating customers are “unreasonably” required to subsidise costs that should not be incurred. This would mean that a DNO would have to be able to demonstrate that the costs incurred for energy efficiency activities, as well as the costs of procuring DSR services, are efficient costs not just by themselves, but also compared to alternative routes of delivery, such as competitive procurement of a 3rd party service.


We consider that under RIIO, DNOs are already incentivised to deliver in the most economically efficient ways, which may cater to deployment of SAVE methods in lieu of network reinforcement, but the non-discrimination requirement under SLC 19 may enforce the way SAVE methods can be delivered. For DNO Price Signals in particular, we consider that the requirement for the method to be economically efficient, may mean that it would have to be delivered as a competitively procured service. We do not consider this is an outcome to be mitigated, since economic efficiency is in the interest of both DNOs and connected customers and is rewarded under RIIO. Moreover, competitive procurement of DSR services is endorsed and/or pursued by the Smart Systems and Flexibility Plan, the ENA ON project, as well as BEIS (through the November 2018 Speech by Greg Clark).

7.3 Guidance from energy efficiency schemes

Uptake of energy efficiency, through Government schemes, has been lower than would be expected given its financial benefits, indicating that there are other barriers to energy efficiency. Lack of understanding of energy use and energy efficiency was identified as a barrier in much of the literature reviewed. It is essential that future energy efficiency programmes aim to increase customer understanding of energy. It is necessary to demystify home energy use and provide clear advice on the energy efficiency options available to households. Such increased understanding has the potential to increase the uptake of energy efficiency measures and increase household engagement with how they use energy. Tailored advice by trusted impartial organisations is one way to achieve this.

Also beneficial would be free detailed home energy assessments, with home visits from advisors to help people understand their energy use and engage with energy efficiency (either in isolation or as a precursor to financial support for energy efficiency). Such assessments could also quantify the household’s energy consumption and the potential savings from various energy efficiency measures. Clear, simple and focused marketing messages around the benefits of energy efficiency, with focus on increased comfort and reduced bills, will help with customer engagement.

For energy efficiency support schemes, one of the key barriers to uptake was hassle for households engaging with the scheme. Thus, it is essential to reduce the complexity of such support schemes as much as possible. High upfront costs and high interest rates associated with support schemes (such as Green Deal) can also be off-putting, thus future programs supporting energy efficiency should be focused on grants, low/zero-interest loans. Ultimately, policy around energy efficiency could introduce increased costs for those homeowners who do not engage with energy efficiency.



Future Government policy needs to address these barriers. Schemes should be simple and informative, as energy consumption is often poorly understood by residential customers. Education should be a priority for any energy efficiency scheme. Future schemes should also consider who is best placed to deliver these messages. The answer will depend on the region and the scheme itself, there is not a 'one size fits all' approach.

7.4 Guidance from time of use tariffs

Previous trials of time of use tariffs indicate that they can lead to demand shifting, however there is still considerable uncertainty of the scale of such demand shifting. Many of the schemes used opt in methods to recruit participants, leading to trial samples that may have been more engaged with energy use and not representative of the population as a whole. In future trials the effect of self-selection should be minimised wherever possible. As with energy efficiency, one of the most effective ways of getting customers to engage with time of use tariffs is personalised engagement and support, usually consisting of home visits, and/or community support groups. It can also be helpful to use the introduction of time of use tariffs to promote awareness and debate on the energy system, which in turn would lead to increased household engagement with how they use energy.

When it comes to the structure of time of use tariffs, loss of control is a key concern for the household, as is increased costs. Critical peak rebates, much like the SAVE DNO price signals, can be an effective way of encouraging demand shifting without increasing energy bills. Transparency and explanation of the reasons for rate changes can also increase trust and engagement with TOU tariffs. As with energy efficiency schemes, complexity should be kept to a minimum. Dynamic TOU tariffs can cause greater shifts than static TOU tariffs, but are less attractive to households. Future tariffs or schemes will need to weigh the costs and benefits of these two approaches. Automation of DSR can produce the greatest shifts in time of use, and can make dynamic TOU pricing more attractive to households but can come with concerns over loss of control. The limited availability of automated DSR technology to low-income households could also be an issue. In many cases, vulnerable customers could benefit from TOU tariffs but are often the most disengaged group. Future schemes should give special consideration to this group and focus on education and engagement to allow customers to make an informed decision. Targeted support for vulnerable customers to switch to and engage with TOU tariffs where appropriate (not all vulnerable households would benefit from the change) should be encouraged.

8 CONCLUSIONS AND RECOMMENDATIONS

From our review of regulatory and policy documents, industry initiatives and energy efficiency schemes, we conclude that there are some potential barriers to DNO deployment of SAVE methods as economic and best practice considerations.

8.1 Regulatory barriers and recommendations

Potential barriers stem from electricity distribution standard licence conditions and relate specifically to the installation of an electricity monitor behind the meter for the LED installation, DNO Price Signal and Enhanced Engagement Campaign methods. The ownership and usage of such a monitor by DNOs is subject to limitations from the SLCs, and we recommend the following steps to mitigate such limitations:

- 1) We recommend that in the future deployment of SAVE Methods (and any similar methods or solutions), DNOs limit the methods to include only the assets required to deliver the method's objective;
 - We consider the functionality offered by the household electricity monitor may only be required for the DNO price signal method, but may not be essential for the LED installation and Enhanced Engagement Campaign methods as these could utilise substation monitoring instead of monitoring at the household level;
- 2) Where a particular asset or functionality is essential, DNOs should consider how this requirement is met in the most efficient manner;
 - We consider DNOs are not uniquely placed to unlock or maximise the benefits of DSR and therefore they do not need to own and operate behind the meter equipment, such as household electricity monitors;
 - We therefore do not consider DNOs seeking licence derogations to mitigate potential barriers from market distortion or customer discrimination to be a successful course of action;
 - We recommend DNOs work with 3rd parties, such as suppliers or independent aggregators, to provide behind-the-meter assets and data services;
- 3) In accessing the benefits of EE and DSR solutions (such as the SAVE methods) whilst satisfying licence requirements and maximising returns under RIIO, we consider DNOs will always have to ensure that (1) a particular solution delivers net benefits to connected customers, and (2) the solution is delivered so that its potential benefits are maximised;
 - We are aware that DNO delivery of EE solutions will be considered by the Government and Ofgem in the future, but we see no clear economic advantage in DNOs delivering EE over and above other organisations, such as supply companies or public institutions;
 - We consider that to unlock the benefits of DSR for distribution networks, DSR solutions need not be delivered by DNOs themselves, but can be procured competitively to maximise benefits;
 - We observe that the Smart Systems and Flexibility Plan (SSFP), the ENA ON project, and the recent speech⁴⁴ by Business Secretary Greg Clark all endorse the development of effective markets for flexibility.

⁴⁴ : <https://www.gov.uk/government/speeches/after-the-trilemma-4-principles-for-the-power-sector>



8.2 Social barriers and recommendations

For future SAVE-like schemes to be successful, they must be engaging and well utilised. Main social barriers uncovered by the research were related to a lack of understanding of energy and energy efficiency schemes.

We believe that partnerships with local, trusted organisations such as charities and local councils are key to maximise participation. (Either between the local partner and the DNO or the local partner and a commercial organisation delivering on behalf of the DNO.) These local partners know the communities they work in and can disseminate information more effectively than the DNO working alone. This may be especially true for venerable or fuel poor households who may be less likely to trust a DNO or commercial organisation. Trust and good communication are essential in demystifying energy.

Partnerships with councils and charities may also bring in additional sources of funding that can make the SAVE methods (or similar interventions) more cost effective and more likely to be the favourable option under RIIIO. These organisations may also be able to claim the social benefits (and any associated funding) that a DNO does not.