

Sustainability *first*

New Energy and Water Public Interest Network

New-Pin – Workshop 6

Tomorrow's World for Energy and Water
What will consumers and citizens want in 2030?
A check-list for change

Workshop report

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Written by Sharon Darcy and Clare Dudeney with support from Judith Ward. This report draws heavily on the 'Tomorrow's World for Energy and Water' workshop that Sustainability First held in partnership with the National Infrastructure Commission in July 2017. We would like to thank all of those that took part in the workshop for their contributions. Responsibility for the paper sits with Sustainability First.

Introduction

Future energy and water services need to be designed around the needs, expectations, behaviours and values of consumers and citizens. This paper draws upon Sustainability First analysis for the New-Pin project – plus outputs from a day-long ‘Tomorrow’s World’ Workshop on 18 July 2017 run in partnership with the National Infrastructure Commission - to look at the future energy and water requirements of households and small & medium-sized enterprises to 2030 - from both a qualitative and quantitative perspective. It thus seeks to move from a more ‘traditional’ horizon scan that sees the future from an energy and water sector perspective - in kilowatt hours of energy and megalitres of water and in terms of changing technologies - to one which also looks ahead from a consumer / citizen point of view.

The energy sector is going through a period of significant and disruptive change (which is being experienced slightly differently between electricity and gas). The water sector is also evolving. Given the projected rise in active consumers and more flexible, decentralised and ‘democratic’ models of energy and water service delivery, the perspective of consumers and citizens will be vital to plan effectively for change.

Part 1 of the paper provides a qualitative, granular & ‘bottom up’ view of what future consumers / citizens of energy and water services may want. It is set out in the form of a Sustainability First ‘Consumer / citizen check-list’ for energy and water companies, regulators and Government to use when considering future needs.

The check-list, summarised on the next page, identifies that the following issues need to be addressed to develop a more coherent approach to future requirements:

1. Convenient and targeted services and support - **broadband access and skills** present a common challenge here.
2. Understanding attitudes and values – these can cut across different socio-demographic requirements. **Some people find uncertainty hard to cope with** and just don’t like change. This matters for essential services.
3. New affordability challenges – **upfront costs of new kit**, methods of charging etc may be an issue for many groups. Affordability of energy and water needs to be seen in the context of projected widening social inequalities.
4. Who is in control? Likely to become increasingly difficult to identify who the decision maker is in the future, particularly with changing tenures (private rent), regional /collaborative / community approaches, the increasing importance of carers and the rise of pro-sumers. The **consumer is becoming a more complex and ‘multi-person’ entity**.
5. Trust in **dynamic markets** - new entrants, third parties, intermediaries and partner organisations can help address many issues but can also raise **new risks** and may become dominant players.

Addressing these issues ‘in the round’ can help identify where there may be tensions between different interests that will need to be resolved going forward.

Part 2 of the paper summarises from a quantitative and macro perspective what the UK’s future energy and water needs are likely to be up to 2030, and beyond. It covers socio-demographic trends and drivers of change for both sectors in technology, climate change and customer expectations. It then provides a future outlook for each sector and the opportunities and challenges that exist from a sector / company perspective.

Part 3 draws together the overarching conclusions from the qualitative and quantitative analysis.

What will energy and water consumers / citizens want in 2030?

A Sustainability First check-list for change

1. Convenient and targeted services and support

- **Companies** - what are you doing to provide more convenient and personalised services/support in terms of: simplicity by design; customer segmentation; support for those without broadband access / skills; and integrated services?
- **Regulators & Government** - have you understood & prepared for the wider impacts of personalization & convenience in terms of: broadband access / skills; 'inconvenient' changes e.g. away from gas central heating; accurate algorithms; data protection, security and ownership; and joined up regulation and consumer protection?

2. Attitudes and values

- **Companies** – do you understand what motivates your customers and how to get behaviour change in terms of: consumer / citizen attitudes; acting as a 'listening' company; competitive / collaborative behaviours; and outcome focused and timely communications?
- **Regulators & Government** – what are you doing in terms of behavior change to facilitate wider long-term public interest outcomes in terms of: interventions and mandatory approaches; when people have experienced significant service disruption; and how regulatory and policy interventions are 'framed'?

3. New affordability challenges

- **Companies** – what are you doing to ensure services are as affordable as possible in terms of: upfront costs; energy / water efficiency; charging arrangements; and opportunities for sharing?
- **Regulators** – what are you doing to ensure future smart energy and water services work for all in terms of: distributional impacts of personalization; developing understanding of the implications of change for customers that may be 'left behind'; fostering / enabling new business models which wish to focus on affordable services – including for the vulnerable; building an evidence base and corresponding narrative; and dealing with failure for people in vulnerable circumstances?
- **Government** – what are you doing to ensure that future energy and water services are fair for all consumers and citizens in terms of: energy / water efficiency programmes; and policy development in related areas?

4. Who is in control? Complex web of decision makers

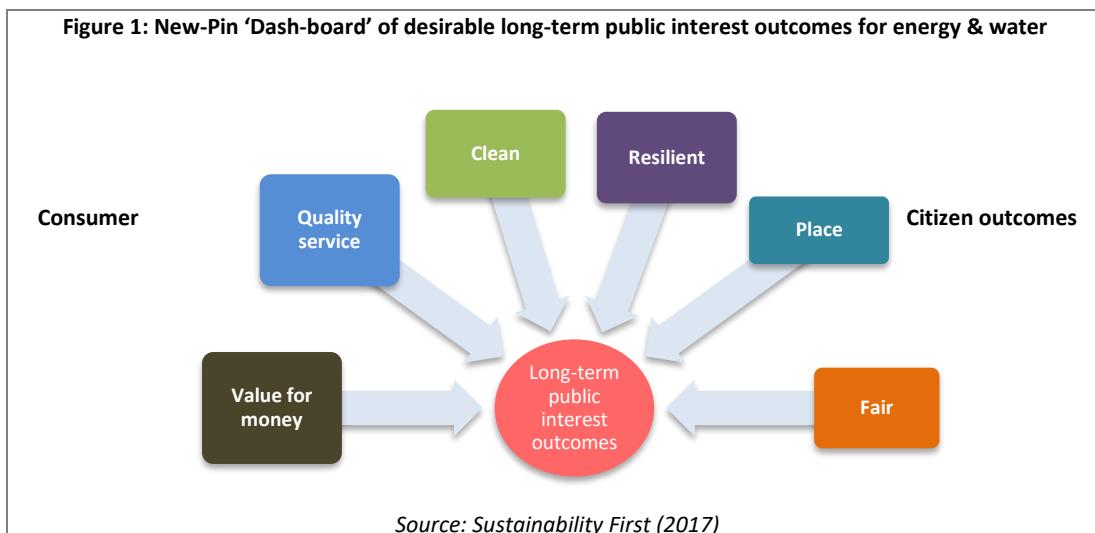
- **Companies, regulators and Government** – do you understand who the decision maker is and are you influencing and supporting them in the most effective way in terms of: landlord / tenant responsibilities; the change from commodity to service provision; devolved, regional and local approaches; collaborative / community opportunities; carers; pro-sumers; and control of 'the system' as a whole?

5. Trust in dynamic markets

- **Companies** – are you building trust and where appropriate working with new entrants, third parties, intermediaries and partner organisations - including through supporting the development of intermediaries to help address specific problems in smart markets?
- **Regulators** – what is the appropriate approach for regulators to new entrants, third parties, intermediaries and partner organisations and how far do you understand their motivations, and potential conflicts of interest?

Part 1 – Qualitative view of future consumer / citizen need

Sustainability First's New Energy and Water Public Interest Network (New-Pin) has previously identified the following desirable long-term public interest outcomes for consumers and citizens in energy and water. Further details of the New-Pin Network can be found at **Annex 1**.



This part of the paper draws heavily on this previous New-Pin work along with the discussions at the 'Tomorrow's World for Energy and Water' workshop held by Sustainability First in partnership with National Infrastructure Commission (NIC) in July 2017. The workshop, part of the New-Pin programme, explored what customers and citizens are likely to want from future energy and water services. It aimed to:

- Provide a more granular view of the future for energy & water from the bottom up - that recognised difference – demographic, economic, geographic, environmental and technological;
- Support the NIC in developing its thinking and its National Infrastructure Assessment; and
- Identify issues that energy and water companies, their regulators and Government need to address to meet the needs of future consumers and citizens.

The event was designed to be inter-active and non-technical, and draw on the experiences of the 79 attendees from a range of public interest groups. By involving a wide variety of stakeholders, it sought to build capacity in public interest groups wishing to engage in energy and water issues and thus develop a more inclusive approach to change. The workshop was attended by a team from think tank Common Vision,¹ helping to ensure that the views of millennials were represented. Common Vision have produced a video film of the day to help share the issues raised with a wider audience.

To get a more realistic and robust view of future needs, participants at the workshop were split into groups to think from the perspective of the following: older people; younger people; people on low-incomes; and people in rural areas. Participants were asked to consider what would need to happen for that socio-demographic group to become an 'ideal' energy / water household by 2030. Diagrams of 'ideal' energy and water households were used to stimulate debate. Each group was asked to consider the enablers and barriers to change for that specific socio-demographic. **Annex 2** provides a summary of responses by each group.

Sustainability First consumer / citizen check-list for energy and water services in 2030

The following Sustainability First check-list identifies five issues that need to be addressed if the future energy and water needs of all consumers and citizens are to be met. These are:

- 1. Convenient targeted services & support**
- 2. Attitudes and values**
- 3. New challenges for affordability**
- 4. Who is control - complex web of decision-makers**
- 5. Trust in dynamic markets**

There was significant consensus at the workshop as to what these issues were likely to be. However, there was also recognition that some of these things could impact on different groups in different ways. The check-list therefore also examines the considerations that specific socio-demographic groups may have with each issue.

It is important to note that there is often a big overlap (inter-sectionality) between different socio-demographic groups. For example, you can clearly be old, living in a rural area and on a low income. The only area where this doesn't apply is aging. It is not immediately obvious whether age cohorts retain their defining characteristics as they get older. Generational research is a complex area. As we go through 'life cycle' changes (growing up, having children, becoming more frail etc), some attitudes and behaviours are likely to alter. However, 'period' effects (events such as wars or natural disasters) and 'cohort' effects (joint lived experiences such as the swinging '60s) may lead to some generational characteristics being more fixed.²

The check-list is designed to be used by energy and water companies, regulators & Government when engaging and listening to consumers / citizens and when planning future services. Although most are already doing many of the things in the check-list, and there are lots of examples of good practice, there is value in pulling these issues together to develop a more coherent and consistent approach to change. This is particularly the case in areas where technology and automation won't 'solve' issues behind the scenes - without standards being affected or consumers being made aware.

Most of the issues in the check-list have an up but also a down side. Companies that provide energy and water services will need to show a step change in leadership when planning for what is likely to be an increasingly challenging social and political environment. However, previous New-Pin work has shown that companies, markets and individual consumers on their own are unlikely to be able to deliver all of the desirable long-term public interest outcomes in the coming decades.³ To meet the needs of all consumers and citizens, in some cases, regulatory and Government action may also be necessary to help construct future markets and / or to intervene when appropriate.

1.1 Convenient, targeted services and support

The issue

Future energy and water services should be simple and easy to use – particularly given growing dependency on electricity (as the enabler for digital comms, Artificial Intelligence etc). Convenience is important for consumers and services are becoming increasingly targeted to meet this requirement. Digital technology is helping to make this possible, but also poses new challenges around data security and resilience . Consumers are unlikely to want convenience at any price. Personalised services raise some wider issues for regulators / Government and the pre-requisite of broadband access poses specific issues for some groups.

Convenient, targeted services & support - Common issues for all socio-demographic groups

Companies: what are you doing to provide more convenient and personalised services/support?

- **Simplicity by design** Consumers and citizens want accessible, secure and easy to use services that have future needs ‘designed in’ so that they are easily able to adapt to changing requirements and shifting vulnerabilities⁴. To ensure simplicity, companies need to listen to individuals and communities and help facilitate them to become active partners in the design process. Automation will help and is likely to increasingly be ‘the new normal’.
- **Segmentation** No customer / citizen / community group is homogenous. The world of work is also changing (self employment, remote working etc); different types of jobs are leading to increasingly different lives.⁵ Within each group there will be a range of expectations and needs. A segmented approach that enables targeted services - & support and communications that recognize individual circumstances – will enable customer adaptation in the future. The Digital Economy Act 2017 should help companies to better target customers entitled to financial support.
- **Services & support for those without broadband access / digital skills** Digital tech enables greater segmentation and development of increasingly sophisticated tariffs and services (including Time of Use tariffs, demand side response and automated services). Currently, 19% of UK households don’t have access to the internet via fixed broadband⁶ and 21% don’t have basic digital skills⁷ and may therefore be unable to take advantage of these new offers. Companies that wish to be respected corporate citizens will provide appropriate assistance to ensure customers without broadband access/ digital skills are not ‘left behind’.
- **Integrated services** May be popular with many consumers if these lead to greater convenience (eg appliances controlled by one app, single bill etc) &/or value for money (eg economies of scale). Important consumers have the choice not to have bundled services.

Regulators & Government: have you understood & prepared for the wider impacts of convenience and personalisation?

- **Broadband access and digital skills** The Digital Economy Act 2017 introduced a broadband Universal Service Obligation; Government currently consulting on the design of this.⁸ The USO, and the UK Digital Strategy 2017, will need to effectively ensure all consumers have broadband access and basic digital skills to engage in a meaningful way with future energy/water services.⁹
- **Accurate algorithms** Personalised services may increasingly be delivered and costs allocated via complex algorithms. Ensuring that these do what they claim (eg provide best deal) and do not stifle competition / lead to collusion¹⁰ is important to build trust in smart future.
- **Significant ‘inconvenient’ changes** Changes to core services such as gas central heating (eg though gas being banned) would clearly lead to significant disruption for consumers. A phased approach to change, strong incentives to install new systems and support for those that may find it difficult to comply would need to be considered.
- **Data protection, security and ownership** A significant data security breach in an essential service such as energy and water could reduce public appetite for personalisation if it was seen as leading to reduced security / resilience. Data protection / sharing frameworks will therefore need to evolve as value of data increases. New General Data Protection Regulation effective in 2018 will be an important part of the change process. Questions around who owns data likely to grow with increased personalization. Public need to be involved in decisions around data ownership to build confidence, maximize benefits of big data and ensure it can be used to meet wider public interest outcomes.

- **Joined-up regulation and consumer protection** Need to be designed to take account of growing inter-dependencies and bundling and to ensure co-ordinated, and where possible seamless, support from the consumer / citizen perspective. Particularly important when consumers / citizens experience problems and service disruption – which may increase with climate change.

Convenient and targeted services - Considerations for specific socio-demographic groups

- **Older people** Service design will need to take into account that the increasingly elderly population, and particularly those in poor health, likely to be more sensitive to impacts of climate change such as flooding and heat.¹¹ Almost a third of the over 65s currently have no basic digital skills¹² and only 42% of the over 75s have access to fixed broadband. May be more likely to need technical support. May also need help overcoming physical barriers (eg controls on smart appliances and installing new technologies). Almost half of over 55s likely to be ‘late adopters’ of latest products and services.¹³ As well as recognizing impact of physical disabilities on service design, also need to take hidden disabilities, including dementia, into account¹⁴. May prefer face-to-face comms.
- **Younger people** Millennials: more interested in automated home energy management services, and willing to pay for these, compared to over 55s (34 to 11%);¹⁵ and more comfortable with company *handling* their personal data compared to baby boomers (51 to 35%) - although willingness to *share* data less pronounced.¹⁶ Younger people expect a ‘social ingredient’ to services / support with messages conveyed by social influencers / ambassadors / ‘virtual community champions’ in a way that recognizes lifestyles and cultures and uses AI and Virtual Reality to engage¹⁷. May expect data to be openly available so can innovate themselves, developing tailored services to meet own specific needs or to make money / fill gap in market.
- **People on lower incomes** Convenience particularly important if have multiple jobs and are also time poor. Managing money already time consuming and stressful for many families living in poverty; although greater convenience from direct debits etc may help, many concerned that these could be unpredictable and hence difficult to deal with¹⁸. Currently a quarter of adult non-users of the internet are in DE households¹⁹ although worth noting that 68% of fuel poor have mobiles. May be wary of dealing with energy / water companies or the state and prefer a local face-to-face intermediary.
- **People in rural areas** In 2016, superfast broadband coverage had only reached 59% of rural homes and businesses; broadband speeds in many rural areas remain poor due to length of connection to property.²⁰ In discrete communities, may be more willing to explore targeted community solutions that are focused on common local needs. More space can make it easier for some to become pro-sumers.



1.2 Attitudes and values

The issue

We all have different values that can influence our approach to risk / change. Values frequently cut across socio-demographic stereotypes. Attitudes need to be taken into account when deciding how best to get change in future services and whether the focus should be on individuals, communities or standards / regulations. This is particularly important if technology and automation do not lead to change happening ‘behind the scenes’ without people being aware. The fact that some people just don’t like change needs to be recognised given projected uncertainties outlined in Part 2 of this paper. Understanding how attitudes may alter as a result of disruptive events important given climate change, cyber security challenges etc.

Attitudes and values - Common issues for all socio-demographic groups

Companies: do you understand what motivates your customers and how to get behaviour change?

- **Attitudes** To get behaviour change and meet expectations, companies need to understand

different attitudes and behaviours – their customers' psycho-demographic profiles²¹. At the Tomorrow's World workshop, Solitaire Townsend from Futuerra explained that people can be roughly divided into three broad groups in terms of their values, what motivates them and how they feel about change. Services, support and communication 'messengers' need to be developed with these three broad psychological groups in mind:²²

- 'Settlers' / 'bricks' - sustenance driven and concerned with safety / security and belonging in own geographical community. Communication best via the group. Normally see the past as positive and are likely to be resistant to change. May be late adopters / laggards in terms of uptake of new technologies / approaches.
- 'Prospectors' / 'goals' – focused outwards. Interested in the here and now. Success orientated; change needs to be practically good for them and enhance their self-esteem. May be frequent switchers and tech led early adopters of innovations.
- 'Pioneers' / 'greens' – want to understand the big picture. Normally see change as positive. Motivated by appeals to ideas, ethics and choice. May be purpose led early adopters of innovations. May have greater interest in reducing environmental impacts (eg switch to green tariffs) and in developing low-carbon / sustainable services.
- **'Listening' companies** Companies need to be honest about their own motivations and values, and, through listening to their stakeholders, how these align with those of their customers.
- **Competitive / collaborative behaviours** For some, particularly prospectors, ensuring that there is 'something in it for them' and giving them a financial stake in service – however small – can incentivise change. Competitive community elements – if framed in a way that resonates – may also work. Collaboration may work with pioneers if they can see change as part of a bigger 'cause'. Experiments / randomized control trials / test and learn etc can help identify most appropriate behavioural approach.
- **Outcome focused and timely communications** Need to focus messages on outcomes that energy and water can deliver that are important to that person (eg heating the home rather than kWh delivered of electricity). Need evidence of positive benefits – not the infrastructure itself. Focusing on what is tangible / visible – often things that are local – can be effective. Need to take the following into account: life stages; life events; and transition stages (including seasons, times of the month when may have more / less money etc).

Regulators & Government: what are you doing in terms of behavior change to meet wider long-term public interest outcomes?

- **Interventions and mandatory approaches** If a significant number of people are unwilling to change their behaviour &/or the impacts of this are significantly detrimental (including to the environment), regulators / Government may need to intervene / mandate change (eg standards, choice editing, fines etc). Need public engagement to help determine 'public risk appetite' on contentious issues.
- **How regulatory / policy interventions are 'framed'** Given different attitudes/values, may want to rethink how to frame interventions that are considered to be in the long-term public interest to gain support of different audiences (eg being an energy / water 'shopper' may resonate with prospectors but not settlers/pioneers). More varied and nuanced approach may be needed.
- **When people have experienced service disruption** The experience of floods, power failures etc can influence attitudes. Uncertainty and lack of control can lead to feelings of loss / isolation. Due to the sporadic yet systemic nature of such events, to build resilience, Government and regulators need to develop a better understanding of how such disasters affect values and behaviours of those involved. Systematic education programmes on issues such as flooding and the involvement of communities of all ages in initiatives such as flood recovery plans can help.²³

Attitudes and values – Considerations for specific socio-demographic groups

- **Older people** – For some, the community spirit, and a desire for ‘nice’ neighbourhoods may incentivize behavior change.
- **Younger people** – Lack of optimism regarding ‘social progress’ (eg only a quarter expecting the social / political situation to improve in the next year).²⁴ However, have grown up with recycling as the norm and may be more willing to take an environmentally friendly outlook. Gameification (eg fitbit for personal energy use with rewards or games to stop pollution) can be fun & may motivate some, helping to overcome lack of experience with service disruption, paying bills etc. May be more willing to collaborate through virtual communities or to take part in collaborative crowd funding projects to give a stake in a system that may seem remote / out of touch. Appeals to identity may help behaviour change. Education around smart services and energy / water saving can help directly – & indirectly via pester power.
- **People on lower incomes** – May be more likely to be loss / risk averse and more likely to conform to and value tradition. Decision often based on coping with stress, often at the expense of future goals.²⁵ Lack of different types of ‘capital’ can influence decisions and behavior, such as: cognitive capital (eg bandwidth); environmental capital (housing quality); human capital (eg education); economic capital (eg income / wealth); social capital (eg social networks); and character capital (eg self efficacy).²⁶ May potentially be more interested in local co-operative approaches.
- **People in rural areas** – May have a stronger sense of community and be ‘hardier’ with more experience of service disruptions. Many in rural areas more connected with nature – this can be used to help frame behavior change messages.

1.3 New challenges for affordability

The issue

Many consumers already struggle to pay their energy and water bills.²⁷ Future smart energy and water markets are likely to pose new affordability challenges, including in terms of the need for new investments in the home. Questions of social equity in the sectors need to be seen in the wider context of the projected increase in inequality across society, the growing squeeze on incomes and the challenging benefits picture. The impact of Brexit on incomes and the cost of essential services is also a significant unknown. Taken together, these points indicate that affordability in the sectors is likely to go up the consumer / citizen agenda in the coming decades.

Affordability – Common issues for all socio-demographic groups

Companies: what are you doing to ensure services are as affordable as possible?

- **Upfront costs** Grants for smart appliances, new technologies, replacing gas central heating systems etc may be necessary to cover the upfront costs of change for some groups to ensure that smart futures are possible for all and that those on low incomes aren’t left using inefficient (and potentially dangerous) appliances etc.
- **Energy / water efficiency / savings programmes** Can help all consumers (& if targeted, those in vulnerable circumstances) address affordability pressures. As these increase to 2030, and companies move into the ‘services’ space, considerable opportunity to ensure efficiency programmes are no longer the ‘Cinderella’ activity in the sectors. Scope to enhance existing energy / water savings schemes & develop new programmes that take interdependencies between energy / water into account.
- **Charging** New methods of charging (eg by temperature, time of day, season, capacity / volume) provide new opportunities for ensuring more affordable basic services. Such schemes can be highly sensitive and need to be developed and tested with the active participation of the groups most likely to be impacted.
- **Sharing economy** Sharing appliances and spaces (eg smart washing machines in blocks of flats, space to dry clothes, EVs, charging points etc) can help keep costs down. Also important given

space constraints in many modern rental properties.

Regulators: what are you doing to ensure future smart services work for all?

- **Distributional impacts of personalisation** With a greater regulatory focus on individual customer issues, and the growing complexity of energy and water systems, in future regulators are likely to be increasingly drawn into debates about distributional issues. As services become more tailored, prices may become more cost reflective. Previously socialised costs may be allocated to higher cost to serve individuals. As switchers tend to come from higher socio-demographic groups, distributional impacts of this trend may be exacerbated. Regulators need to address resulting issues.
- **Implications of change for customers that may be ‘left behind’** As tech and innovation lead to service changes, need to understand and plan for distributional impacts of declining markets. In energy, regulators already seeking to understand what impact some people choosing to go ‘off grid’ may have on affordability for existing network users – who may be vulnerable / less able to play active part in smart markets due to upfront costs. Who should pay for stranded assets / decommissioning likely to be growing problem. Need to develop mechanisms such as insurance arrangements for those on private wires who may still wish to be connected to networks for back-up to ensure socially equitable distribution of costs.
- **Enabling / fostering new business models which wish to focus on affordable services** Niche new entrants that want to target those with lower disposable incomes (eg via smart pre-pay) or have other vulnerabilities may need additional help / information to get started. Regulatory innovation programmes / and stimulus packages could have specific social obligation measures to support those innovating in this area. Sustainability First’s Project Inspire is identifying good practice in innovation & vulnerability for energy consumers.²⁸ Case studies from this project and others need to be widely disseminated.
- **Evidence base and corresponding narrative** Working together (eg through UKRN), regulators need to build a clearer picture of what the combined impact of affordability issues is across essential services²⁹ - and is likely to be given future trends. Coherent narrative needs to be developed to communicate to all market participants the changing social context for their work.
- **Dealing with failure** Not all new innovations and services will work. Consumers in vulnerable circumstances unlikely to have resources to ride problems and may need additional protections to ensure that they can continue to afford energy and water as the sectors go through dynamic change.

Government: what is being done to ensure that future smart services are ‘fair’ for all?

- **Energy / water efficiency programmes** Post Green Deal, need new system for financing energy efficiency, particularly for people in vulnerable circumstances, and targets to improve energy efficiency standards for all existing domestic and commercial properties³⁰. Opportunity in both energy/water to use relevant standards in this area (social housing, new homes, planning, appliances etc) to ensure affordability pressures are managed for all.³¹ The impact of Brexit on existing appliance efficiency standards needs to be monitored; looser standards could indirectly push up bills.³²
- **Policy development in related areas** Government needs to facilitate public deliberation on the wider implications of smart markets in terms of fairness and social equity. Results of such exercises need to feed into policy development in related areas such as tenancy rules, welfare and benefits reform etc.

Affordability – Considerations for specific socio-demographic groups

- **Older people** Although at the end of the 2020s older pensioners are likely to have more money after housing costs than those in work and pensioner poverty is set to decline,³³ for many wealth

- may not easily be accessible. May be interested to explore leases for investments in smart appliances / kit – particularly if they consider that they may not be around to benefit from this.
- **Younger people** Child poverty is expected to rise sharply to 2020.³⁴ Millennials currently more cautious about money and financial management.³⁵ Affordability is likely to be growing issue as more likely to be at the sharp end of the less secure future labour market and to experience problems getting accommodation.³⁶ May be more comfortable / experienced in sharing.
 - **People on lower incomes** Poverty premium is already an issue and working age people expected to see a slow and steady increase in poverty to 2040. People on low incomes fewer resources to be able to prepare, respond to and recover from extreme weather.³⁷ Families below the Minimum Income Standard tend to prioritise day to day expenses over larger outlays.³⁸ Need to understand the combined affordability challenges that this group face for essential services – not just energy and water. Don't like bill shock.
 - **People in rural areas** May be off gas grid, have solid walls that leak energy and lower disposable incomes than people in urban areas.³⁹ Living in older properties that are difficult to modernize / have aesthetic barriers / are listed so can't install new more efficient (and money saving) technologies may add to future affordability pressures. Limited economies of scale may make it more difficult for some rural areas to take advantage of some money saving new technologies and infrastructure developments. Need support to develop creative work rounds / approaches.

1.4 Who is in control? A complex web of decision makers

The issue

As we undergo a shift from centralised systems and passive consumers to more decentralised systems and active consumers, understanding who is in control and identifying the appropriate decision maker to work with likely to become more complex. There is already a principal / agent problem in energy and water services. With the rise in the private rental sector, this issue will become more complex. In an increasingly aging society, and one in which people of all ages live longer with more disabilities and challenges, increasing numbers of carers will add to this complexity – particularly if social services continue to decline. Devolution, Metro Mayors, collaborative and community approaches etc will also entail working with a wider group of decision makers – who may be fluid and are likely to have multiple objectives. Issues of control are also likely to come to the fore with the rise of pro-sumers.

Decision makers - Common issues for all socio-demographic groups

Companies, regulators and Government: do you understand who the decision maker is and are you influencing / supporting them in the most effective way?

- **Landlord / tenant responsibilities** With the rise of the rental sector, many people will have less incentive / ability to make energy and water efficiency improvements to their home. May be more effective to give landlords incentives to ensure their properties are smart/efficient. Longer contract terms and clearer landlord/ tenant responsibilities may also help. Mandating improvements to existing housing stock may also be needed.
- **Move from commodity providers to service companies** A more sophisticated understanding of how to identify appropriate decision makers for different services within the home necessary (eg those who control the thermostat may be different to those who continuously use IT).
- **National, regional and local approaches** With devolution, Metro Mayors etc need to build better understanding of what consumers / citizens want from energy and water services in different localities & places. A plurality of approaches that recognize local difference, and the advantages of a social as opposed to individual response to energy / water challenges (pooling risks, scale, delivering multiple objectives etc), may be increasingly expected by consumers and citizens.
- **Collaboration and community approaches** Frequently require the involvement of a wider group of stakeholders who may have fragmented and unclear decision making powers. As more varied and distributed energy and water services develop (eg distributed generation, catchment

management etc), need new approaches to identify, engage with and respond to more diverse stakeholders. Without changes in institutional focus on existing decision makers, and associated market governance arrangements, may be difficult to move from centralized / top-down models of service provision. Sustained community participation also needs seed funding, training and on-going resourcing.⁴⁰

- **Carers** As more people live longer with disabilities and challenges (not just the old), the role of carers in making decisions about energy and water is likely to increase. In some ways, carers are the ultimate and most pervasive third party intermediaries.
- **Pro-sumers (eg producing their own solar power and selling surplus back to the grid)** The relationship between companies & consumers will change as people become more active consumers/prosumers. Risk / reward sharing mechanisms will need to evolve as pro-sumers become more assertive and potentially band together and question the role of being rule and price ‘takers.’ To unleash this resource and unlock the potential for their more innovative and creative in-put into future services, a different approach to service design will be needed.
- **Control of ‘the system’ as a whole** The technological, climate and demographic change outlined in Part 2 of this paper, are leading to new questions about who controls the energy and water ‘systems.’ For example, who controls the Systems Operator function and who should own and control core network assets?

Decision makers – Considerations for specific socio-demographic groups

- **Older people** Some older people may prefer to have their energy and water services dealt with by friends, family or carers. May already have Power of Attorney or nominee arrangements which may need to evolve to keep pace with smart markets. Some may be more supportive of decisions being made centrally via higher standards/compulsion etc.
- **Younger people** Not always direct energy / water bill payers so may find it more difficult to reduce / influence spend or service use. Need to do more to inform them of what their rights are in terms of tenancies and energy and water efficiency improvements and to support them to do what they can to reduce usage.
- **People on lower incomes** – If people on lower incomes also have hidden disabilities, particularly with mental health, they may also prefer to have their services dealt with by friends, family or third party nominees.
- **People in rural areas** With more space, may have more options for change. More versatile, local solutions likely to require decisions from a wider group of stakeholders across the community.



1.5 Trust in dynamic markets

The issue

The energy and water markets are dynamic and, particularly in energy, changing fast. Challenges to incumbents from Non Traditional Business Models and other new entrants and differing views on public / private ownership of energy and water services are likely to mean that trust in the sectors remains a live issue in coming decades. New entrants, third parties, intermediaries and partner organisations can help existing energy / water companies overcome some of the problems that they may experience with trust (eg through better reputations, different skills mix etc). These challenger brands and new organisations may, of course, end up replacing existing incumbents and becoming major players themselves. As they do so, public expectations of their services and behaviour may evolve. It is important to understand what motivates new players. Many may well be content remaining niche market participants. However, if they do grow, understanding their capacity and capability to scale up may be important. Regulation needs to adapt and evolve as this dynamic picture unfolds if trust is to be maintained.

Trust in dynamic markets - Common issues for all socio-demographic groups

Companies: are you building trust and where appropriate working with new entrants, third parties, intermediaries and partner organisations?

- **Building trust** Within companies, trust has to be earned & maintained over time. Can be built by aligning your motivations and risk appetite with that of your customers, giving people control over choices they can make (eg method of engagement or how any changes in their local area are implemented) as well as by providing secure / quality services, regular / predictable bills & clear comms. Responding to shocks in prompt / honest way helps.⁴¹
- **New entrants, third parties, intermediaries and partner organisations** Third parties such as group switching brokers, NGOs & local community groups may be more trusted than energy & water providers. Working together with such groups can help build understanding of consumer and citizen needs within licensed companies, bring in specialist skills and help with outreach into communities.
- **Supporting the development of intermediaries for specific issues** There is potential scope for companies, both individually and also working through trade associations etc, to do more to support the development of intermediaries that could help address specific issues in smart markets (eg older people and digital services or brokers for younger people that may need to change service providers regularly due to short term tenancies).

Regulators: have you got an appropriate approach to new entrants, third parties, intermediaries and partner organisations?

- **A different regulatory approach** New entrants, third parties, intermediaries and partner organisations may need a different approach to existing companies / service providers to participate in the energy and water sectors. Regulators will want to consider how they: share data so it is accessible; simplify and ‘demystify’ their processes; the language used etc. Streamlining the regulatory process (eg through Principles Based Regulation in energy retail), and ‘Innovation Links’ etc⁴² should help. The regulatory approach may need to evolve as new players become more established.
- **Motivations and conflicts of interest** Need to recognise that new entrants, third parties, intermediaries and partners have own motivations and that conflicts of interest can arise. They may also experience service problems and issues with trust themselves, particularly if they grow and move beyond their ‘niche’ positions. Regulation may be needed and regulators may wish to pay due consideration to how risks / rewards are shared between licensed companies & associated groups.

Trust in dynamic markets – Considerations for specific socio-demographic groups

- **Older people** May be more likely to trust institutions. May be less likely to want to share data – unless with previously well known groups.
- **Younger people** For this group, it is even more important that trust needs to be continually earned. Transparency and choice also rated highly. May be more demanding and willing to experiment and take business elsewhere if get bad service (millennials more likely than over 55s to consider switching energy providers if don’t get a seamless experience - 79 to 64%).⁴³ Three quarters of millennials think that companies can be a positive force – but only 59% consider that companies have actually made a positive impact. In contrast, 73% think charities / NGOs have made an impact.⁴⁴
- **People on lower incomes** More likely to be loss and risk averse, distrustful of energy / water companies or the state and prefer dealing face to face with local intermediaries.
- **People in rural areas** May be more likely to trust third parties, intermediaries and partner

Sustainability First – New-Pin

organisations that understand the natural / environmental context and consider landscape impacts of any changes. A clear design and innovation framework can give third parties a line of sight as to the opportunities for more flexible approach (eg via distributed energy and catchment management in water).⁴⁵

Part 2 – Macro overview of energy and water requirements to 2030

Part 2 of this paper summarises at a macro level and in a quantitative way what the UK's future energy and water needs are likely to be up to 2030, and beyond. It covers socio-demographic trends, drivers of change for both sectors and future scenarios.

The paper draws heavily on the NIC's discussion papers on the drivers for future infrastructure supply and demand in the UK. It was used to provide the background context for the joint 'Tomorrow's World' workshop held by Sustainability First and the National Infrastructure Commission on 18th July.

2.1 Socio demographic trends for the UK

The National Infrastructure Commission has considered future demographic trends and implications for infrastructure as part of National Infrastructure Assessment (NIA)⁴⁶ work.



Population growth – increase by 7.3% by 2025 to 69 million⁴⁷. The impact will not be even, concentrated in urban southeast and big cities – highest in London. Resulting increased customer demand for energy and water⁴⁸.



Ageing population – Over 60s will make up 26.1% of UK population in 2024 (18.1 million)⁴⁹, an increase from 23.1% of UK population (14.9 million) in 2014. One in 12 people will be aged over 80 by 2039. People will live longer but with multiple health issues (incl. dementia) and greater care needs⁵⁰. As people get older, usage patterns change (e.g. less energy use during after-work peak⁵¹, but potentially more overall⁵²) and carers may take more decisions.

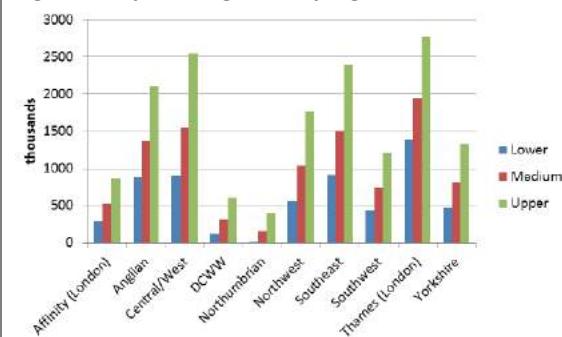


Modest economic growth – anticipated over the next 5 years (OBR, IFS). Brexit has exacerbated uncertainties. Average growth of Gross Domestic Product (GDP) per capita of 1.7% per year⁵³. As people get richer, they demand more infrastructure services.



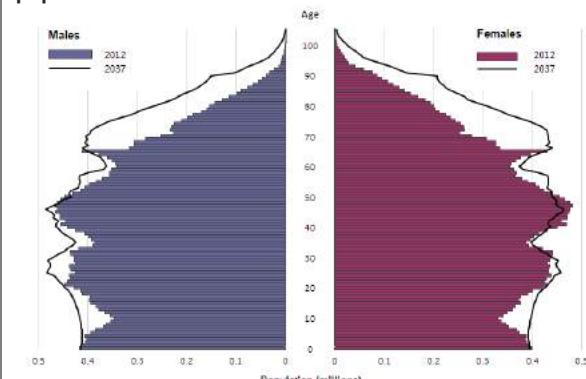
Projected increase in inequality – real after housing cost incomes expected to fall between 2014-15 and 2020-21 for poorest 15% on average⁵⁴. Questions of 'fairness' within and between generations

Figure 2: Population growth by region 2016 to 2040



Source: WaterUK (2016) (NB DCWW= Welsh Water)

Figure 3: Estimated & projected age structure of UK population 2012 & 2037



Source: ONS (2012)



Essential services: limited room for manoeuvre – There is relatively low elasticity of energy/water consumption to income or energy/water prices⁵⁵. Price elasticity varies within the population e.g. people on lower incomes are likely to be more responsive to changes in prices and incomes than people on higher incomes.

(housing, pensions, tuition fees etc.).



More households, smaller size – number households in England is projected to increase to 28.0 million in 2039 from 22.7 million in 2014 – with an average growth equivalent to 210,000 per year⁵⁶. Average household size projected to fall to 2.21 in 2039, or by 6%, from 2.35 in 2014. Larger households use less energy on a per person basis⁵⁷.



Squeezed incomes – house prices have continued to rise. Household spending and debt to income ratio has increased (OBR). Utility bills have risen. Energy/water bills will remain concern for consumers / politicians.



Uncertain benefits – shortfall between private rents & housing benefit could put 1m households at risk of homelessness by 2020⁶⁰.



More private renters – additional 1.8 million households become private renters by 2025 in England and Wales. Almost **1 in 4 of UK households** and more than half of 20-39 year olds will be renting privately⁵⁸. There will be more private renters than people in social housing. With shorter leases / less space, more difficult to install efficiency measures?



Working remotely – currently, at least one-third of the UK labour force works remotely all or some of the time⁵⁹. The trend for remote working is expected to increase. Impact on energy and water usage patterns.



Efficiency and technology – higher levels of efficiency (supplies, usage, appliances) and new technologies may help offset increased demand.

2.2 Behavioural trends for future consumers – changing expectations



Data and personalisation – enables consumer segmentation & targeting of new/responsive products that are more reflective of individual costs (supply at peak) and needs.



The Institute of Customer Service ‘Customer of the Future’ report - changes for consumers to 2025:

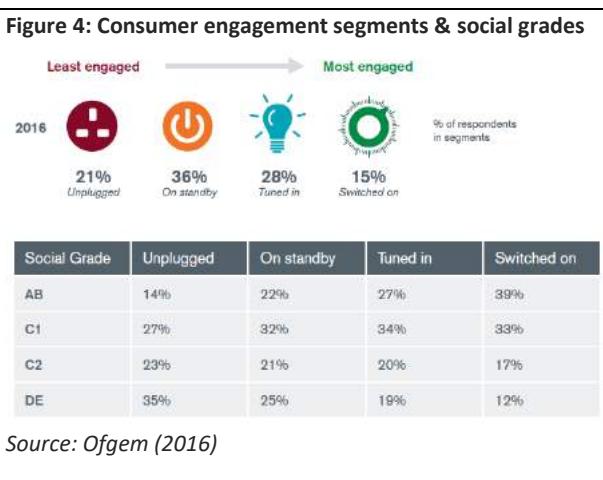
1. Convenience - have less time & patience. Despite cyber wars, prepared to share personal data in return for ease of use.
2. Rising regulatory scrutiny.
3. Artificial intelligence.
4. Increasing power of customers.
5. Gov. financial challenges.
6. Increasing speed of change.
7. Network economy.
8. Pluralisation of society.
9. Sensors / monitors.
10. Ethics / values significant⁶¹.



Engaging Tomorrow’s Consumer
Sustainability messaging needs: quality/durable services; simplicity; and appeals to social conscience⁶².



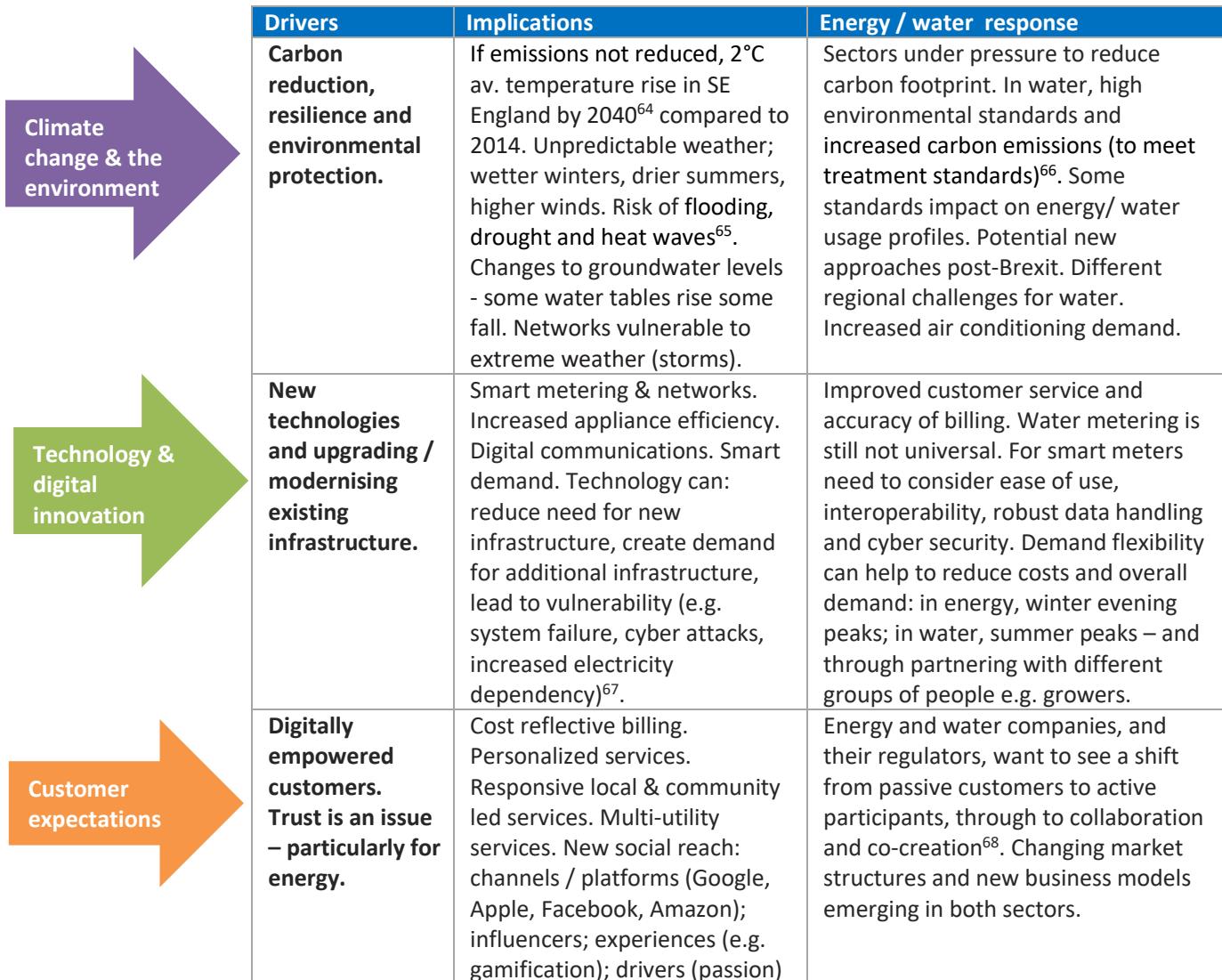
Fair switching? – switched on consumers tend to be from higher socio-economic groups⁶³. Issues with ‘sticky’ energy customers not switching – despite savings to be made. Possible future concerns re. algorithms and automatic switching.



Sharing economy – car sharing may increase with modest income growth / driverless cars – so electric vehicles may not need to be charged at home. Other community schemes popular (e.g. local PV or flood prevention measures).

2.3 Drivers of change & New-Pin desirable outcomes for energy and water sectors

The socio demographic trends of increased population, urbanization and affluence will lead to increased demand in both sectors. Other major drivers of change include:



Drivers	Implications	Energy / water response
Carbon reduction, resilience and environmental protection.	If emissions not reduced, 2°C av. temperature rise in SE England by 2040 ⁶⁴ compared to 2014. Unpredictable weather; wetter winters, drier summers, higher winds. Risk of flooding, drought and heat waves ⁶⁵ . Changes to groundwater levels - some water tables rise some fall. Networks vulnerable to extreme weather (storms).	Sectors under pressure to reduce carbon footprint. In water, high environmental standards and increased carbon emissions (to meet treatment standards) ⁶⁶ . Some standards impact on energy/ water usage profiles. Potential new approaches post-Brexit. Different regional challenges for water. Increased air conditioning demand.
New technologies and upgrading / modernising existing infrastructure.	Smart metering & networks. Increased appliance efficiency. Digital communications. Smart demand. Technology can: reduce need for new infrastructure, create demand for additional infrastructure, lead to vulnerability (e.g. system failure, cyber attacks, increased electricity dependency) ⁶⁷ .	Improved customer service and accuracy of billing. Water metering is still not universal. For smart meters need to consider ease of use, interoperability, robust data handling and cyber security. Demand flexibility can help to reduce costs and overall demand: in energy, winter evening peaks; in water, summer peaks – and through partnering with different groups of people e.g. growers.
Digitally empowered customers. Trust is an issue – particularly for energy.	Cost reflective billing. Personalized services. Responsive local & community led services. Multi-utility services. New social reach: channels / platforms (Google, Apple, Facebook, Amazon); influencers; experiences (e.g. gamification); drivers (passion)	Energy and water companies, and their regulators, want to see a shift from passive customers to active participants, through to collaboration and co-creation ⁶⁸ . Changing market structures and new business models emerging in both sectors.

2.4 Future outlook for water supply and flooding



Total water supply & demand: a varied picture - UK total public water supply currently exceeds demand by a little more than 10%⁶⁹. There is an uneven distribution of population / resources⁷⁰. Some water zones have modest deficits (where demand is > supply) presenting a risk of drought within the short to medium term.



Water deficit predicted to be between 5% and 16% by the 2050s – resulting in widespread deficits across many water resource zones if no adaptation interventions. Significant variability - London and the South East most at risk of deficits followed by Central, West and Yorkshire. Uncertain future picture – eg WaterUK report for England and Wales has range of 36 different future scenarios⁷¹. Others (eg NIC) estimate smaller deficits.



Drought and scarcity – range of predictions. 12% chance of 'severe' drought in East / South East over a 25 year period⁷² (rare event worse than any seen in Twentieth Century with standpipes, rationing etc for 2-3 months). Droughts increase risk of subsidence that could impact pipes and other assets. Thames Water now has a desalination plant to reduce risk.

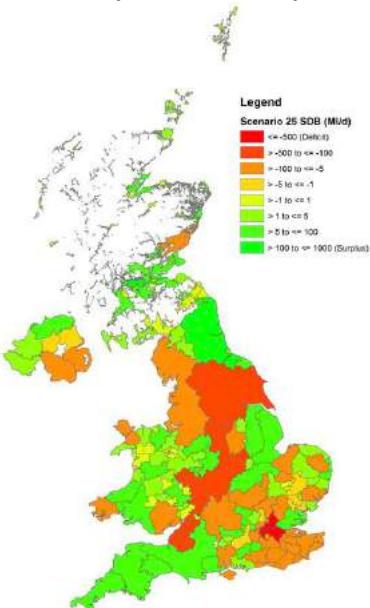


Metering: getting there - around 40% of households now have a water meter – the majority should have one around 2020. Customers with a meter on av. use ~123 litres p.p. per day, customers without ~153 litres⁷³. Reduced water usage in showers etc can also reduce energy usage and bills. Southern has a 'green doctor' home audit / retrofit scheme and Thames a smart metering programme.



Water quality – Increased abstraction can impact on quality, environment standards & aquatic environment. But National Environment Programme could also control / reduce abstractions.

Figure 5: Example 2050s supply-demand balance for current water resource systems – a varied picture



Source: NIA (2017)



Leakage – Accounts for an average of 22% of total water supply in most water resources zones (despite recent reductions)⁷⁴. New technologies better at detecting and fixing leaks?



Flooding – 1.8 million people in the UK currently live in properties at significant risk of flooding (greater than 1 in 75 or 1.3% annual probability)⁷⁵. 5 million properties at risk of flooding as of December 2013. 10% chance of a catastrophic flood in England within the next 20 years (one causing over £10 billion of damage)⁷⁶. Need for catchment measures⁷⁷. Environment Agency's estimate of replacement value of its flood defence assets is £24bn⁷⁸ - in major cities there are also approx. £12bn of defences in private ownership.



Affordability & value for money – Remain a concern in the future, with differing pictures between regions & for household and business customers. Incentive on customers to pay water bills when other costs are up weakened by ban on household disconnections.

2.5 Future outlook for the energy sector

Energy sector is changing rapidly. National Grid has set out four possible scenarios to 2030 – most figures below are based on this⁷⁹. Many global projections are more ambitious about low carbon uptake⁸⁰.



Uncertain electricity demand – rising or stable? Energy consumption in 2030 likely to be different from today. Uncertainty due to technological change. Under ‘gone green’ scenario, total demand could increase to 346TWh in 2030, from 334TWh in 2015. Or remain at a similar level at 331GW for ‘consumer power’ view.



A smart meter in every home by 2020? Energy landscape for consumers changing rapidly - digital, smart tech in homes, big data and new firms and business models⁸¹. Cost reductions will vary by technology.



Demand side flexibility – ‘Smart power’ – interconnection, storage and flexible demand – could save consumers up to £8bn a year by 2030⁸². The Association for Decentralised Energy estimates potential for demand side response of 9.8TWh by 2020⁸³. Storage capacity / batteries set to increase from 3GW to 4-11GW by 2030.



Electric vehicles on the up – uptake of 4 million electric vehicles by 2030 / 60% new sales?⁸⁶



Affordability & value for money – costs to consumers likely to increase, & bills will become more cost reflective. Who pays for decommissioning /consumers leaving grid - undecided



Decarbonisation – target to cut greenhouse gas emissions to 80% below 1990s levels by 2050. Traditional sources of supply are being replaced with an ever-diverse mix. Decline of fossil fuels, increased electricity storage, increased renewable energy. By early 2020s 40% of generation could come from wide range of renewable sources.

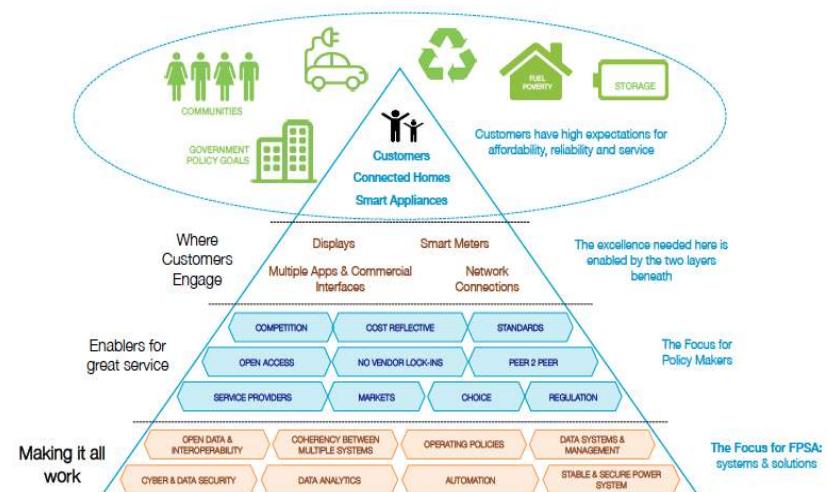


Electrification of heat leads to falling gas demand / heating - under consumer power scenario there will be 1 million heat pumps by 2025 – mainly in new build? Need to change behaviours / expectations to get uptake?



Energy efficiency – of homes, transport and appliances continues to increase. Domestic energy demand has fallen by 19% since 2000, despite a 12% increase in number of households & a 10% rise in population⁸⁴. UK Government estimates that, in 2014, average energy efficiency (SAP) rating of English dwellings was 61 – up from 45 in 1996, implying a 25% fall in modelled energy usage⁸⁵.

Figure 6: The elements of a low carbon future



Source: Future Power System Architecture Project (2017)

2.6 Opportunities for water and energy?

There is future uncertainty for both energy and water users due to: population growth, demographics, economics, household usage changes & behaviours; and the major drivers of change – climate change, technology & customer expectations. The sectors face many similar challenges & opportunities, including:

- **Collaboration and ‘fair’ approaches to sharing risks and rewards** – eg catchment management in water where Water Framework Directive encourages partnerships to improve water environment.
- **New innovative technology** – eg smart metering and predictive asset maintenance.
- **Smart & integrated utility services** – potential to control all utility services from one app. Billing could be linked to the customer (smart phone) not the meter – e.g. EV charging with Ubitricity⁸⁷.
- **Decentralised approaches** – eg in electricity, micro-generation and battery storage equipment. In water, local slow water and rainwater harvesting schemes. In both, demand side response.
- **Prosumers** – With distributed energy generation, micro-grids, ultra energy efficient buildings & electric vehicles – consumers could be more self-sufficient, offering services back to the system.
- **New finance systems** – eg blockchain⁸⁸ could enable energy users to trade on peer-to-peer basis, without need for 3rd parties⁸⁹. Crowd sourcing of funds for local initiatives possible in both sectors.

Part 3 Conclusion

Change is already happening for customers in the energy and water sectors but is likely to accelerate considerably in the coming decades. Although the impact of change is currently greatest in energy, it is also being felt in water as customer expectations change across the board and water companies are affected by the fall out from, and new opportunities of, the low carbon transition.

Amidst all of this upheaval, it is vital to ensure that future energy and water services meet consumer and citizen needs. For this to happen, three key challenges need to be addressed:

1. The necessity of **fast-broadband and good simple connectivity** – not just for rural areas. Digital access and skills are increasing, and the new broadband Universal Services Obligation should accelerate this trend. However, unless connectivity is improved, it could act as a barrier to change with distributional impacts for energy and water users.
2. How to tackle **affordability for up-front investment** - in terms of new / changed kit.
3. How to crack **tenure-related issues**. Whether you are an elderly owner-occupier, a young renter, doing up a property, a landlord etc – there need to be targeted practical measures which factor in tenure and where somebody is in that particular tenure ‘cycle’.

This paper provides a high level Sustainability First check-list for energy and water companies, their regulators and Government to use when considering future service provision. The check-list is ‘framed’ in terms of what is likely to happen in the wider social / political context in the coming decades. It is hoped that by using the check-list, the approach to change is more coherent and firmly rooted in the real experience and behaviours of citizens and consumers. By taking into account both economic drivers and behavioural approaches, the check-list should help ensure that decisions made around energy and water services are more people centred and future proofed.

The check-list identifies the **common areas** that need to be addressed **for all service users**. These are important as the interests of different socio-demographic groups often overlap. They are driven by the technological, demographic and climate change that will shape future energy and water services for nearly all consumers and citizens. The predicted increase in inequality across the economy is also likely to have an impact on all energy and water users – even if this is only indirectly in terms of knock-on political and regulatory impacts.

The **common** areas that are identified in the check-list are summarised below.

1. Convenient and targeted services and support

- **Companies** - what are you doing to provide more convenient and personalised services/support in terms of: simplicity by design; customer segmentation; support for those without broadband access / skills; and integrated services?
- **Regulators & Government** - have you understood & prepared for the wider impacts of convenience and personalization in terms of: broadband access / skills; significant ‘inconvenient’ changes; accurate algorithms; data protection and ownership; and joined up regulation and consumer protection?

2. Attitudes and values

- **Companies** – do you understand what motivates your customers and how to get behaviour change in terms of: consumer / citizen attitudes; ‘listening’ companies; competitive / collaborative behaviours; and outcome focused and timely communications?
- **Regulators & Government** – what are you doing in terms of behavior change to facilitate wider long-term public interest outcomes in terms of: interventions and mandatory approaches; when

people have experienced significant service disruption; and how regulatory and policy interventions are ‘framed’?

3. New affordability challenges

- **Companies** – what are you doing to ensure services are as affordable as possible in terms of: upfront costs; energy / water efficiency; charging arrangements; and opportunities for sharing?
- **Regulators** – what are you doing to ensure future smart energy and water services work for all in terms of: distributional impacts of personalization; developing understanding of the implications of change for customers that may be ‘left behind’; fostering / enabling new business models which wish to focus on affordable services – including for the vulnerable; building an evidence base and corresponding narrative; and dealing with failure for people in vulnerable circumstances?
- **Government** – what are you doing to ensure that future energy and water services are fair for all consumers and citizens in terms of: energy / water efficiency programmes; and policy development in related areas?

4. Who is in control? Complex web of decision makers

- **Companies, regulators and Government** – do you understand who the decision maker is and are you influencing and supporting them in the most effective way in terms of: landlord / tenant responsibilities; the change from commodity to service provision; devolved, regional and local approaches; collaborative / community opportunities; carers; pro-sumers; and control of ‘the system’ as a whole?

5. Trust in dynamic markets

- **Companies** – are you building trust in the company and where appropriate working with new entrants, third parties, intermediaries and partner organisations - including through supporting the development of intermediaries to help address specific problems in smart markets?
- **Regulators** – what is the appropriate approach for regulators to new entrants, third parties, intermediaries and partner organisations and how far do you understand their motivations and potential conflicts of interest?

In addition to the common areas identified above, the check-list also highlights areas where a more **targeted approach** may be needed **for specific socio-demographic groups**. For example, with an ageing population, specific attention will need to be given to energy and water users with increasing physical and hidden disabilities. And from a younger person’s perspective, future energy and water services will need to be designed around increasingly insecure lives (renting, more flexible jobs market etc). However, it is important to recognise that there is significant overlap between these different groups (eg you can be young, on a low income and living in a rural area).

When a more granular approach is appropriate, and if the needs of different socio-demographics do not coincide, regulators and Government may need to play a more active role in balancing the interests of different groups. As this may have significant distributional implications, it is important that it is done in a transparent and inclusive way.⁹⁰

As well as leading to direct benefits for consumers and citizens, the check-list will be a useful tool for companies to help secure their futures and identify where further innovation and change will be needed. Checking that they are putting their customers at the heart of what they do should help increase their customer satisfaction today and enable the shift towards more active customers tomorrow (saving energy / water, demand side response, prosumers etc).

Nearly all companies are doing many of the things included in the check-list already. However, from New-Pin we know that good practice can often just exist in pockets of a business and may not happen at the necessary scale to be sustainable. The check-list should facilitate conversations across the company to ensure good practice is spread and embedded. Similarly, although regulators

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and Government are already addressing many of the points raised, there is scope for them to do this in a more comprehensive, joined-up and outwardly focused way.

There is considerable uncertainty in some of the macro projections in the sectors – particularly in energy. It is therefore important that the check-list is reviewed on a regular basis so that future services are developed in a flexible and iterative way.

Annex 1 – Sustainability First’s New Energy and Water Public Interest Network (New-Pin)

Background: New-Pin brings together stakeholders active in the energy & water sectors to help secure greater focus in company, investor, regulatory & policy decisions on **long-run public interest issues**. It aims to:

- **Build understanding between the energy and water sectors and their stakeholders.** New-Pin explores areas of similarity and difference, leverages learning and identifies practical steps all actors can take that could better serve long-term public interest issues;
- **Strengthen stakeholder engagement.** New-Pin seeks to increase public participation in decisions by water & energy companies, investors, regulators and policy makers through developing lasting capacity and thought-leadership among ‘public interest’ advocates; and
- **Stimulate a more ‘inclusive’ perspective on governance.** The Network is exploring what governance in the public interest looks like for energy and energy companies.

New-Pin was established by the charity Sustainability First in 2015. The New-Pin Network is made up of consumer, environmental, citizen, academic and investor interests, a small group of energy and water companies, regulators and Government departments.

Sustainability First arranges and facilitates carefully structured New-Pin workshops to discuss relevant long-term public interest issues. The process is iterative and is evolving as New-Pin becomes more established. Network members decide which topic to focus on at each workshop. Prior to the workshops, Sustainability First holds bilateral discussions with members and other interested parties to discuss what they think are the key public interest issues in that topic area and to identify appropriate case study material. Following a literature review, this information is then used to draw up a draft paper for consideration at the workshop. After the session, the paper is revised to take on board comments. All final workshop papers are placed in the public domain.

Current and proposed New-Pin papers

- Towards a definition of the long-term public interest, August 2015
- Long-term affordability: who should pay for our infrastructure resilience and renewal and the move to low carbon? October 2015
- Trust and confidence: what does this mean for the different stakeholders in the energy and water sectors and what can be done to build and maintain this? March 2016
- Long-run resilience: Long-run resilience in the energy and water sectors. Are twentieth century approaches for securing resilience relevant for citizens and consumers of the twenty-first? June 2016
- Consumer, citizen and stakeholder engagement and capacity building, October 2016
- How far will market led approaches deliver the desired long-term public interest outcomes for energy and water, February 2017
- Tomorrow’s world for energy and water, September 2017
- Energy and water: how effective is your board in delivering long-term public interest outcomes? Autumn 2017
- Innovation and regulation: what’s the problem that innovation is trying to solve and how do regulators let go without letting companies off the hook? November 2017
- New-Pin: lessons learnt and next steps, February 2018

The New-Pin Network Current New-Pin public interest advocate members include: Citizens Advice, The Consumer Council for Water, Green Alliance, The Centre for Sustainable Energy, Water Wise, WWF, ShareAction and The iGov Programme at Exeter University. Company members include, from the energy sector; Electricity North West, Northern PowerGrid, RWE NPower, Scottish and Southern Electricity Distribution and Western Power Distribution; and from the water sector; Affinity Water, Anglian Water, South East Water, Southern Water and United Utilities. Regulatory members include: The Environment Agency, Ofgem, Ofwat and the Water Industry Commission for Scotland. Government representatives are: DfES, DEFRA, the Scottish Government and the National Infrastructure Commission. Other individuals with a relevant interest are invited to specific Network meetings

Annex 2 - Enablers /barriers to be tackled before different groups expect to adapt to/actively engage with our changing energy & water systems

<p>Older people</p> <ol style="list-style-type: none"> 1. Enablers: <ol style="list-style-type: none"> a. Low upfront costs – even if some may have capital to invest b. Convenience c. Family / friends / neighbour / intermediaries one can trust d. Standards / mandatory approach / compulsion e. Gradually build trust in technology – over time & with ext. support 2. Barriers: <ol style="list-style-type: none"> a. Lower disposable incomes b. Life expectancy/health related issues – physical barriers c. Long replacement cycles & pay back periods – won't see benefits 3. Priorities: <ol style="list-style-type: none"> a. Regulate trusted intermediaries b. Simple to use product standards, definitions & requirements c. Financial support & leases to cover initial investments for tech etc 4. Change for this group won't happen unless trusted intermediaries provide simple to understand services with support in place 	<p>Younger people</p> <ol style="list-style-type: none"> 1. Enablers: <ol style="list-style-type: none"> a. Renting – landlord incentives to ensure smart/efficient properties, longer term contracts and clearer landlord / tenant responsibilities b. Open and accessible data and connectivity c. Gameification / comparisons / embarrassment d. New business models (eg community ownership, crowd funding) 2. Barriers: <ol style="list-style-type: none"> a. Energy/water invisible services – limited experience of problems b. Often not direct bill payers so limited opportunities to engage with service providers – and can't be water prosumers 3. Priorities: <ol style="list-style-type: none"> a. Social messaging on key issues - fosters individual action / sense identity b. Data transparency and sharing 4. Change for this group won't happen by 2030 unless services are convenient and people understand them more
<p>People on low incomes</p> <ol style="list-style-type: none"> 1. Enablers: <ol style="list-style-type: none"> a. Finance – incentivised by income savings, grants for appliances, new methods of charging (eg by temperature, season, capacity etc) b. Trusted third parties, intermediaries and partner organisations – like face to face contact but also through mobile coms (68% of fuel poor have a mobile) c. Better targeting / segmentation / development of profiles 2. Barriers: <ol style="list-style-type: none"> a. Low disposable incomes – for day to day & for investments in smart kit b. Access to /provision of information – for consumers AND for potential new market entrants 3. Priorities: <ol style="list-style-type: none"> a. Trustworthy services and simple and accessible social tariffs and grants b. Partnerships & collaboration – combined energy / water outreach & services c. Improvements to housing stock 4. Change for this group won't happen by 2030 unless there is easily accessible financial support, with companies, regulators & policy makers working together to design strategies with low income groups in mind from the start 	<p>People in rural areas</p> <ol style="list-style-type: none"> 1. Enablers: <ol style="list-style-type: none"> a. Community solutions may be more popular in stronger & more clearly defined communities – with experience of independence / resilience b. More space / land enables more versatile solutions eg storing water c. People more connected to nature – impacts of use more visible 2. Barriers: <ol style="list-style-type: none"> a. Ltd. Economies of scale & don't get same support when funding schemes calculated on a per capita basis eg flood measures b. Low disposable incomes & often live in older properties that are difficult to modernise / with listed status / aesthetic barriers c. Threat of widening urban-rural tech gap: Limited / no broadband d. Some 'conservative' social attitudes / resistance to change 3. Priorities: <ol style="list-style-type: none"> a. Access – including Wifi and broadband b. Enable local and rural-tailored solutions – need variety of approaches 4. Change for this group won't happen by 2030 unless rural communities are active partners in infrastructure change programmes

References

- ¹ See <http://www.covi.org.uk>
- ² Pew Research Centre (2015) The whys and hows of generations research
- ³ See http://www.sustainabilityfirst.org.uk/images/publications/new-pin/New-Pin_Market_approaches_workshop_22_Feb_2017_FINAL_REVISED_SLIDE_SET.pdf
- ⁴ Vulnerability has both core and none core elements. The latter can be dynamic and affect everyone at different stages in their lives.
- ⁵ IPPR (2016) Future proof Britain in the 2020s
- ⁶ Ofcom (2017) Access and inclusion: outcomes for consumers in vulnerable circumstances
- ⁷ Lloyds Bank (2017) Basic Digital Skills
- ⁸ DCMS (2017) Broadband USO: Consultation and design
- ⁹ DCMS (2017) UK Digital Strategy 2017
- ¹⁰ See, for example, Freshfields, Bruckhaus Deringer (2017) Pricing algorithms: the digital collusion scenarios
- ¹¹ JRF (2016) UK poverty: causes, costs and solutions
- ¹² Lloyds Bank op cit
- ¹³ Accenture (2016) New Energy Consumer Survey
- ¹⁴ For example, in transport the impact of hidden disabilities on passengers has been documented by Professor Mackett www.ciltuk.org.uk/Portals/0/Documents/Forums/Acc&inc/Related%20information%20&%20links/Roger%20Mackett.pdf?timestamp=1486546561484
- ¹⁵ Accenture op cit
- ¹⁶ Columbia Business School (2015) What is the future of data sharing?
- ¹⁷ BBC (2016) The Bottom Line, broadcast 5/11/16
- ¹⁸ JRF (2016) Falling short: The experiences of families below the Minimum Income Standard
- ¹⁹ Ofcom (2017) Adults' media use and attitudes Report 2017
- ²⁰ Ofcom (2016) Connected Nation 2016
- ²¹ See <https://hbr.org/2016/03/psychographics-are-just-as-important-for-marketers-as-demographics>
- ²² Stemming from Maslow's hierarchy of needs, this theory was explored by Chris Rose in his 2011 book 'What Makes People Tick'. He has written further about Values Based Segmentation - see <http://threeworlds.campaignstrategy.org/wp-content/uploads/2013/03/Summary-of-Values-Based-Segmentation-CR-CSL-March-2013.pdf>. This thinking is used by groups such as Cultural Dynamics Strategy and Marketing (www.culdyn.co.uk), Futerra (see www.wearefuterra.com/wp-content/uploads/2015/10/Sellthesizzle.pdf) and has influenced social marketing / nudge approaches.
- ²³ Maggie Mort et al, Lancaster University (2016) Children, young people and flooding: Recovery and resilience
- ²⁴ Deloitte (2017) Millennial Survey
- ²⁵ Joseph Rowntree Foundation (2017) How poverty affects people's decision making processes
- ²⁶ Behaviour Insights Team (2016) Poverty and decision making: How behavioural science can improve opportunity in the UK
- ²⁷ See http://www.sustainabilityfirst.org.uk/images/publications/new-pin/New-Pin_-Affordability_Workshop_28_Oct_2015_-_FINAL_PAPER_PDF.pdf
- ²⁸ See <http://www.sustainabilityfirst.org.uk/index.php/inspire>
- ²⁹ NAO (2017) Vulnerable consumers in regulated industries
- ³⁰ See, for example, Green Alliance (2017) Why the UK needs an ambitious Clean Growth Plan now
- ³¹ For example, see Waterwise (2017) Water Efficiency Strategy for the UK
- ³² ECIU (2017) Made in China: Importing higher energy bills
- ³³ IPPR op cit
- ³⁴ IFS (2017) [Living standards, poverty and inequality in the UK, 2016-17 – 2021-22](#).
- ³⁵ BBC (2016) The Bottom Line, broadcast 5/11/16
- ³⁶ IPPR op cit
- ³⁷ JRF (2016) UK poverty: causes, costs and solutions
- ³⁸ JRF op cit
- ³⁹ NEA (2017) UK Fuel Poverty Monitor 2016/17
- ⁴⁰ Ofwat (2017) Tapped In
- ⁴¹ See http://www.sustainabilityfirst.org.uk/images/publications/new-pin/New-Pin_Trust_and_Confidence_Paper_FINAL_VERSION_FOR_WEBSITE_18.3.16.pdf
- ⁴² See for example <https://www.ofgem.gov.uk/about-us/how-we-engage/innovation-link>
- ⁴³ Accenture op cit

⁴⁴ Deloitte op cit

⁴⁵ CPRE (2017) Energy Scenarios Research

⁴⁶ NIC is analysing the UK's long-term economic infrastructure needs, setting out a strategic vision over a 30-year time.

⁴⁷ ONS (2015) [National Population Projections: 2014-Based Statistical Bulletin](#).

⁴⁸ NIC (2016) [The impact of population change and demography on future infrastructure demand](#).

⁴⁹ ONS statistics (2014) [National Population Projections UK mid-2014 to mid-2114](#).

⁵⁰ Age UK (2015) [The Age UK almanac of disease profiles in later life: a reference on the frequency of major diseases, conditions and syndromes affecting older people in England](#).

⁵¹ Anderson et al. (2016) *Electricity consumption and household characteristics: Implications for census-taking in a smart metered future*, Computers, Environment and Urban Systems.

⁵² DECC (2016) [National Energy Efficiency Data-Framework Report](#), Annex C.

⁵³ Office of Budgetary Responsibility (2017) [Fiscal Sustainability Report](#).

⁵⁴ IFS op cit

⁵⁵ NIC (2017) [Economic growth and demand for infrastructure services](#).

⁵⁶ NIC (2016) [The impact of population change and demography on future infrastructure demand](#).

⁵⁷ DECC (2016) [National Energy Efficiency Data-Framework Report](#), Annex C.

⁵⁸ PwC (2015) [UK Housing Market Outlook: The Continuing Rise of Generation Rent](#).

⁵⁹ The Work Foundation & Lancaster University (2016) [Working Anywhere: A Winning Formula For Good Work?](#)

⁶⁰ Shelter (2017) [Shut out; Households put at risk of homelessness by the housing benefit freeze](#)

⁶¹ The Institute of Customer Service (2016) [The customer of the future](#).

⁶² World Economic Forum (2014) [Engaging Tomorrow's Consumer](#).

⁶³ Ofgem (2017) [Future Insights Series - The Futures of Domestic Energy Consumption](#).

⁶⁴ Defra (2014) [Climate Change Explained](#).

⁶⁵ Committee on Climate Change (2016) [UK Climate Change Risk Assessment 2017](#).

⁶⁶ Severn Trent Water (2010) [Changing Course – Delivering a sustainable future for the water industry in England & Wales](#).

⁶⁷ NIC (2016) [The impact of technological change on future infrastructure supply and demand](#).

⁶⁸ Ofwat (2017) [Tapped in: from passive customer to active participant](#).

⁶⁹ NIC (2017) [The impact of the environment and climate change on future infrastructure supply and demand](#).

⁷⁰ Yorkshire Water and PwC (2016) [The water and wastewater sectors: The long view](#).

⁷¹ WaterUK (2016) [Water Resources long term planning framework \(2015-2065\)](#).

⁷² WaterUK (2016) [Water Resources long term planning framework \(2015-2065\)](#).

⁷³ Water UK (2016) [Discover water – the amount we use](#).

⁷⁴ NIC (2017) [The impact of the environment and climate change on future infrastructure supply and demand](#).

⁷⁵ NIC (2017) [The impact of the environment and climate change on future infrastructure supply and demand](#).

⁷⁶ WSP, Parsons Brinckerhoff & Business in the Community (2015) [The UK in 2030 – key trends for the built environment](#).

⁷⁷ EFRA select committee (2016) [Future flood prevention Second Report of Session 2016–17](#).

⁷⁸ National Audit Office, Defra and the Environment Agency (2014) [Strategic flood risk management](#).

⁷⁹ National Grid (2016) [Future Energy Scenarios: Gone Green – wealthy, environmental sustainability top priority; Slow Progression – long-term environmental strategy; Consumer Power – wealthy, market-driven; No Progression – low-cost solutions](#).

⁸⁰ For example, <https://about.bnef.com/blog/global-wind-solar-costs-fall-even-faster-coal-fades-even-china-india/>

⁸¹ Ofgem (2017) [Future Insights Series - The Futures of Domestic Energy Consumption](#).

⁸² NIC (2016) [Smart Power](#).

⁸³ ADE (2016) [Flexibility on demand: Giving customers control to secure our electricity system](#).

⁸⁴ DECC (2015) [Energy Consumption in the UK](#).

⁸⁵ Standard Assessment Procedure (SAP) is used to monitor the energy efficiency of homes, with an index based on calculating annual space & water heating costs for a standard heating regime, on a scale of 1 (highly inefficient) to 100 (zero net energy cost).

⁸⁶ The Committee on Climate Change (2017) [Report to Parliament on Meeting Carbon Budgets – Closing the Policy Gap](#).

⁸⁷ Ofgem (2017) [Future Insights Series - The Futures of Domestic Energy Consumption](#).

⁸⁸ A blockchain is a distributed digital database that automatically tracks transactions across a network & is the basis of the Bitcoin.

⁸⁹ Ofgem (2017) [Future Insights Series - The Futures of Domestic Energy Consumption](#).

⁹⁰ For how this can be done, see http://www.sustainabilityfirst.org.uk/images/publications/new-pin/New-Pin_-_Engagement_Discussion_Paper_-_FINAL_-_November_2016.compressed.pdf