

Understanding the impact of changes in the energy policy landscape: Summary report

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This report summarises a research project to support the Scottish Government's work on promoting consumer engagement and protecting consumers as part of changes to energy policy and Scotland's low-carbon transition.

There are four other reports from this project:

- [Changes to the energy landscape and potential impacts on Scotland's consumers](#)
- [Changes to the energy policy landscape and potential impacts on Scotland's consumers: Distributional impact modelling](#)
- [Domestic energy consumer types: Review of existing segmentation approaches](#)
- [Domestic energy consumer types: Segmentation profiles](#)

Summary

- The energy policy landscape is changing significantly, and forthcoming changes in energy policy are likely to impact on consumers in a variety of ways.
- Drawing on data associated with housing tenure, household income, rurality, and energy efficiency a set of eight consumer archetypes has been developed that provide a framework for exploring how the impact of energy policy changes may vary for different groups of consumers in Scotland.
- The impacts of specific changes in energy policy on each of these groups of consumers can be modelled to understand how these impacts may vary across different groups of energy consumers.
- Our analysis models the implications of a switch to time of use (TOU) tariffs; increased uptake of electric vehicles (EVs); and the future for domestic heat pumps and solar photovoltaics (PV) systems for different consumer groups.
- Overall, the modelling shows that those with higher incomes are more likely to participate in the evolving smart energy market and benefit from new technologies and energy market solutions, raising equity and distributive concerns.

ClimateXChange is Scotland's Centre of Expertise on Climate Change, providing independent advice, research and analysis to support the Scottish Government as it develops and implements policies on adapting to the changing climate and the transition to a low carbon society.

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This research is independent and does not necessarily reflect Scottish Government policy.

Please also note that, although published in late 2020, this research was finalised in 2019.

Introduction

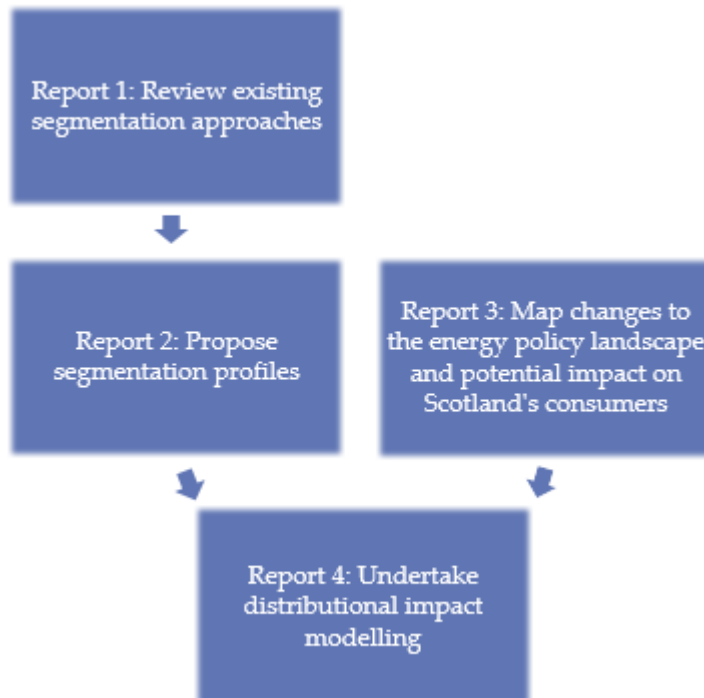
The Scottish Energy Strategy¹ aims to strengthen the development of local energy, protect and empower consumers, and support Scotland's climate change ambitions while tackling poor energy provision.

One of the priorities of the Strategy is to promote consumer engagement and protect consumers from excessive or avoidable costs. It also aims to promote the benefits of smarter domestic energy applications and systems for all consumers.

Through ClimateXChange the Scottish Government commissioned several linked research projects to support its work on promoting consumer engagement and protecting consumers as part of Scotland's low-carbon transition.

The programme of work, completed in mid-2019, consisted of:

- 1) Reviewing current approaches aimed at identifying groups of energy consumers in the UK.
- 2) Developing an approach to identifying specific groups of energy consumers, identifying eight specific groups or archetypes.
- 3) Reviewing forthcoming changes in energy policy to identify those changes likely to impact on energy consumers. These changes were grouped into policy changes associated with:
 - smart energy;
 - decarbonising energy supply; and
 - energy efficiency.
- 4) Considering the implications of a subset of these policy changes for each specific energy consumer group to highlight how they may impact differently on each consumer group.



¹ <https://www.gov.scot/publications/scottish-energy-strategy-future-energy-scotland-9781788515276/>

Figure 1: Four particular pieces of research that have been undertaken and the relationship between them.

Report 1: Domestic energy consumers: Review of existing approaches to segmenting energy consumers in Great Britain

A review of existing approaches to the segmentation of energy consumers in Great Britain was undertaken in order to understand the extent to which these are useful in the Scottish context.

The work reviewed eleven consumer segmentation approaches developed by Ofgem, Scottish Government, the Financial Conduct Authority, Smart Energy GB, energy suppliers and commercial marketing organisations. The research concludes that existing segmentation models are of limited relevance to a Scotland- and consumer-focused segmentation, for two principal reasons:

- Firstly, because of their primary use for marketing and communications, most segmentation models are attitude and behaviour based. In order to effectively model the impacts of energy policy and interventions an understanding of a wider range of consumer characteristics and contexts would be important, as the impacts will not just be determined by attitudes and behaviours, but also by physical and socio-economic characteristics.
- Secondly, the geographic distributional elements of existing segmentations, other than the commercial models, are extremely limited so could not be readily utilised to model impacts across different geographies.

Report 2: Domestic energy consumer archetypes: Segmentation profiles

The review of existing segmentation models was used to inform the development of an approach to identifying specific groups of consumers, or archetypes, for the Scottish Government. As well as incorporating energy policy levers, the approach uses input data that is readily available and regularly updated. This helps to make the segmentation adaptable and affordable.

The archetypes were produced from data in the Scottish Housing Condition Survey (2014 - 16) and the Scottish Household Survey (2014 - 16), supplemented with information from Ofgem Consumer Segmentation (2017) data. The data was separated into eight distinct ‘clusters’ or household archetypes intended to assist Scottish Government and others in more accurately and consistently assessing the implications of energy policy and interventions on different types of consumers.

The archetypes are summarised in table 1. All households (and consumers) in Scotland are represented by these groups. The names of the archetypes represent the most typical characteristics, predominant features or average statistics (e.g. household income) across all households in these groups. It should be noted that within groups there exists a degree of variation in these characteristics and statistics. A more detailed discussion on the main intended uses of the archetypes as well as their limitations is available in the main report.

Archetype	Number of hhlds	Average net income	Main rurality	Long-term illness or disability	Energy market engagement
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1	Single low income renters using electricity for heating	245,000	£18,700	Mixed	42%	8%
2	Urban very low income single older adults	289,800	£11,600	Urban	43%	24%
3	Switched on wealthier couples and families	597,000	£41,700	Urban	17%	84%
4	Families or younger couples in urban areas	418,700	£19,400	Urban	7%	42%
5	Wealthy rural families	99,300	£42,400	Rural	21%	55%
6	Older urban couples who own their homes outright	320,600	£25,100	Urban	44%	63%
7	Urban social renters with long term health problems	285,400	£17,400	Urban	92%	25%
8	Rural, less affluent older adult households	174,500	£22,800	Rural	30%	30%
All households		2,430,300	£25,100	-	34%	47%

Table 1: Summary of consumer archetypes

Report 3: Changes to the energy landscape and potential impacts on Scotland's consumers

This review picks out the important future developments in energy policy and explores how these may impact on consumers. The work focuses particularly on changes occurring in the next five years, and considers changes originating in Scotland, the UK and Europe.

The graphic overleaf shows the main targets and policies including legally binding emission reduction targets set out in the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 and commitments made in the Scottish Energy Strategy. The work looks specifically at Scottish Government policies on renewable energy and energy efficiency (with reference to UK and European-level policies for comparison). The UK Government retains powers over regulation of the energy sector as well as the power to raise taxes from energy bills.

The analysis and findings are grouped under three policy themes:

- Smart consumers
- Energy decarbonisation
- Energy efficiency

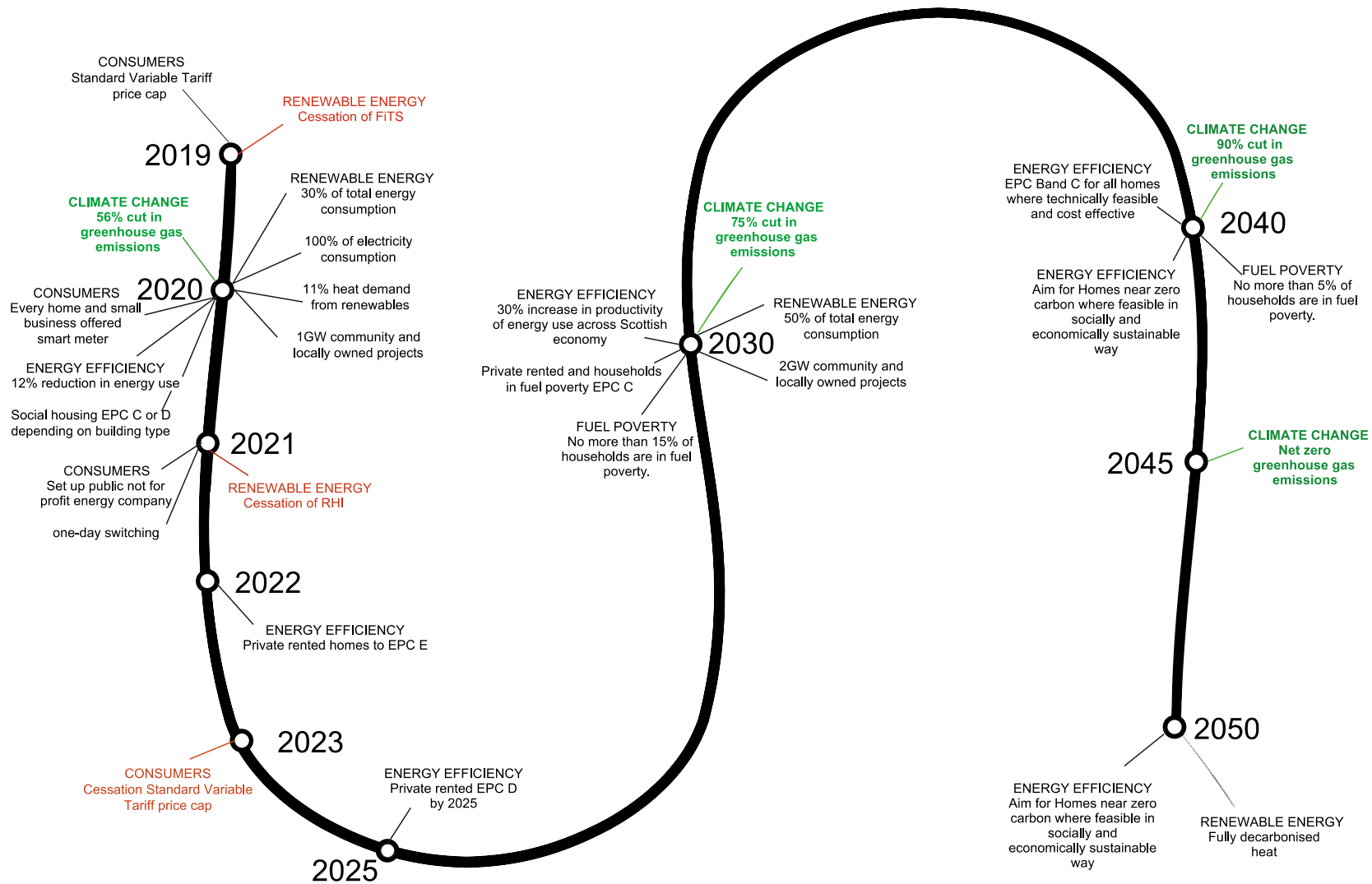


Figure 1 Key changes to the energy landscape for consumers in Scotland, 2019-2050. Text in green reflects Scotland’s legally binding emission reduction targets.

Key findings: Smart consumers

A number of changes in the energy policy landscape relating to innovative consumer approaches and technologies are likely to have implications for consumers:

- Consumers are being expected to take a much more active role in the energy market. This includes exercising their **choice to switch supplier**. New policies aimed at making switching easier are due to be introduced. However, the majority of consumers do not currently routinely exercise this right. Those customers on restricted meters, tariffs or fuels are likely to have limited switching choice.
- The **smart meter rollout** is one of the enablers of a future in which consumers, their appliances, their cars and their decisions on when and how much energy to use, play an essential part in the integration of low carbon technologies into everyday life. However, many consumers do not understand smart meter functions and only a fifth of customers express interest in signing up to a Time-of-Use² tariff, with a bias towards younger consumers and those with higher incomes.
- A **lack of digital connectivity in remote areas** has delayed the smart meter rollout. This excludes these customers from some of the better tariffs and limits opportunities to switch supplier and save money on bills.
- Smart adaptations tends to **require consumers to be digitally literate and have internet access**, those that are digitally excluded could be excluded from these benefits.
- A series of **energy price caps** have been introduced, however, these are due to be rolled back with the full rollout of smart meters and measures to make switching easier. As described above some groups of consumers will not necessarily benefit from the smart meter and switching policies.
- Many scenarios mapping pathways to significant emission reductions require both further and large-scale decentralisation of energy and a shift towards more **consumers generating energy themselves, flexing their demand and buying into the “smart” energy future**. Some consumers are likely to have less flexibility in their energy demand (for example households with children or complex medical demands), and less scope to generate their own energy.

Key findings: Energy decarbonisation

Decarbonising Scotland’s energy system is one aspect of Scotland’s energy strategy with targets and policies originating from the EU, UK and Scotland all likely to have implications for consumers.

- Renewable energy support schemes at the UK level have been supported through a **levy on consumer bills**. This has included mechanisms to support householders, housing associations and businesses to install low carbon heating systems and invest in local energy projects. This provides longer-term protection against fluctuating fossil fuel costs for all consumers.
- Less well-off **customers lack the upfront capital to invest in renewable energy schemes** and therefore benefit from the associated returns (e.g. from Feed-in Tariffs and the Renewable Heat Incentive). However, as a percentage of income, they pay more towards these schemes.
- The move towards smaller more dispersed and local projects means that we are much more likely to live and work near, or travel past energy generation projects. There is some limited evidence that **proximity to projects enhances support and engagement in the energy market**. There is potential to build on this: through new business models that forge a direct commercial relationship with local customers; and through community ownership of projects or land.
- **Local renewable energy schemes** can bring energy security to those in remote areas otherwise reliant on high cost, imported fuels.

² The time of use tariff allows energy companies to charge different amounts for electricity depending on the time of day.

Energy efficiency

- Delivering forthcoming commitments to a **reduction in energy use, improvements in building energy efficiency and curbing fuel poverty** are all likely to have significant implications for consumers.
- Home energy efficiency improvements are already having a protective effect against rising fuel prices for consumers and **lifting some households out of fuel poverty**.
- Funded in part from consumer levies, Scotland has made **good progress in installing energy efficiency measures**, leveraging support from consumer-levy-funded UK-wide schemes to target measures in social housing, harder-to-reach and harder-to-treat properties. As a result, Scotland has successfully countered what would have been an urban concentration of schemes targeting the cheapest measures. Maintaining progress in the installation of energy efficiency improvements is likely to require further work to convince home owners to take individual actions.
- Households with lower levels of choice on energy source (e.g. off gas customers) are more likely to have poorer energy efficiency and higher levels of fuel poverty. Improving energy efficiency for this group of consumers offer particular benefits.
- Smart meter data shows that income is the strongest driver of energy consumption. On a national scale when prices rise, consumption drops – promoting energy saving but potentially driving consumption levels to dangerously low levels among the fuel poor and in so doing disadvantaging those that already have a low environmental impact by virtue of low incomes. In the future, **smart meters might provide more insight into these effects and help to protect against under – as well as over-consumption**.

Report 4: Changes to the energy policy landscape and potential impacts on Scotland's consumers: Distributional impact modelling

This aspect of the work applies the archetype framework of consumer types to assess the distributional consumer impacts – or who will be impacted, where, and by how much for a subset of key energy policy changes.

The assessment relates to changes that are emerging as part of a transition to a more 'smart' energy system and the implications of changes to low carbon energy policies.

Specifically:

- a switch to time of use (TOU) tariffs;
- increased uptake of electric vehicles (EVs); and
- the future uptake of domestic heat pumps and solar photovoltaics (PV) systems.

The modelling has considered changes that might occur until 2025. Impacts are presented by consumer segmentation type.

The full report sets out more details about the assumptions and observations by consumer group, however the information can be summarised as follows:

Time of use tariffs

- Time of Use (TOU) tariffs are one of the first ways in which consumers can start to use the full functionality of smart meters. The modelling draws on evidence of who is likely to take up smart meters and TOU tariffs and the benefits of doing so (lower bills), to model impacts.
- The modelling suggests that those most likely to benefit from ToU tariffs are typically found in the more affluent archetypes, where households typically own their own homes, are more engaged in the energy market.

Adoption of electric vehicles

- EV uptake was modelled by considering the most likely households or consumers to switch to EVs and apply an estimate of the numbers of households doing so by 2025, based on UK government and energy industry projections.

- Observations highlight that uptake is likely to be highest amongst affluent couples and families.
- The modelling also highlights that there are likely to be geographical distributional impacts. For example, the model suggests that urban consumer archetypes accounted for over 80% of future EV owners, while rurally located consumer archetypes accounted for less than 15%.
- The modelling also shows an anticipated overlap between EV owners and those switching to TOU tariffs.

Uptake of low carbon technologies in the home

- Models were also created that projected the uptake of heat pumps and solar PV systems up to 2025. These are or have been supported financially by the Renewable Heat Incentive (RHI) and Feed-in-Tariff (FiT) respectively.
- Uptake rates were projected to be highest amongst affluent couples and families – accounting for two thirds of those installing solar PV systems between now and 2025. Uptake of ground source heat pumps by 2025 was projected to be highest amongst affluent rural householders.
- Those least likely to benefit (and potentially losing out through increase energy costs) are those on lower incomes, more loss averse and renting their own homes.

Overall, the modelling shows that having financial resources and being less risk-averse are likely to be significant driving factors in determining whether energy consumers will participate in the evolving smart energy market and adopt newer energy technologies. As a result, benefits from new technologies and energy market solutions are likely to be stacked upon those with higher incomes.

Simultaneously, those who are unable or unwilling to engage in future energy market changes will likely pay a premium. In particular, it is likely that as ToU tariffs become more common and households switching to these are able to shift energy usage to reduce costs, those left on standard tariffs could see their bills rise to cover losses in energy supplier revenues.

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