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UK Rooftop Solar Behavioural Research

A report by Basis Social

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Glossary

Schemes and programmes

- Feed-in Tariffs (FIT): a government programme set up in April 2010 designed to promote the uptake of small-scale renewable and low-carbon electricity generation technologies. It required participating licensed electricity suppliers to make guaranteed payments on both generation and export from eligible installations. The scheme closed to new applicants in March 2019.
- Green Homes Grant (GHG): a grant scheme for homeowners and landlords in England that covered up to two-thirds of the cost of installing certain energy-efficient and low-carbon heating improvements. Solar photovoltaic panels were not included in the Green Homes Grant. The scheme closed in March 2021.
- Microgeneration Certification Scheme (MCS): a certification scheme for low-carbon products and installations. Membership of MCS demonstrates adherence to recognised industry standards on quality and compliance.
- Property Assessed Clean Energy loans (PACE): a type of financing for energy-efficient upgrades or the installation of renewable energy sources where debt is linked directly to the property, rather than the owner. PACE loans have been launched in the EU, the US, and Australia, though are not available in the UK at the time of publication.
- Smart Export Guarantee (SEG): an obligation set by the government for licensed electricity suppliers to offer a tariff and make payment to small-scale low-carbon generators for electricity exported to the National Grid. The SEG came into force on 1 January 2020 following the closure of the FIT scheme. SEG payment rates are variable.
- Solar Together: a solar panel and battery storage group-purchase scheme, spearheaded by local authorities, allowing residents and small businesses to install solar panels on their homes and businesses at an affordable price.

Sample profiles

- Adopters: households or businesses that have solar panels already installed.
- Considerers: households or businesses who might consider installing solar panels.
- Rejectors: households or businesses who are unlikely to consider installing solar panels.
- Small and medium-sized enterprises (SMEs): businesses with the following headcount and turnover characteristics

	Headcount	Turnover
Medium	<250	£41m
Small	<50	£8.2m
Micro	<10	1.7m

Executive summary

This research set out to understand the factors that influence the adoption of rooftop solar photovoltaic (PV) panels for households and small and medium-sized enterprises (SMEs). The project specifically aimed to understand the barriers and enablers to adoption across different consumer and business attitudinal and behavioural profiles including those who are considering installing solar panels (Considerers), those who have already installed solar panel (Adopters), and those who would not consider installing solar panels (Rejectors). The research involved an online survey of 889 households across GB and online depth interviews with 15 SMEs. Findings were mapped to a behavioural framework to aid analysis.

Headlines: Household research

From the analysis of our findings, a range of measures would help to encourage the installation of solar panels in households, including:

1. Risk mitigation: a Guarantee Scheme and approved solar panel supplier and installer listings.
2. Financial support: up-front financing and spreading costs out over time.
3. Options for surplus energy: the ability to make financial gains from selling excess energy back to the grid, as well as access to battery storage.

There is also opportunity for government to provide clear and trusted information to demystify the installation process, counter myths, and concerns.

- Other than the Green Homes Grant, awareness of current green energy schemes is low. While uptake of the Smart Export Guarantee (SEG) is likely to be high among new solar panel owners, the variable tariff structure makes it less of an incentive to install compared with the Feed-in Tariffs (FIT) which had guaranteed payments.
- In this sample, those considering solar panels were predominately female (61%), had a young age profile (49% aged under 35 years), were ethnically diverse (18 % from ethnic minorities), and of higher social grade (40% AB). They are also making or planning to make their way onto the property ladder.

Headlines: SME research

- A focus on business efficiency following COVID, together with the new super deduction on capital allowances,[1] provide a unique set of circumstances to encourage the uptake of solar panels.
- The commercial viability of solar is the primary concern for SMEs. The economics are attractive over a 5–10-year horizon.
- While helpful for small and micro businesses, overall access to capital and financing is not a major barrier to the adoption of solar panels. However, creating a stable policy environment to plan both upfront costs and returns is a concern.
- Environmental considerations are material to the decision process and increasingly seen as part of businesses' license to operate.
- Timely and targeted communications to SMEs contemplating solar is important to drive adoption. SMEs will identify with communications that demonstrate the commercial returns for solar panel installations on businesses that are comparable in terms of energy use and premise size.
- SMEs need a simple step-by-step guide for the factors they need to consider when adopting solar. Given the low engagement with government websites, disseminating such information via energy companies and installers is more likely to support its use.
- Potential increases in business rates were the single biggest barrier for the adoption of solar and SMEs felt it should be a priority for government to address this. Medium-size businesses with higher energy use were routinely considering installation of 50kW and above.[2]
- For small and micro businesses, the relatively short period of time they are likely to remain in a property to justify the investment is a significant barrier.

[1] From 1 April 2021 until 31 March 2023, companies investing in qualifying new plant and machinery assets (including solar panels) will be able to claim a 130% deduction capital allowance. Effectively this means they will be able to cut their tax bill by up to 25p for every £1 they invest. See: https://www.gov.uk/guidance/super-deduction

[2] On the 1st April 2017, revised rateable values published by the Valuation Office Agency (VOA) came into effect, which saw a six to eight-fold increase in business rates for companies who own and consume electricity supplied from rooftop solar installations (other than those eligible for transitional aid who will experience a gradual increase). There is a business rates exemption for solar power generating equipment (less than 50kW) between its installation and the next business rates revaluation. In instances where installations are greater than 50kW, businesses can see their rates increase. The government is currently undertaking a fundamental review of the business rates system. This review will consider reform on all elements of the business rate system, including the treatment of plant and machinery and its impact on investment. The Review will conclude in Spring 2021.

Headlines: Discussion and conclusions

The potential to drive greater adoption of solar PV to help meet net zero commitments is encouraging given:

- the cost of solar panel installation has declined by 60% since 2010, with group purchase schemes offering to the potential to bring average household costs below £4000.
- there have been very positive experiences of both household and SME Adopters in this study, with expectations met or exceeded in terms of efficiency savings, ease of purchase, maintenance and reliability, and environmental benefits.
- solar offers less disruption and greater familiarity relative to other low carbon measures, such as wall and floor insulations and heat pumps.
- the technology is effective at offsetting carbon.
- there is headroom for expansion, particularly given the low deployment footprint in urban areas such as London.

From the analysis of our findings, to drive adoption there is a need to:

Address risk through the development of a Guarantee Scheme, for example. Given warrantees are commonly available from manufacturers of solar PV, this barrier may in part be addressed by raising awareness of existing schemes. Concerns around workmanship and whether companies would be trading in the future could also be addressed through an expanded role of MCS and other accreditations.

Given the very low (0.05%) failure rate of solar PV,[3] there also may be scope for a government-backed guarantee scheme given the level of risk involved.

Support financing and spread out the upfront costs potentially through creating a policy environment to encourage the adoption of new financial products, such as Property Assessed Clean Energy (PACE) style loans. Such loans have a long payback horizon and importantly have debt tied directly to the property, rather than the owners.

Highlight the potential for financial gains from installation by making relatively modest changes to the SEG design (potentially by fixing increasing rates for a defined period), together with a great focus on awareness-raising and marketing of the scheme.

For SMEs, there is a window of opportunity until March 2023 provided through the super-deduction to push solar as a key opportunity for capital expenditure.

Targeted communications, providing examples of the potential commercial return for similar types of businesses, could provide a timely nudge to enable SMEs contemplating

[3] https://www.nrel.gov/news/program/2017/failures-pv-panels-degradation.html

efficiency measures to actively pursue solar. There is a particular opportunity to drive adoption amongst medium-sized businesses with higher energy use.

The SME journey can also be improved via a **step-by-step guide to the installation process**, including costs involved, fiscal considerations, together with recommended installers.

For smaller and micro businesses, the potential to **align incentives for landlords to support with upfront costs, plus options for financial support such as grants or PACE loans**, are needed to maximise uptake with this group.

Headlines: Policy questions

There were several policy questions of interest for the study. Summary findings are given below:

Are alterations needed to the SEG?

There is scope to make alterations to the SEG to encourage adoption of solar PV. For households, this could include increasing awareness of the scheme, repositioning communications to explicitly highlight the ability to make money from selling surplus energy back to the grid, setting a higher minimal rate of return, and introducing fixed rather than variable tariffs for a limited adoption period.

Fixing and increasing rates of return are also likely to be influential for small and micro businesses with lower energy uses. Again, much needs to be done to raise awareness of the scheme, and targeted communications are needed if it is to play any meaningful role in the adoption process.

Do potential fiscal changes present barriers to the uptake of solar?

Potential increases in business rates were a significant barrier for the adoption of solar by SMEs. Potential changes to rates are a particular concern for medium-sized businesses with higher energy use and likely to change the fundamental assumptions around the installation return on investment (ROI).

VAT changes were less of a concern for SMEs, though all the businesses engaged in the research had a turnover of more than £85K and were VAT registered.

For smaller businesses, as for households, given centrality of costs and benefits to the decision, any increase in VAT is likely to be a cause of friction.

Is a misalignment of incentives between landlord and renters preventing the installation of solar?

For households, the role of landlords was not explicitly explored in the study. For SMEs, incentives for landlords were seen to be misaligned. The financial burden fell on the leaseholder, with increases in property value benefitting the freeholder. This was a particular

barrier for smaller businesses who may need to relocate to accommodate their growth. Beyond offering tax breaks, potential incentives for landlords were not explored in depth.

What communications are required by government?

For householders, a government-approved list of installers would promote greater confidence in decision-making. Myth-busting is also important this group, to address concerns about cowboy builders, the suitability of the British weather for solar, together with the impact that solar can have on carbon emissions.

For SMEs, government can play an important role to encourage businesses to move from contemplating solar installation to taking the first steps into action. Targeted communications with examples of potential costs savings from similar businesses in terms of size, sector, and energy use, have potential to be a significant enabler.

Given recent policy changes, do people feel government is supportive of solar?

For householders, 40% of participants who were Considerers think solar is now a lower priority for government, though reasons for this cannot be ascertained through the survey.

For SMEs, particularly those that have adopted solar, there is a perception that government support for solar has waned, relative to other low carbon measures such as Electric Vehicles (EVs). This was mainly due to the changes and closure of the FIT scheme.

Overall, whilst a government statement or signal of support for solar in the run-up to COP26 may go some way to allaying these concerns, of far greater importance is to remove potential fiscal barriers and nudge SMEs, plus provide peace of mind through guarantees and better financing options for households who are considering adoption.

Household research – summary of findings

Research approach

A representative UK online survey panel was screened to identify current homeowners and those who are planning to buy a home in the next two years in Great Britain, who either have solar panels or who could potentially install them in future.[4] Respondents were recruited into one of three groups:

- Adopters, who already have solar panels installed at their home.
- Considerers, who might consider installing solar panels.
- Rejectors, who are unlikely to install solar panels.

The survey was conducted between 15th to 22nd March 2021 and comprised 889 households (Adopters n = 294, Considerers n = 300, Rejectors n = 295). While Considerers are the core focus of the research, the nature of Adopters and Rejectors provides useful context in which to understand the changing market.

Incentives and barriers to installing solar panels.

There is no stand-out incentive that would encourage the installation of solar panels, but an array of measures both to motivate and to combat barriers for the range of people thinking about installing solar panels.

Risk mitigation is the strongest single incentive. Having a guarantee in place in case anything goes wrong was ranked top by 40% of participants who were Considerers and second by 43% of participants who were Rejectors. Related to this, the capability of accessing information was found to be low, with the perceived difficulty of the buying, installation, and maintenance process also a strong motivational barrier. Central government and local authorities have a potential role to play in setting up a Guarantee Scheme and facilitating an approved list of suppliers – both being strong motivators for Considerers in the sample.

Providing clear and trusted information about the process is a further way to address these barriers, but this does not need to be personally tailored. Information could be provided both to help clarify the process and to counter minority concerns such as uncertainty about the lack of the environmental impact, impact on property resale, and feasibility in the British climate. Government communications could play a role both in informing and encouraging uptake among participants who were Considerers: although government does not seem to have been a strong prompt for Adopters in the sample (43%),[5] many of them (63%) do recall messages at the time highlighting the value and impact of installing solar panels. Related, 40% of

[4] Defined as either a current homeowner who does not have solar panel installed or someone planning to buy a property in next two years.
[5] Adopters in this sample had installed solar panels between 2014-2021.There was limited communications on solar from government during this period.

participants who were Considerers think solar is now a lower priority for government. This shift in tone has the potential to be a barrier.

Addressing concerns about financing is also key, with up-front costs a clear barrier to installation. This could be mitigated for participants who were Considerers (at least for those at an earlier life-stage) by spreading the costs over time and through other government financial assistance. While cost mitigation could be achieved via the use of community projects to share the costs (e.g., Solar Together), or with direct funding (e.g., a grant scheme), or loans repayable over time; greater awareness and trust of any such initiatives would first need to be in place.

The ability to make financial gains from selling excess energy back to the grid was found to be one of the top incentives for Considerers in the sample. While saving money on energy bills is a strong motivator, this may be offset by concerns of not getting higher return on surplus generation considering upfront costs, given typical household savings from SEG in the region of £100-200 per year.[6] A further option to offset this concern is access to battery storage, another top incentive for (29%) participants who were Considerers.

Almost all Adopters in the sample (96%) reported having been confident they would make future financial savings, reflecting changes to the mechanisms for selling back excess energy since many of them installed their panels array.[7]

Schemes and financial incentives

Awareness of schemes through which excess energy generated can be sold back to the grid and those offering direct support to households for installations was found to be understandably highest among participants who were Adopters and lowest among Rejectors, with Considerers in between.

Specifically, 62% of Considerers in the sample reported being aware of the Green Homes Grant[8] (vs 73% Adopters) but, of those aware, only 33% knew little about it beyond the name. One in three participants who were Considerers were aware of the SEG (30% vs 42% Adopters) and of Solar Together (31% vs 32% Adopters). However, a similar level of awareness for a fictional ‘buy back’ scheme included in the survey (31%) suggests awareness around such initiatives is both limited and unclear. Clearly only a minority of those who might consider installing solar panels were aware of solar-specific schemes and incentives in place, and given confusion over what the schemes are called, this could reduce their scope to encourage uptake.

Significantly lower levels of awareness were reported for participants who were Rejectors for both the SEG and Solar Together (both at 9% in the sample).

Among Adopters in the sample, reported installation dates reflect the pattern of FIT installations recorded by government, with a sharp drop in the number of annual installations

[6] Information on rates of return were provided in the survey.
[7] See page 33 for details.
[8] The Green Homes grant was not available for Solar PV only solar thermal installations.

after 2015 when the FIT tariff reduced sharply.[9] In the absence of national data on installations since the introduction of the SEG, findings from Adopters in the sample suggest an uptick in installations in 2020, albeit not back up to 2015 levels. The same proportion of participants who were Adopters reported having completed their installation since January 2021 as reported having used the SEG (18%).

While 72% of both Adopters and Considerers in the sample reported being happy to change electricity supplier or install a meter to take advantage of the SEG, the perception of being tied into an energy supplier, and a lack of tariff stability were concerns for over half. Opinion on the size of the return was split, with one in three agreeing that it is not worth taking it up for such a small amount, and one in three disagreeing. Reported uptake of the SEG scheme among participants who were Adopters suggests that, once the panels are installed, homeowners will use the scheme. But attitudes suggest that the SEG is not a significant incentive to promote the installation of solar.

Sample profiles[10]

Participants who were Considerers reported being at an earlier life-stage, with half aged under 35 and a substantial proportion looking to take their first step onto, or to move up the property ladder. They were found to have high earning potential and be ethnically diverse, with 18% of Considerers from a minority ethnic background (of whom 10% Asian British).[11] Decision making may well, in future, be led more by women, as 61% of Considerers in the sample were female.[12]

Also, solar power Considerers in the sample were found to be highly likely to consider installing a range of other energy-saving measures with few having any of these installed in their property already, and these could compete with solar panels for any available budget. Details on other measures are as follows:

[9] https://www.gov.uk/government/statistics/solar-photovoltaics-deployment
[10] The study adopted a controlled quota sampling approach, focused on surveying c.300 Adopters, Considerers and Rejectors respectively to explore barriers and incentives to adoption in each group. While quotas were set by gender, age, and region, in order to produce a sample that is broadly nationally representative, the profiles only fully characterise the attitudinal groups within the sample.
[11] See Appendix 1, Table 2 for statistical significance.
[12] The English Housing Survey (https://www.gov.uk/government/collections/english-housing-survey) shows the largest change in tenure during 2015-2020 is for couples with no children who are owner occupiers and who have a mortgage – which has increased by 1.7%. Additionally, MCS data shows seven in ten installations since 2008 are for owner-occupiers (https://renewingbritain.com). The greater propensity for women to be Considers may be due to potential changes to decision making within households, though more research is required to understand this.

Table 1: Potential adoption of other energy-efficient measures for Considerers of solar

	Would consider	Already installed
Double/triple glazing	54%	26%
Loft insulation	50%	25%
Energy-efficient boiler	62%	16%
Draft proofing	56%	14%
Wall insulation	53%	21%
Floor insulation	56%	7%
Smart heating controls	61%	7%

SME research – summary of findings

Research approach

Fifteen online in-depth interviews were conducted via Zoom with SMEs who had either installed or were considering installing rooftop solar panels. Interviews were carried out between 16-20th March 2021.

SME profile

SMEs covered a range of sectors, including manufacturing, services, retail, construction, and farming, and included both freeholders and leaseholders of the business premises. Eight of the interviews were with medium-sized business, with the remainder spread across small and micro business. A range of solar installation sizes were covered from 5kW to over 70kW.

Triggers and motivators

There were three triggers and associated motivators for the adoption of solar by SMEs:

1. Economic uncertainty driven by COVID, Brexit and potential headwinds from changes to energy prices making energy efficiency and costs savings a priority.
2. Super deduction on capital allowances for new plant and machinery announced in the March 2021 Budget creating a ‘now or never’ mindset for adoption.[13]

[13] https://www.gov.uk/guidance/super-deduction. See also footnote 1.

3. Timely communications that promise to make the process easy, offering to vet suppliers and provide the benefits of group purchase (a less common, though important factor).

Additionally, environmental considerations were significant, with net zero seen as an increasingly important factor governing in business' license to operate, particularly for more polluting sectors.

Key questions

Costs and returns associated with solar, from installation costs, bill reduction and capital expenditure relief, were the most important questions for businesses. Next were technical questions, concerning the detail of how electricity generated through solar would supply the business, and its effectiveness at powering different activities (e.g., back-office vs machinery). Finally, practical considerations concerned the reliability of panels and the disruption to the business during installation.

Finding information

Information seeking for SMEs is ad hoc, piecemeal, and reactive – though generally sufficient to meet their needs. There was a need for a step-by-step guide to help SMEs plan more effectively. In its absence a 'learn as you go' approach was adopted. In this:

- Energy companies/installers were the 'go to' organisations for SMEs, immediately associated with having useful information on solar linked to financial, technical, and practical questions.
- Trusted third parties (generally business hubs or trusts, such as The Growth Hub, Green Trust, Carbon Trust, Energy Saving Trust) offered advice to certain SMEs either directly or via their websites. Barriers to contacting these organisations included low awareness, plus a perceived lack of understanding of either business needs or the detail of solar.
- Use of central and local government information was minimal, with their role in the processes associated with financial support, rather than business advice. When local authorities have proactively reached out, for instance though Solar Together, communications have been timely and welcomed.

Costs and benefits

Calculations involved an assessment of upfront costs of installation, including any fitting costs; the size of installation, which was driven by the level of energy consumption and size of roof; and rate of return, also driven by energy consumption and the timeframe for an expected ROI. Consistently, this was found to be between 5-10 years for businesses. While access to finance was not cited as a barrier to adopting solar, many smaller businesses had explored the very limited options for grants.

A combination of access to capital at low rates of interest, the super-deduction allowing 130% capital allowances on solar investments, plus 5–10-year investment horizon meant the commercial decision to push ahead with solar was attractive (and better than expected).

A significant barrier noted by leaseholders was the length of time SMEs intended to remain in the property – a particular concern for growing small and micro businesses.

The SEG was generally not material to the decision to install for SMEs, as the commercial focus was placed on savings through energy efficiency rather than an ability to sell back to the grid. While there was greater interest in the SEG for smaller businesses with lower energy usage, this was minor (a 'nice to have') relative to concerns over the time they were likely to remain in the premises. Farmers were also more interested in SEG relative to other sectors (both for rooftop and ground mounted solar), and this related to a broader practice of utilising land for commercial return. But even for this group, energy efficiency was a more important factor than selling back surplus energy through micro-generation.

Installation

Finding a trusted supplier involved a mixture of recommendations, personal research, and advice from third parties. In the absence of firm guidance, people used intuitive judgements about which installers to choose, looking for larger well-known brands (particularly energy suppliers). There was limited knowledge of the Microgeneration Certification Scheme (MCS) or similar initiatives, though the principles of such schemes were supported. More generally, people used Check-a-trade or Google Reviews to vet quality. Overall, while finding a trustworthy installer could be better supported through proactive outreach from government with approved supplier lists, it was only a minor barrier to adoption.

For larger installations, the process was generally reported to be more complicated than anticipated, due to disruption to day-to-day business operations during the process. Overall, running costs, maintenance costs and financial returns have generally been in line with or positively exceeded expectations since installation.

Fiscal changes

Awareness of potential changes to business rates was very low and no SMEs considering adoption had explored the prospect of an increase to business rates in their commercial planning. When explained, potential changes to rates are posed to be the single largest barrier to the adoption of solar for medium-sized companies.

VAT was a less significant concern for SMEs, though few had explored any VAT implications. All businesses we spoke to were VAT registered, and hence increasing the 5% rate on installation of energy saving materials (while a concern) was ultimately not a major factor in the decision.

If government do make changes to the rateable value and VAT implications concerning solar, it is paramount to be very explicit about doing so and provide tailored guidance to SMEs about the financial implications.

Government support for solar

Overall, solar was viewed by SMEs as being pushed less by government, relative to other low carbon measures (including electric vehicles and other domestic property energy efficiency measures); and that support had waned over the last few years. But on balance, government was still seen as supporting solar PV. As noted, this balance would likely tip the other way with any increases to rates and VAT.

Recommendations from participants

1. Provide a step-by-step guide to the factors that businesses need to consider when installing solar, help to signpost people to useful materials that provide more detail, and provide lists of recommended installers.
2. Provide clear examples of costs of solar including different sizes of installation, different energy uses and other 'hidden costs' (e.g., scaffolding; additional works to the building; disruption to operations etc.).
3. Target those considering installing solar (in particular, medium-sized business with higher energy use) and provide tailored information on financial returns.
4. Provide better incentives to landlords to support adoption amongst smaller business, who are more likely to need to move premises before an investment in solar paid back.
5. Do not introduce fiscal barriers to the adoption of solar panels.

Research background

Research objectives

The key aim of the research was to address evidence gaps on the solar market for households and SMEs in Great Britain. Research was needed in the context of the closure of the FIT scheme and the introduction of the SEG, and other direct support incentives and fiscal barriers. A further point of interest was whether and how government communications could play a greater role in expanding solar installations.

The research was designed to provide new information on:

- Factors influencing the decision to deploy solar.
- Key barriers to deploying solar.
- Profiles of those deploying, or likely to deploy, solar.

Household research method

Research was conducted with households in Great Britain via an online survey. The study adopted a controlled quota sampling approach, focused on recruiting three behavioural and attitudinal segments (Adopters, Considerers and Rejectors of solar panels, as detailed below). To produce a sample that was broadly representative of Great Britain, a UK population panel was screened to identify GB adults aged 18-80, with quotas were set by gender, age, and region.[14]

Respondents were screened to identify the following (see appendix 1, Tables 10-12 for breakdown):

- Homeowners of either a leasehold or freehold property (with sole or shared ownership).
- Non-homeowners planning to purchase a property in the next 2 years.

The following leaseholders were excluded from the survey, as outside of the scope of homeowners who could potentially install solar panels:

- Those unable to play a part in any decision on solar panel installation at their home and who were not at all interested in the installation of solar panels on their roof.

From within this population, respondents were divided into three attitudinal segments, with even quotas of approximately 300 interviews set for each of:

[14] Quotas and achieved sample are provided in table 11 in appendix 2. While age, gender, and regional quotas, were met, the age profile of the sample was skewed slightly (vs GB population) towards older people, who were more likely to be on the property ladder than those aged under 35; and to enable us to achieve the quotas on Adopters, who had an older age profile.

- Adopters: Homeowners who have solar panels installed already at their property (both those who played some role in their installation, and those who did not). Sample size 294.
- Considerers: Those who might consider installing solar panels (alone or in consultation with others in the household or a landlord – using points 3-5 on a scale of 1 to 5 where 1 is definitely would not consider and 5 is definitely would consider).[15] Sample size 300.
- Rejectors: Those unlikely to consider installing solar panels (points 1-2 on the same scale). Sample size 296.

All surveys were completed online from 15th to 22nd March 2021. The sampling approach did not provide a measure of the relative sizes of the three segments within Great Britain, so it is not possible to combine them into a total GB sample of the eligible population. All analysis is, therefore, conducted at the level of the segments.

While respondents were screened from a broadly representative panel of adults in Great Britain, no corrective weighting has been applied, as there is no known population profile that could be used. Given this, and the relatively small numbers of respondents within each segment, these results should be treated as indicative. Nonetheless, they do provide examples of different barriers and triggers to solar adoption within the sample of each individual group.

SME research method

The business stage of the research was conducted online and involved qualitative depth interviews with 15 SMEs, eight of whom were considering installing rooftop solar panels within the next two years (Considerers) and seven of whom had already installed solar (Adopters).

Interviews were carried out between 16-20th March 2021 and conducted on the Zoom platform. Interviews were transcribed and analysed using a framework approach to understand triggers and barriers across the customer journey.

SMEs covered a range of sectors, including manufacturing, services, retail, construction, and farming, and included both freeholders and leaseholders of the business premises.

The interview explored:

- the SME journey.
- triggers stimulating an interest in solar PV.
- information sought and knowledge gaps.
- others involved in the decision.
- how costs and benefits were assessed.
- experiences around the installation process.

[15] Top two box was 67% for this group.

- (for Adopters) experiences post-installation.
- barriers and enablers associated with the above.

A full sample breakdown for SMEs is provided in appendix 2.

Introduction to the COM-B Model

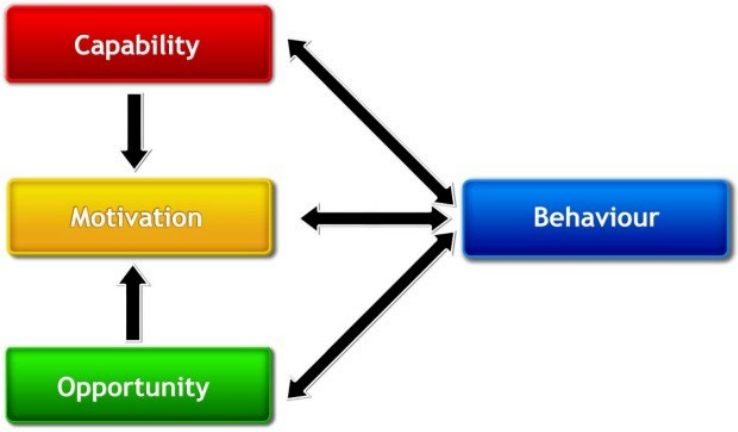
Influences on a given behaviour, such as installing solar panels, can be identified using the COM-B model of behaviour. The COM-B model forms the hub of the Behaviour Change Wheel (BCW) an evidence-based framework for designing and delivering interventions to change behaviours at the individual, organisational, community and population level.

The COM-B model identifies three factors that need to be present for any behaviour to occur: capability, opportunity, and motivation.

- Capability refers to a person's physical attributes (e.g., strength, dexterity) and psychological attributes (e.g., knowledge, understanding, memory, decision-making).
- Opportunity refers to attributes of the physical environment (e.g., finances, policy content, material resources) and the social environment (e.g., social norms, models and leaders, cultural narratives, and practices).
- Motivation refers to reflective processes (e.g., beliefs, identity, evaluations) and automatic psychological processes (e.g., emotion, routines, and habits) that drive a behaviour when the capability and opportunity are present.

These three factors form an interacting system with behaviour (Figure 1). If just one of these is not in place, then the desired change will not occur. It is, therefore, often important to not only remove barriers to the desired behaviour change, but also put in place targeted enablers to support capability, opportunity and motivation where needed.

Figure 1. COM-B framework[16]



While not the focus of this research, COM-B will be useful in considering future behavioural interventions to stimulate the uptake of solar across different audiences. An illustrative use of the model using data from this study is provided in Annex 1.

Our findings are now discussed in more depth.

[16] From: Michie, S., van Stralen, M. M., & West, R. (2011). The behaviour change wheel: A new method for characterising and designing behaviour change interventions. Implementation Science, 6(1), 1. https://doi.org/10.1186/1748-5908-6-42

Household research

Headlines

From the analysis of our findings, a range of measures would help to encourage the installation of solar panels in households, including:

- Risk mitigation: a Guarantee Scheme and approved solar panel supplier and installer listings.
- Financial support: up-front financing and spreading costs out over time.
- Options for surplus energy: the ability to make financial gains from selling excess energy back to the grid, as well as access to battery storage.

There is also opportunity for government to provide clear and trusted information to demystify the installation process, counter myths, and concerns.

Other than the Green Homes Grant, awareness of current green energy schemes is low. While uptake of the Smart Export Guarantee (SEG) is likely to be high among new solar panel owners, the variable tariff structure makes it less of an incentive to install compared with the Feed-in Tariffs (FIT) scheme which guaranteed payments.

In the sample, those considering installing solar panels were at a relatively early life-stage but with high earning potential. They were also making or planning to make their way onto the property ladder. Women comprised 61% of participants who were Considerers, suggesting they could take a bigger role in the decision in the future. Considers were also ethnically diverse, with 18% from an ethnic minority background.

Rejectors in the sample were more likely to be middle aged, White, from lower social grades, and already own a property, plus be less likely to have plans to move.

Findings

Motivators and barriers to installing solar panels

Attitudes towards the installation of solar panels were measured among all three segments (Adopters, Considerers, and Rejectors) to identify possible incentives for, or barriers to, future installations. Batteries of 18-28 statements were presented to respondents, who were asked the extent to which they agreed or disagreed with each. Annex 2 lists the statements, together with ‘shorthand’ references to each that will be used in the charts and tables in this chapter to reduce complexity. These statements have been mapped onto the COM-B model of behaviour that was introduced earlier, enabling a behavioural analysis which can effectively guide the

design of interventions aimed at solar adoption.[17] Certain statements relate to more than one domain of COM-B, and the colour-coding below is used to indicate to which domains the statement relates.

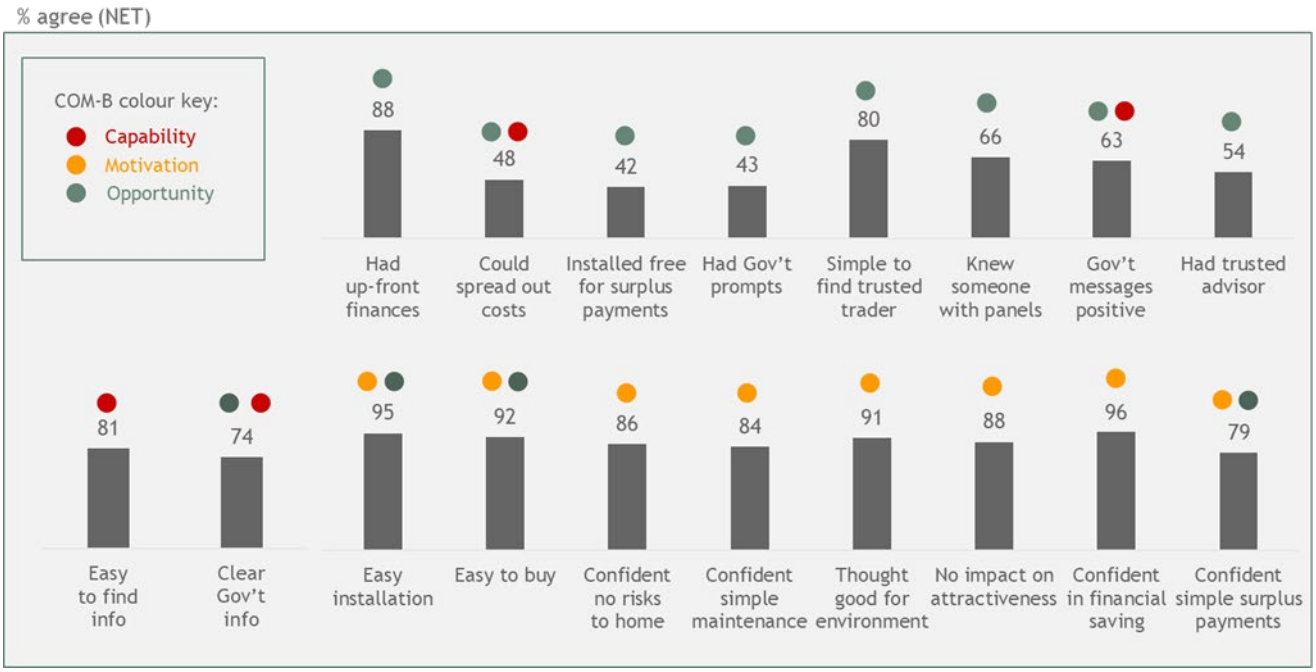
Figure 2. COM-B coding

COM-B category	Key
Capability	●
Motivation	●
Opportunity	●

Adopter attitudes

Attitudes among Adopters in the sample towards their experience of installing solar are shown in Figure 3. This illustrates the reported recall of wide-ranging motivations for the installation, and strong capabilities, with opportunity strongly driven by up-front financing and finding a trusted installer.

Figure 3. Adopter motivators and barriers: capabilities and motivations mapped to the COM-B Model



Base: Participants who were Adopters who know when solar panels were installed (194). Source: Q14. For each of the following statements, how much do you agree or disagree that it influenced you to install solar panels?

The vast majority of Adopters in the sample reported ease of finding information (81%), which is an aspect of capability, and understanding government information (74%), which reflects both capability and opportunity. Most said they had up-front finances in place (88%) and could easily find a trusted installer (80%), which are opportunity factors. The installation process was

[17] See page 22.

recalled as easy by almost all (95%), as was the purchase process (92%), with ease relating to both opportunity and motivation. Also relating to motivation, most reported high levels of confidence when making the installation that there would be no risks of damage to their home (86%) and that ongoing maintenance would be simple (84%). The vast majority also anticipated financial savings (96%) and environmental benefits (91%) and a lack of impact on the attractiveness of their home (88%), with slightly fewer reporting having had confidence that getting surplus payments would be easy (79%). Only around 20% disagreed with each of these statements.

Fewer Adopters in the sample reported being able to spread out the up-front costs (48%) or having their panels installed for free in return for passing on the payments for any surplus generation (42%), which might be opportunity barriers. Few also reported having been prompted by government communications (43%) although government messaging at the time was seen as positive (63%). Social opportunity played a relatively lesser role than financial opportunity (other than finding a trusted installer) although two in three participants who were Adopters say they did know someone else with solar panels (66%) and over half that they had a trusted advisor, whether a friend, or professional (54%).

Considerer and Rejector attitudes

Figure 4: Considerer and Rejector motivators and barriers mapped to the COM-B Model: capabilities and motivations.

Base: All respondents: Considerers (300), Rejectors (295). Source: Q15. How much do you agree or disagree with the following statements about solar panels?

Participants who were Considerers and Rejectors were both asked a battery of 28 questions to assess what key barriers and incentives are operating for those considering installing solar panels, and which could further tip people into rejecting or deciding to proceed with a solar installation. Figure 4 shows the findings for the two audiences.

There may be scope to convert some Rejectors, as 45% in the sample said they have never really thought about installing solar panels before, suggesting a reflexive rather than a considered decision. Even among participants who were Considerers, one in three said they have not really thought about it before (33%), which could mean further information would shift their level of willingness to install solar panels.

Up-front costs were found to be an opportunity-barrier to installation for two in three in both segments, and almost six in ten said they simply could not afford the up-front costs. However, spreading out the costs over time would be an incentive for far more participants who were Considerers (61%) than Rejectors (23%). Among Considerers and Rejectors in the sample combined, spreading the cost was found to be more of an incentive for younger people, those planning to move home or buy a property, and those with a mortgage, so this seems to be related to life-stage and willingness to take on (more) debt. Ethnic minority participants in the sample are also relatively more likely to find this motivating.

Using solar panels to save money on electricity bills was reported to be a strong motivator for participants who were Considerers (76%) but much less so for Rejectors in the sample (42%). This money saving-related motivation may, however, be insufficient to tip the balance, unless concerns about up-front costs are not addressed, along with concerns for almost half of participants who were Considerers (47%) that they will not get a fair price for the surplus electricity they sell back to the grid. Such concerns could delay uptake, with 43% of Considerers in the sample agreeing that the technology will become cheaper in a few years.

Early adopters of solar PV would have had the option to reduce or remove the costs of their installation through an agreement with an energy provider, but even so, most participants who were Adopters in the sample reported having had up-front finances for their installation. Such widespread arrangements are no longer in place and alternative sources of finance or cost spreading will be needed for those without the up-front financial resources. This could, of course, include the use of community projects to lower the costs (e.g., via Solar Together), or with direct funding or loans repayable over time, but widespread awareness and trust of any such initiatives would need to be in place.

Perceived capability relating to information is low among participants who were both Considerers and Rejectors: 44% of Considerers in the sample agree that information about solar panels is very complicated. Information and understanding are also likely to be opportunity barriers, with under half of participants who were Considerers saying information is easy to find (43%) and a similar proportion stating that there are simply too many options, and they find it confusing (40%). Other barriers could relate to social opportunity, with 56% of Considerers in the sample reporting they do not know who to trust, and 45% agreeing that they would be more likely to go ahead if they knew other people who had installed solar panels.

Both central and local government has a potential role to play in providing trusted information, with two-thirds of participants who were Considerers reporting that a Guarantee Scheme would allay repair concerns (67%) and that a government-approved list of builders would make them feel more confident (65%). This kind of intervention would be important to further motivate Considerers, of whom a substantial minority reported being put off by stories they have heard about cowboy builders (46%) or just do not trust builders to do a good job with solar panels (32%). However, this is not necessarily a role that government is seen to be taking currently, with around four in ten in both segments reporting that solar panels are less of a priority for government than they used to be, which makes them less convinced to install them. Among Adopters in the sample, most reported having found it easy to get information and to identify a trusted installer, although it is possible that the people who found this very difficult did not go ahead with their plans.

A further substantial barrier is the 'hassle factor', with six in ten participants who were Considerers reporting they would be more likely to install solar panels if the installation process were easier (61%). Over half of each segment were reported being concerned about the ongoing maintenance of panels (55%), as a further potential burden. Almost all participants who were Adopters (95%) reported that installation was easy, and it would be worth exploring whether it was genuinely easier in the early days of FIT, or whether current concerns about difficulty could be addressed with more information and advice.

There was less reported concern about other possible risks from installing solar panels, although these issues could de-motivate a substantial minority if not addressed. These include the potential for a negative impact on the attractiveness of their property (31% of Considerers and 42% of Rejectors in the sample) and concerns about difficulty selling their house for around one in three of each segment in the sample. Most participants who were Adopters (88%) did not report a negative impact on the attractiveness of their property, although it is possible that only those who were less concerned deciding would have decided to go ahead.

For both segments, there were also practical doubts for around a third about the feasibility of solar panels in the British climate, particularly outside of summer, and a quarter had concerns about it working for those without a south-facing roof. Even among participants who were Considerers there were doubts about the impact of installing solar panels on climate change, with one in four (25%) reporting they thought there would be no impact, thus providing no environmental motivation to install them. Nine in ten Adopters in the sample (91%) reported that they thought that their installation would be good for the environment.

Consider and rejector measures to encourage uptake of solar.

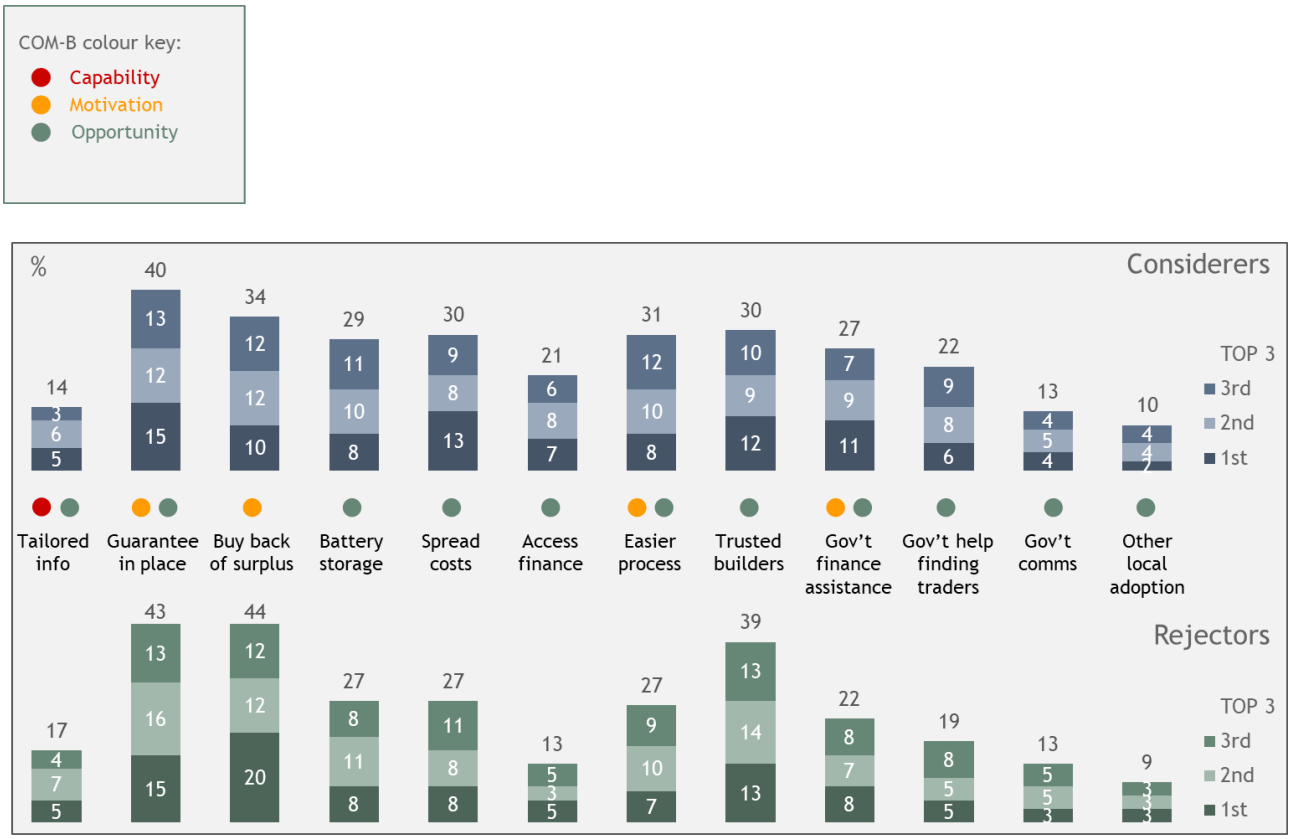
The discussion above suggests a potential range of measures to encourage uptake of solar panels, including financing, risk mitigation (e.g., through a guaranteed repair scheme), help finding trusted information and traders, and addressing concerns such as feasibility, returns on surplus energy production, and any potential impact on property resale. Considerers and Rejectors in the sample were offered a list of possible incentives for installation and asked to select their top three, to establish which are likely to be most impactful. There is no single stand-out incentive, with a range of options appealing to both segments and, while it is

possible to rank them, the closeness of that ranking would suggest that a wide range of incentives would need to be in place to appeal to the full range of those considering installing solar panels, and this does not narrow the list down hugely from the concerns seen already (see Figure 5).

Risk mitigation was found to be the top motivation for both segments, in terms of being chosen as the number one incentive and being placed in the top three. Specifically, having a guarantee in place in case anything goes wrong was placed in the top three by 40% of Considerers and 43% of Rejectors in the sample. Among Considerers this was reported to be the single issue that stood out most strongly (albeit still not chosen by a majority), with the next five or six items relatively similar in terms of priority.

The ability to make financial gains from selling surplus energy to the grid was ranked second, although this was more motivating to Rejectors (44%) in the sample than to Considerers (34%) and more appealing to those at a later life-stage (older, own their home outright). Related to selling surplus energy, around three in ten place (29%) having access to battery storage so that electricity generated can be used later in their top three.

Figure 5: Top 3 measures to encourage solar installation amongst Considerers and Rejectors.



Base: All respondents: Considerers (300), Rejectors (295). Source: Q16. Of the following, what are the top three incentives to encourage you to buy solar panels?

Finance related incentives were among those placed in the top three by around three in ten Considerers in the sample. This includes spreading the cost out over time (30%) and, despite

earlier findings suggesting spreading out the cost would be a much smaller incentive to them, 27% of participants who were Rejectors also put this in their top three. A similar number of Considerers in the sample (27%) selected government and Local Authorities making it easier to get finance for solar panels, while 21% chose being able to access finance more generally.

Other incentives with a similar ranking relate to the process of installing solar panels. Three in ten Considerers in the sample (30%) placed having trusted builders for the installation in their top three, with this relatively more of an incentive for Rejectors (39%). Related to this, around two in ten participants who were Considerers (22%) ranked government and Local Authorities making it easier to find suppliers in their top three. Three in ten Considerers in the sample (31%) also put making the buying, installing and maintenance process easier into their top three, reflecting concerns seen previously about these elements of the installation.

Three potential incentives were ranked in the top three by fewer Considerers and Rejectors in the sample and, as such, are likely to have less of an impact on uptake. While information is perceived as complicated, personally tailored information is a priority for just 14% of participants who were Considerers. Information is clearly needed, given findings discussed previously, but it is not a priority for this to be tailored. Clear government endorsement was ranked in the top three by 13% and having other local adopters was reported as a top-three priority for just 10%. In terms of social opportunity, practical help with financing and installation is clearly seen as more important than social normalisation.

Based on the discussion above, there is no one stand-out incentive that would encourage the installation of solar panels, but an array of measures both to motivate and to combat barriers for the range of people thinking about installing solar panels. This should include raising awareness of existing schemes, with the potential for new government led activity and communication. The key areas to address are:

Risk mitigation, including a Guarantee Scheme in case something goes wrong, and approved supplier listings.

Financial support, with options for up-front financing and spreading costs over time.

Options for using surplus energy generation, including increasing the financial return, plus access to battery storage for those who would rather use the energy later, rather than return it to the grid.

These should all be underpinned by clear and trusted information to demystify the process, and communications to counter myths and concerns.

Awareness of incentive schemes

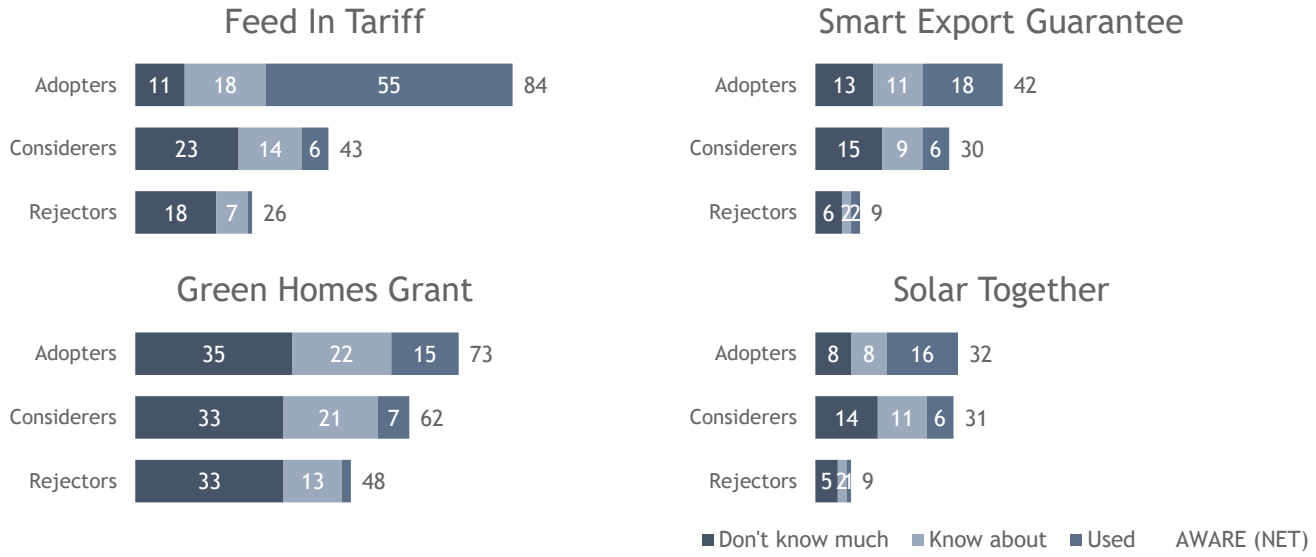
The survey was also used to assess awareness and reported use of the various schemes that could promote solar installation to households, including the schemes through which excess energy can be sold back (FIT and SEG) and those offering direct support to households for

installations (the national Green Homes Grant[18] and the locally organized group buying scheme, Solar Together). A fifth fictional scheme the 'Boris Buy Back' scheme was included to assess potential levels of false awareness.

As shown in Figure 6, awareness and use of each scheme was reported (understandably) highest among participants who were Adopters and lowest among Rejectors, with considers in between.[19]

Figure 6. Awareness and use of incentive schemes, by segment.

Figure 6 shows



Base: All respondents: Adopters (294), Considerers (300), Rejectors (295). Source: Q17. Are you aware of any of the following schemes?

The difference is starkest for the FIT scheme, which reflects its lack of relevance for those who do not yet have solar panels. Reported awareness was highest out of all schemes for the Green Homes Grant among participants who were Considerers (62%) and Rejectors (48%), reflecting considerable publicity about changes to the scheme at around the time of the survey. Uptake of the scheme was reported by 15% of Adopters and 7% of Considerers in the sample but awareness was relatively superficial, with a third of each segment saying they have heard of it but know little about it.

Reported awareness levels were lower for the SEG and Solar Together, and it is worth noting that the reported levels of awareness and use of these two are similar within each segment to those reported for the fictional 'Boris Buy Back' scheme. This suggests that just a minority of the sample are aware of any solar-specific schemes and that there is considerable confusion over what the schemes are called, which could reduce their ability for uptake.

Awareness of the SEG was highest among participants who were Adopters (42%), with 18% reporting having used it. Awareness was lower among Considerers in the sample (30%), which

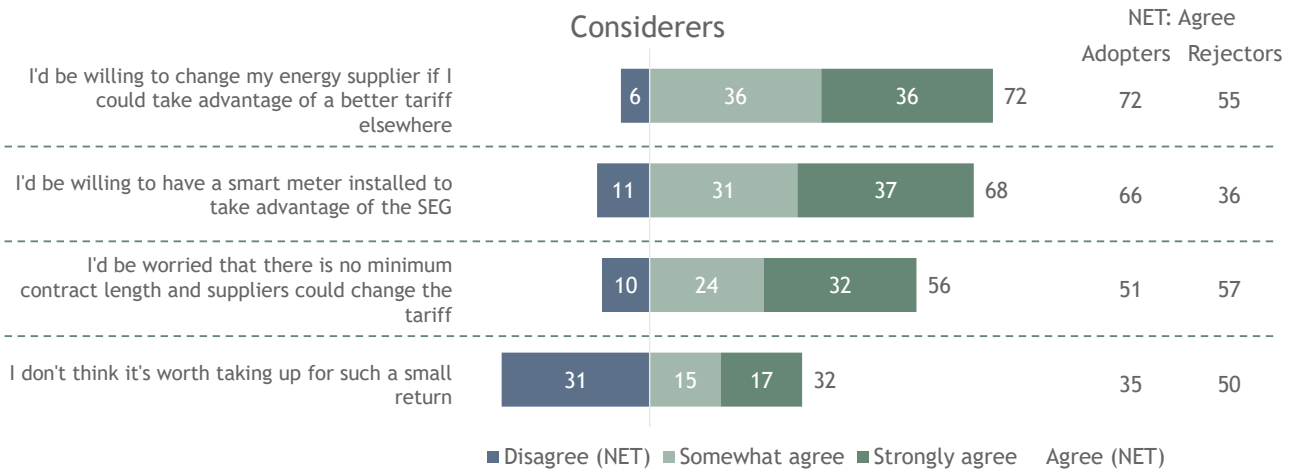
[18] The Green Homes Grant was not available for Solar PV only solar thermal installations.
[19] See Household data appendix 1, Table 3 for full data.

means it is unlikely to be acting as an incentive to install solar panels. Awareness of Solar Together was around one in three for both participants who were Adopters (32%) and Considerers (31%), so is also unlikely to be acting as an incentive for many to install solar panels.

Since the SEG is a relatively new scheme following on from the closure of the FIT, the research offered an opportunity to establish the extent to which there are barriers to uptake. Respondents were explained the scheme before being asked for their opinions, to balance out different levels of awareness (see Figure 7).[20]

There was a high degree of willingness among participants who were Considerers in the sample to change electricity supplier (72%) and to have a smart meter installed (68%) to take advantage of SEG, suggesting that these will not be a major barrier (and very few disagreed). A lack of stability of the tariff was reported as a concern for over half (56%), but Considerers in the sample were more evenly split over whether it was worth taking up the SEG for such a small return (32% agree and 31% disagree).

Figure 7. Attitudes towards the SEG for Considerers and Rejectors



Base: All respondents: Adopters (294), Considerers (300), Rejectors (295). Source: Q18. We now want to ask you some questions about the Smart Export Guarantee (SEG). The SEG enables people who have solar panels to sell their surplus energy back to the grid. There are various tariffs available from suppliers and for a typical household, this could mean in addition to bill savings making £100-200 each year from selling back the excess energy they produce. Thinking about the SEG, how much do you agree or disagree with the following statements?

Among participants who were Considerers, those who do not currently own their own house were relatively less likely to say they would be willing to change suppliers, but they were also less likely to be concerned about the level of stability, and the financial return of the scheme. This could possibly reflect the earlier stage of their thinking about solar power, and it may be that once they have bought a property and done more research, their level of concern could increase.

The attitudes of Rejectors in the sample suggests the effort involved in changing supplier or getting a smart meter could be a barrier to expanding the pool of Considerers, but that the size

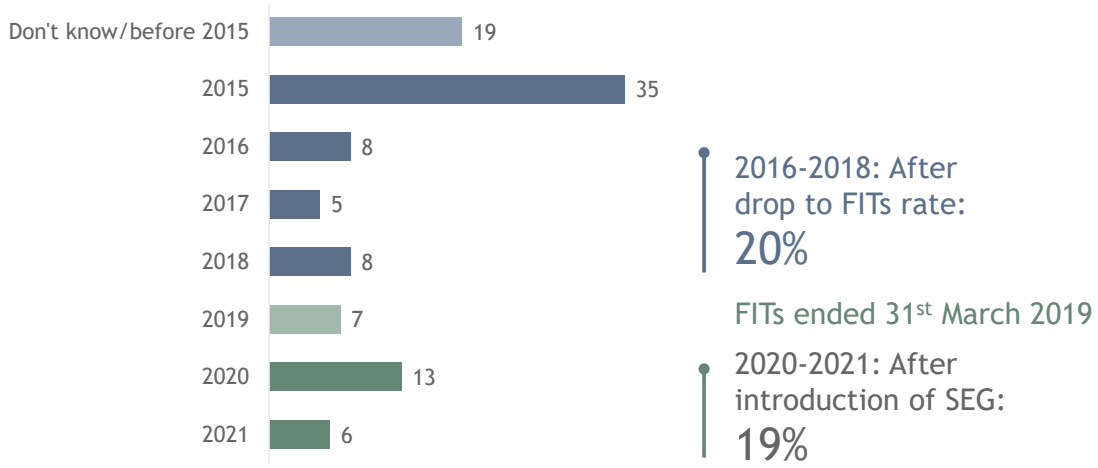
[20] More detailed attitudes of all three segments are set out in the appendix 1, Table 4.

of the return could be a larger barrier, with 50% of participants who were Rejectors agreeing it is not worth taking up SEG for such a small return.

Existing uptake in the context of the FIT and SEG

One aim of the research is to explore how changes to the solar subsidy regimes could impact the interest in and uptake of solar panels. The FIT was introduced in April 2010, with a sharp decline in the rates on offer to participants at the end of 2015 and continuing to drop until the scheme closed to new participants at the end of March 2019, in line with decreases in the costs of solar. The SEG was launched in January 2020. The data collected from participants who were Adopters who had some involvement in their installation suggests a sharp drop in installations after 2015, the last year with a higher rate of FIT return (see Figure 8).

Figure 8. Year of installation of solar array (among Adopters involved in installation)



Base: All involved in installation: Adopters (240). Source: Q12. Which year did you install solar panels? (please write in – range of 2015-2021 permitted).

Around one in three (35%) participants who were Adopters reported having installed their solar panels in 2015, with a drop to 8% in 2016 and similar lower levels for most years that followed, after the sharp drop in the FIT rates on offer. Government figures for changes in FIT accredited installations also show a sharp drop from a 27% year-on-year increase in cumulative installations in 2015, to just a 5% annual increase in 2016, with the rate of increase then slowing further and with no new accredited installations after the scheme closure in April 2019.[21] This suggests that the survey data are a reasonable reflection of changes in levels of installation by year.

There is no national data on installations since the introduction of the SEG in January 2020, but the survey data suggest that the number of installations was higher in 2020 (13% of those reported in the survey) than in the preceding few years. More installations may have been planned, of course, with the Covid-19 pandemic possibly preventing some installations from going ahead. The figure for 2021 only represents the first quarter of the year, but in total one in

[21] https://www.gov.uk/government/statistics/solar-photovoltaics-deployment

five of those who had installed solar panels in the sample reported doing so after the introduction of the SEG (19%), which is suggestive of some recent recovery in uptake. Findings reported earlier suggest uptake of the SEG scheme by 18% of participants who were Adopters, which aligns with this figure, and suggesting that most of those installing panels are using the scheme now.

From the discussion above, awareness of existing schemes would need to be improved to act as an incentive for installation among participants who were Considerers. While uptake of the SEG is likely to be high among new solar panel owners, its market-based nature (i.e., perceptions of being tied into an energy supplier, minimum term contracts, and a lack of tariff stability) make it less of an incentive to install compared with the FIT scheme.

Sample profiles

The study adopted a controlled quota sampling approach, focused on surveying c.300 participants who were Adopters, Considerers and Rejectors respectively to explore barriers and incentives to adoption in each group. While quotas were set by gender, age, and region, to produce a sample that is broadly nationally representative, the profiles below only fully characterise attitudinal groups within the sample. Further details on the achieve sample and sample quotas are given in appendix 1 at Table 10 and 11.

In this context, this section considers the nature of the three attitudinal segments: participants who were Adopters (those who already have solar panels on their roof), Considerers (those who might consider installing solar panels) and Rejectors (those unlikely to do so). The segments have been characterised in terms of gender, age profile and ethnicity, and region. For more detailed figures, see Appendix 1, Table 2: *Profile of solar attitudinal segments.*

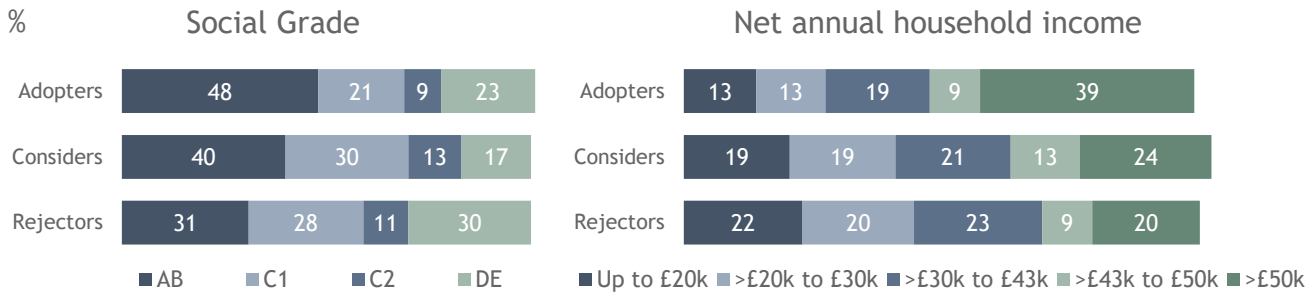
In terms of the sample demographics (see figures 9 and 10):

- Adopters comprise a group who are predominately male (61%), middle aged or older (53% aged over 55 years), white (95%), and of high social grade (48% AB) - with 39% having a household income above £50k per annum.
- Considerers comprise a group who were predominately female (61%), young (49% aged under 35 years), ethnically diverse (18 % from an ethnic minority background), and of high social grade (40% AB) - with 24% having a household income above £50k per annum. Considerers also have the potential for a higher income, which may influence their perceived ability to plan for a large expenditure, such as installing solar panels.
- Rejectors comprise a group who are evenly split by gender, middle aged or older (59% aged over 55 years), white (91%), and of low social grade (41% C2DE) - with 42% having a household income below £30k per annum.

Figure 9: Socio-demographics of the attitudinal segments.[22]

Base: All respondents: Adopters (294), Considerers (300), Rejectors (295). Source: S1. (gender) Are you … ? S2. And how old are you? S3. Which of the following areas do you live in? Q21. What is your ethnic group?

Figure 10: Affluence of the attitudinal segments.[23]



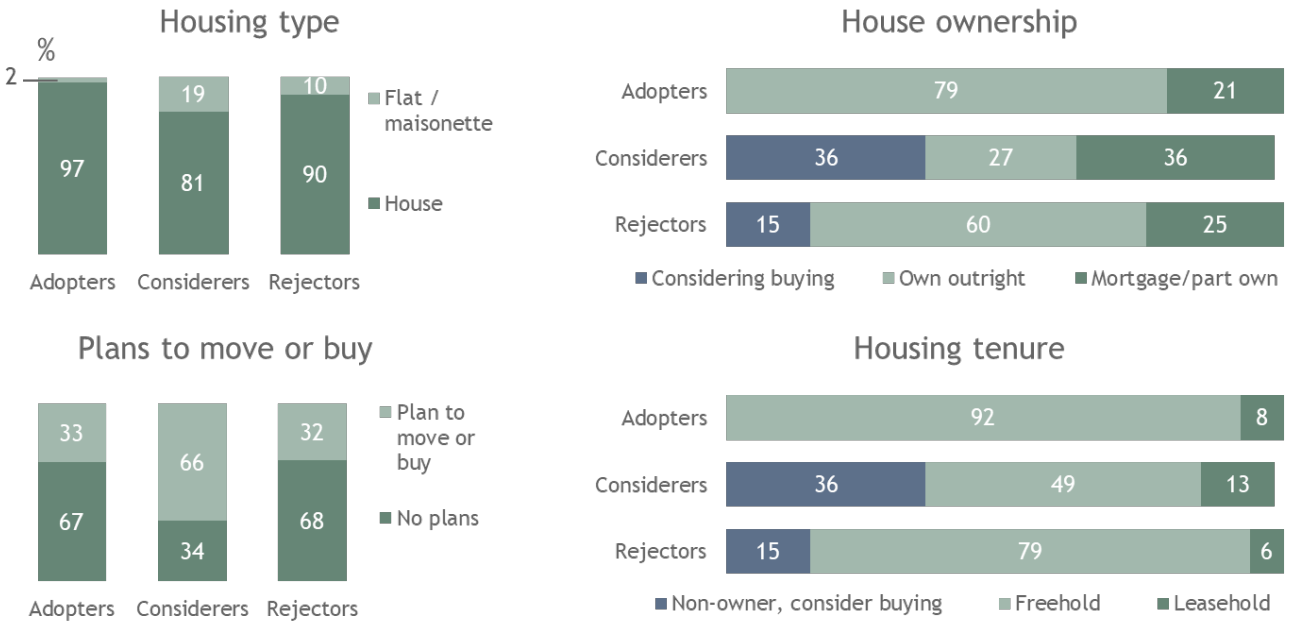
Base: All respondents: Adopters (294), Considerers (300), Rejectors (295). Source: Q20. Which one of the following categories best describes the employment of the main income earner in your household? Q19. What is your household income before tax?

As shown in Figure 11, the majority of participants who were Adopters live in a house, owned the freehold and did not have a mortgage. Rejectors in the sample comprised 15% who are not currently property owners, but who were considering buying. It should be noted that leaseholders who could not play a part in deciding to install solar panels or who were not at all interested in doing so were excluded from the survey, so each segment only includes people who could potentially choose to install panels.

[22] 1% of considerers chose 'Prefer not to say' in relation to gender.
[23] Social Grade definitions: AB Higher & intermediate managerial, administrative, professional occupations; C1: Supervisory, clerical & junior managerial, administrative, professional occupations; C2: Skilled manual occupations; DE: Semi-skilled & unskilled manual occupations, and Unemployed.

Just over one in three participants who were Considerers still have a mortgage (36%), with a similar number of non-owners who are considering buying a property (36%) and the remainder to be leaseholders who may choose to install solar panels (13%). Two in three Considerers reported that they were considering moving in the next two years (66%).

Figure 11: Housing status of the attitudinal segments



Base: All respondents: Adopters (294), Considerers (300), Rejectors (295). Source: Q2. In terms of your main home, which of the following best describes the type of property you live in? Q3. In terms of your main home, which of the following best describes your situation…? Q4. Is your property leasehold or freehold? Q5. Are you considering moving from your property in the next two years? Q6. Are you looking to purchase your own property in the next two years?

Overall participants who were Considerers (those most likely to install solar panels in the next couple of years), are a young population, with a substantial proportion looking to take their first step onto, or to move up the property ladder. They are more likely to be female, have high earning potential, are spread across the UK and are ethnically diverse.

Participants who were Rejectors are middle aged, White, have an equal split across genders, are from lower social grades, and already own a property.

Nature of current installations

Further contextual information was captured about their solar array of Adopters in the sample. The vast majority reported having installed the panels themselves (86%) with just 14% having bought the property with solar panels already installed. Among the small number of respondents who bought a property with existing solar panels (n=48), there was a fairly even split between those who said it positively influenced their decision to buy and those who said it did not. Knowledge about their array was not detailed, but among those who were able to give an answer, installations were most likely to be in the 3kW to 5kW range (47%), with 15% under 3kW, 17% over 5kW up to 6kW, and 20% over 6kW. The date of installation is discussed later in the chapter, in the light of the evolution of incentives such as the FIT and the SEG.

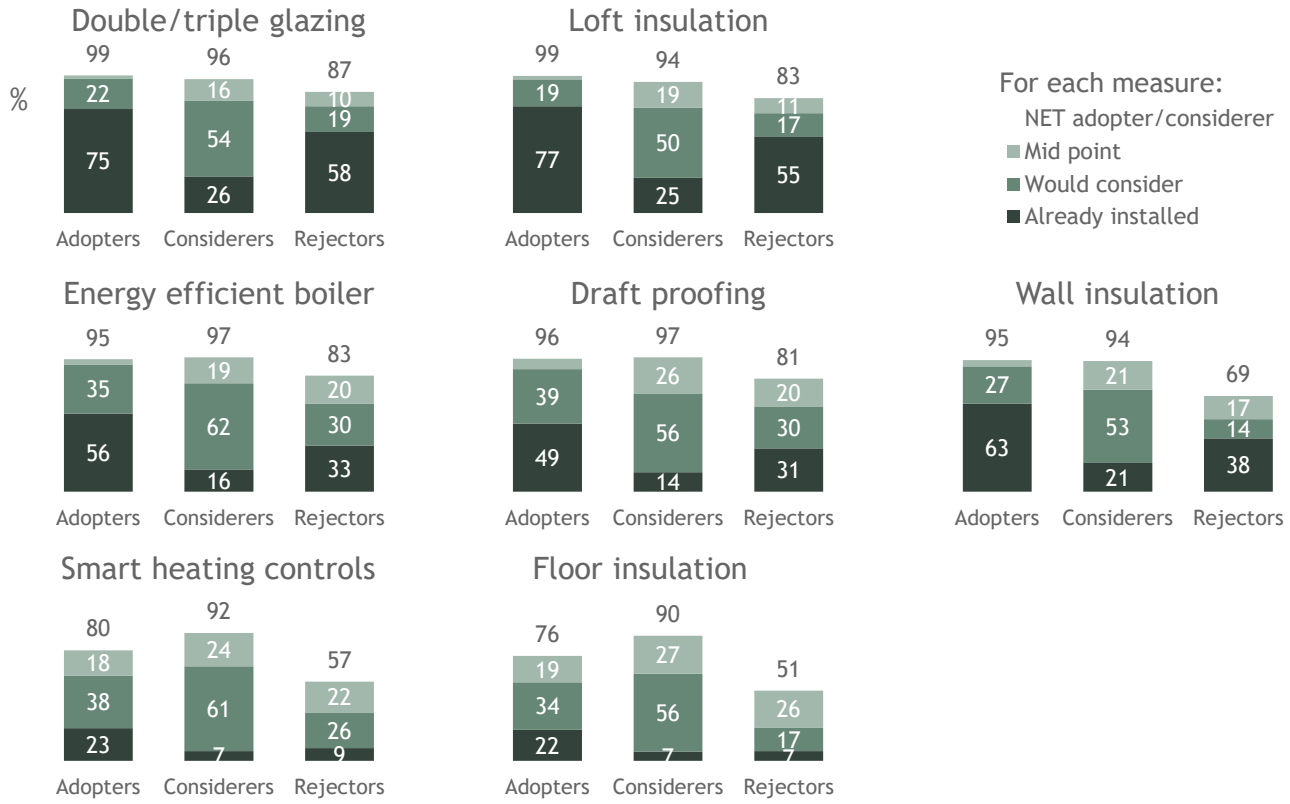
Interest in other energy-saving behaviour

As might be anticipated, solar panel Adopters in the sample were more likely to report already having installed a range of other energy-saving measures, with participants who were Considerers more likely to be considering installing each, and Rejectors less interested (see Figure 12).[24] This question offers insight into where solar panels sit in the wider array of possible measures that can be taken to save on household energy bills. Figure 12 shows the proportions that already have each measure in place (the ‘Adopters’ for that measure), those who would consider them and who chose the mid-point on the scale of consideration (together, the ‘Considerers’ for that measure) with the figure at the top being a combined count of all ‘Adopters’ and ‘Considerers’ for each measure.

Solar power is not included in Figure 12 since all participants who were Adopters have them already and no Rejectors in the sample would consider solar panels, by definition. Among participants who were Considerers (those who are at all likely to consider installing solar panels) 40% said they would definitely consider them (a score of five out of five), with 28% saying they probably would (a score of four) and 33% choosing the mid-point of the scale. This means that, among Considerer participants, two in three (67%) said they are likely to consider installing solar panels, with the remaining third still in need of more persuasion.

[24] See Household Data appendix 1, Table 2, for fuller data at this question; NOTE: Non homeowners were asked to think ahead to when they own a home, with homeowners asked about their current situation.

Figure 12: Interest in installing other energy-saving measures, by segment.



Base: All respondents: Adopters (294), Considerers (300), Rejectors (295). Source: Q7. We now want to ask you about energy efficiency, by which we mean measures to reduce the amount of energy required to heat and power your home. NON-HOMEOWNER: Thinking ahead to when you own a home, how likely or unlikely are you to consider making the following improvements to make it more energy-efficient? HOMEOWNER: How likely or unlikely are you to consider making the following improvements to your home, to make it more energy-efficient?

The remaining measures can be split broadly into three groups:

- The common: double/triple glazing and loft insulation. These are clearly the most common measures, with over half of solar panel Rejectors in the sample reporting having these installed already, and most at least willing to consider them. Few participants who were Considerers have them already, so these could compete with solar panels for the household improvement budget.
- The midfield: Energy-efficient boilers, wall insulation and draft proofing. While levels of interest were similar to the first group among participants who were Considerers and Adopters, fewer had these already and Rejectors in the sample were slightly less interested in each. Again, participants who were Considerers may have to decide whether to choose to invest in these or in solar panels.
- The uncommon: Smart heating controls and floor insulation. While around one in five participants who were Adopters report already having each, interest in these is higher among Considerers in the sample. These are the two measures that were relatively more popular among people aged 25-44 compared with younger or older respondents. It may be that these were seen as newer or more technical innovations, appealing more to a younger audience.

While at least nine in ten participants who were Considerers were willing to consider each of the measures, the ‘uncommon’ were most similar to solar panels in terms of attitude for this segment, with few already having either smart heating controls or floor insulation but two in three who would actively consider installing them, similar to the 67% who would actively consider installing solar panels. However, more in total reported that they would consider the more established measures such as double or triple glazing and loft insulation, and it is possible that these would take priority when improving energy efficiency.

The discussion above suggests that participants who were solar power Considerers are equally likely to consider installing a range of other energy-saving measures, with few having any of these installed in their property already, and these could compete with solar panels for any available budget, with prioritization potentially given to more established measures such as loft insulation, or replacement windows.

SME research

Headlines

1. With economic uncertainties arising from Brexit and the pandemic, businesses are looking for new ways to be lean and efficient. This, together with the new super deduction on capital allowances, provide a unique set of circumstances to encourage the uptake of solar. Commercial viability of solar is the primary concern for SMEs, and the economics generally stack up over a 5–10-year horizon. While welcome for smaller businesses, overall access to capital and financing was not found to be a major barrier for SMEs. However, creating stable policy environment to plan both upfront costs and returns was a concern.

2. Environmental considerations are material to the decision process. This goes beyond 'doing your bit' and is increasingly seen as part of businesses' license to operate in a net zero world. As well as brand and customer benefits, providing greater certainty around energy costs in the wake of potentially volatile prices is motivating. While never the deciding factor, 'being green' can stretch expectations around the timeframe for return on investment.

3. There is not an easily accessible, step-by-step roadmap for businesses buying solar. Much online information is tailored towards households rather than SMEs and, in the absence of clear guidance, businesses make educated guesses about the steps involved. This approach misses key elements of the decision process (e.g., business rates, VAT, planning permission) and can lead to unwelcome surprises. Despite this, most journeys were positive, suggesting that triggers to move people from contemplating to taking the first steps to action are critical to enable adoption.

4. The use of central and local government information was found to be almost non-existent during a typical customer journey. Businesses associate government's role on solar predominantly around grants to enable adoption, and government websites were not always associated with clear and simple advice. While most businesses turn to energy providers and installers directly, they believed this provides a partial view on options and pitfalls. Where local authorities have proactively supported the decision process, for example via initiatives to group buy and identify installers such as Solar Together, it has been received positively.

5. Government risks sending mixed messages on their support for solar. For adopters, this has included significant changes to the FIT scheme and its replacement with the SEG. For Considerers, particularly medium-sized businesses with high energy use, the potential for business rates increases with installations above 50kW was found to be the biggest single barrier to adoption. Additionally, given these are significant and long-term investments, sudden changes to incentives and 'hidden' costs such as rates implications creates friction and leaves the impression that government are not fully committed to net zero.

Introduction

This stage of the research conducted qualitative interviews with 15 SMEs, eight of whom were considering installing rooftop solar panels within the next two years and seven of whom had already installed. Interviews were carried out between 16-20th March 2021.

SMEs covered a range of sectors, including manufacturing, services, retail, construction, and farming, and included both freeholders and leaseholders of the business premises.

The interview explored:

- the SME journey.
- triggers stimulating an interest in solar PV.
- information sought and knowledge gaps.
- others involved in the decision.
- how costs and benefits were assessed.
- experiences around the installation process.
- (for Adopters) experiences post installation.
- barriers and enablers associated with the above.

A sample breakdown is provided in the appendix 2.

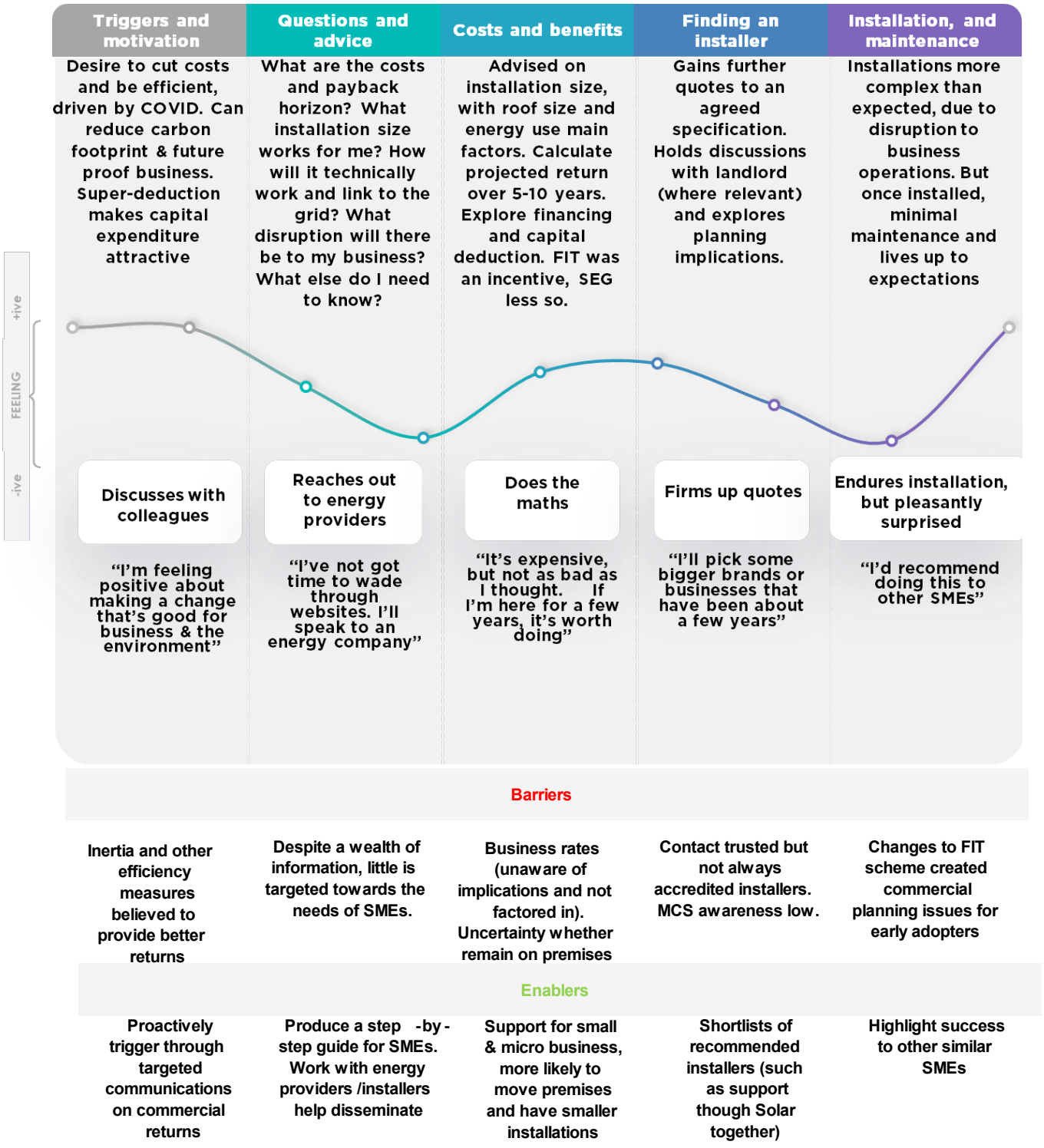
Findings

A typical SME journey

While we spoke to a wide range of businesses, the customer journey around the installation of solar was remarkably consistent. As figure 13 below illustrates, the stages typically involved:

- A trigger to move from contemplation to action, generally concerning opportunities to be more energy-efficient.
- A series of questions associated with the costs, return, technical details, and disruption.
- Getting an initial quote and doing back of the envelope calculations on cost options for different sizes of installation; exploring commercial viability including capital deductions.
- Finding other installers and getting more quotes; working up a detailed specification; speaking to other relevant parties.
- For those adopting solar, following a decision to proceed there is a period of disruption during installation. While this was often much greater than anticipated, it was tempered by a remarkably good experience post-installation.

Figure 13: Typical SME journey exploring and adopting solar.



Across the wide range SME experiences explored, journeys were relatively smooth, and people generally felt able to make 'good enough' decisions. Moreover, no Adopters regretted installation.

While the journey can undoubtedly be improved, this also suggests that triggers to move people from contemplating to taking the first steps into action are critical to enable adoption

given that commercial benefits of solar are more attractive than anticipated, particularly for larger businesses.

The research has also shown that businesses undertake their journey in the absence of any clear guidance of the necessary steps involved, essentially by making a series of educated guesses about who to speak to and why.

While generally this suffices, several medium-sized companies were considering installations of over 50kW and had no idea of the potential implications for business rates. As will be explored in more depth, such changes were material to their decision and very unwelcome news. In short, potential business rates changes pose the single biggest barrier affecting adoption for these businesses.

The customer journey is now explored in detail.

The triggers and motivation for adopting solar

Almost universally, the motivation for adopting solar was the potential to reduce costs and be more energy-efficient.

For SMEs who were Considerers, several businesses had been thinking about this area for some time. Factors that moved them from contemplating the idea to taking the first steps involved mixture of macro-economic drivers, policy incentives, together with small nudges.

Specific triggers included:

- **Economic uncertainty driven by COVID, Brexit and potential headwinds from changes to energy prices.** While COVID was the most important factor, economic uncertainty has installed a focus on cutting costs and ensuring operations are lean and efficient. Energy is a significant cost for all SMEs and in certain manufacturing businesses energy price fluctuations could mean the difference between profit and loss. The combination of saving money and reducing uncertainty around volatile energy prices is compelling.
- **Super deduction on capital allowances**. The Chancellor's recent initiative allowing companies to claim 130% capital allowances on investments such as solar had created 'now or never' mindset, encouraging people to take the plunge.
- **Timely communications that promise to make the process easy**. Alongside these big picture drivers, the timing of the Solar Together scheme, offering to vet suppliers and provide the benefits of group purchase provided a nudge for certain SMEs.

  "Brexit was quite a pivotal moment, because it was entering the unknown. Solar panels are something that you can invest in, that, you know the cost of. There's an initial outlay but the cost doesn't change after that. At least we know that we'd be getting something consistent, no matter what electricity or energy prices did".

  Small business, Freeholder, Building trade, Adopter.

> *"We had a green energy feeler from the council, basically. So that triggered it probably about September October last year. And then our electricity costs because they're so high, because of our manufacturing process. And because our margins have kind of like shrunk due to the pandemic, we're looking at all the long-term cost cutting measures we can bring in. It will provide energy stability over the next five years."*
>
> *Medium-sized business, Considerer, manufacturing, freeholder.*

While Rejectors were not engaged as part of this study, several respondents reported having previously considered installing panels but had not pursued the option at the time. It was specifically the recent economic circumstances, plus generous capital allowances, that had encouraged them to think again about solar.

While the macro-economic conditions were different, SMEs who were Adopters also had similar motives and triggers to Considerers. They included:

- Significant concerns on energy use and increasing energy costs.
- The initial generosity of the FIT scheme, particularly for early adopters.
- The 'nudges' from installers, offering deals and offers to incentivise adoption, particularly for the farming and manufacturing sectors.

In addition to energy efficiency and cost, environmental considerations were significant motivators for SMEs. While an added benefit, this was not about doing good per se but more related to an awareness that net zero will be an increasingly important factor governing a business' license to operate. Being able to demonstrate pro-environmental practices was already an issue for the award of tenders and was being asked as part of supply chain management. Several SMEs had already electrified their vehicle fleet and felt solar was the next logical next step.

Finally, sectors such as manufacturing, construction and services were not only heavy energy users, but created products that were far from environmentally friendly – from hard to recycle plastics, to the provision of plant machinery. Numerous business felt solar provided not only an opportunity to work towards net zero, but also offset wider environmental impacts that were more difficult to manage.

Initial concerns and questions about solar

Questions around solar fell into three categories:

1. **Financial**

This was the largest category and concerned the costs and returns associated with solar.

Specific questions included:

Main questions

- What are the costs of installation?
- What will be the reduction in my energy bill?
- What relief will I get on capital expenditure?

Secondary questions

- What are the ongoing maintenance costs?
- What are the costs and benefits of batteries and storage?
- How much can I make selling back to the grid? (a greater concern for smaller businesses with lower energy use).

2. **Technical**

This was the next most significant category and concerned the detail on how electricity generated through solar would supply the business, and its effectiveness at powering different types of activity. Specific questions included:

- How effective will it be at powering heavy plant machinery?
- What is the likely energy return with installations of different sizes?
- How will energy be distributed across the building?
- What is my grid status and how will this work with my Distribution Network Operator? (a specific concern for farming).

3. **Practical**

While the smallest category, practical considerations were not without importance and concerned everyday worries about the reliability and disruption of panels. Specific questions included:

- How reliable is the supply and how will it vary seasonally?
- Will there be disruptions to my day-to-day business?
- Are there health and safety implications of the installation process?
- What is the position with the landlord if there is damage to the fabric of the building?
- What is the shelf life of panels?

While the question lists above are intuitive, they were not comprehensive and there were specific gaps around the wider implications of installing solar – notably on business rates, planning, and VAT. As will be explored later, these issues were generally not on people's radar and had the potential to derail installation plans, particularly for medium-sized businesses with higher energy use.

Seeking information

The current information journey for SMEs is ad hoc, piecemeal, and reactive – though generally sufficient to meet their needs.

Specifically, SMEs approached researching solar through an intuitive, 'learn as you go' process that involves certain assumptions around the knowledge and role of different actors in the process.

The path to knowledge began with Google, with simple search terms returning much information but limited practical advice. Specifically, online content was felt to be tailored to the needs of households rather than business and it quickly became challenging to find information specifically relevant to a company's circumstances.

> *"Yeah, it's not very forthcoming for businesses, I must say. For residential there's a lot more information out there, you hear a lot more about it. You think it will be simple, but there are so many different elements you need to consider as a business, like rates and VAT. For someone like me who's coming to this completely unaware, there's much more support from the government that's needed".*
>
> *Medium-sized business, Leaseholder, Manufacturing, Considerer.*

In the absence of a roadmap, SMEs used a series of assumptions and rules of thumb around the role of different actors who could support the journey.

There were four groups:

1. **Energy companies/installers**

These were the 'go to' organisations for SMEs, immediately associated with having useful information on solar linked to the financial, technical, and practical questions noted above. In several instances, these were the only organisations from whom advice was sought. A typical information journey would include speaking to a single provider, discussing in detail options for their premises and gaining information on associated costs. This specification was used to gain quotes from other installers. While such organisations were ultimately trying to sell solar, and consequently may minimise the risks, overall, they were felt to provide sufficient information to make a go- or no-go decision.

2. **Trusted third parties.**

Trusted third parties offered useful advice to certain SMEs either directly or more usually via their websites. They included:

- The Renewables Energy Hub
- Growth Hubs
- Energy Savings Trust
- Carbon Trust

As helpful as these sites were, they suffered from two problems: generalist sites were not tailored specifically the needs of SMEs. Conversely, business sites were not tailored to the needs of solar and would often have information on a wide range of low carbon measures.

Overall, these organisations were less commonly contacted by SMEs and were a distant second to energy providers and installers from whom advice was routinely sought. In part this is due to awareness, but also as energy trusts were perceived to have less understanding of the costs and practicalities involved for SMEs.

3. **Other SME Adopters**

While potentially one of the most valuable sources of advice, there was very limited engagement with other SMEs. When this did occur, it was generally via word-of-mouth, or due to other businesses nearby having solar installed. Landlords had also played a role in connecting business with others in their estate who had adopted solar – through this was mainly related to recommending installers, rather than guidance around the process more generally.

While people had directly searched online for the experience of SMEs adopting solar, generally results took the form of testimonials on supplier's websites. While there were a handful of online SME forums where installation was discussed, and the advice found to be useful (particularly due to its 'warts and all' nature), generally this information was hidden from broader, open searches on the topic.

4. **Government**

Both central government departments and local authorities were not top of mind for SMEs researching this space. There were two factors influencing this:

- First, and most significant, was that government's role in the processes was predominantly associated with financial support. Generally, as grants for SMEs could not be found, motivation to engage with government information tailed off.
- Second, and a factor for certain respondents, was an association that dealing with government would likely be bureaucratic and slow. There were mixed experiences of gaining information from government websites in this context.

This is a missed opportunity for variety of reasons:

- Despite concerns around bureaucracy, government were trusted to give fair and impartial advice, relative to installers.
- As noted in the questions section above, there were several ‘hidden frictions’ around business rates and VAT that SMEs needed to be aware of at the beginning of their journey.
- When local government has proactively reached out with support, for instance though the Solar Together scheme, advice has been timely and welcomed.

> *“I haven’t accessed anything by the government in terms of reducing our carbon footprint. I didn't even really occur to me to look in that direction. I mean I've always hated government websites. I think if you're dealing with suppliers you know, you're going to get at least 98% of the information you need from them anyway.”*
>
> *Medium-sized business, freeholder, Considerer, manufacturing sector.*
>
> *“Today I'm relying on manufacturer installer websites. I would honestly feel far more comfortable if I had a government website who could give me the answers. And a whole new level of confidence if I could talk to someone.”*
>
> *Small business, freeholder, Considerer, construction sector.*

Given this, there is scope for government to provide SMEs with a clear ‘step-by-step’ guide for the factors they need to consider when installing solar. This is discussed in more depth later, particularly around different approaches to disseminate the information, as SMEs are unlikely to visit government websites as part of a typical research process.

Costs, benefits, and financing of solar

As noted earlier, assessing the commercial viability of solar focused on several interrelated factors:

- Upfront costs of installation, including any fitting costs associated with changes to the interior of the building and other costs such as scaffolding (which was not insignificant for larger businesses, and also needed to be factored into ongoing maintenance).
- Size of installation, which was driven by the level of energy consumption and size of roof. Battery and storage cost were also part of this equation, though generally seen to be less attractive given the level of additional cost for the return.
- Rate of return, which again was linked to energy consumption, but mediated by the timeframe for an expected ROI.

- Financing of the above, both in terms of the balance between cash and loans to undertake the work, plus the scope to offset capital expenditure.

While these calculations were detailed and required thought, the inputs needed were relatively straightforward[25] and the largest variable was the expected time to see a return. Consistently, this was between 5-10 years for businesses.

In this context, one significant barrier noted by leaseholders was the length of time SMEs intended to remain in the property. Small and micro businesses looking to make such investments are also growing businesses. The potential for them to need larger premises in the medium term was a sizable factor in any decision.

Environmental considerations also shaped the decision process and were increasingly seen as part of businesses' license to operate in a net zero world. As well as brand and customer benefits, providing greater certainty around energy costs in the wake of potentially volatile prices was motivating. While never the deciding factor, 'being green' did stretch expectations around the timeframe for return on investment – shifting a five-year horizon towards the 7–10-year range.

Financing was an important element of the decision and businesses ranged from paying all in cash to avoid further debt given financial uncertainties, to those looking to borrow all capital given the very low rates of interest. Predominantly SMEs opted for a mixture of cash and loans, with a focus on the latter. Importantly, irrespective of the means, access to finance was not cited as a major barrier to the adoption of solar.

This combination of access to capital at low rates of interest, the super-deduction allowing 130% capital allowances on solar investments, plus 5–10-year investment horizon meant that the overall commercial decision to push ahead with solar was attractive and better than expected.

Wider incentives offered by government, such as the SEG, were not material for SMEs considering investing in solar. There were three factors involved in this.

First, general rates of awareness around the scheme were low. Second, once the scheme was explained, rates of energy consumption were felt to eclipse any potential to sell back to the grid. Third, rates of return from the SEG were viewed as relatively modest.

Nonetheless, smaller businesses were open to the idea of selling back surplus energy if possible and would potentially shop around for better deals from energy providers, though more likely to be driven by costs of supply rather than export. It was also noted that in businesses such as farming, SEG may also be more of an incentive – not only for rooftop but

[25] In certain instances, getting firm rather than approximate costs from installers was cited as an issue, though this was not a barrier for most SMEs.

also for ground solar. This is likely to be because such businesses have greater openness and flexibility to different uses of land assets.

Overall, SEG does not have anything like the attractiveness of the FIT which was central to the take up of solar amongst early Adopters in the study. In certain instances, the FIT was the main reason for the installation of solar, with the initial generosity of the scheme outstripping energy efficiency savings and providing a very healthy ROI. As one early adopter noted, the return from their first installation remains one of the most profitable parts of their business.

There was not an expectation that the SEG would offer such generous returns as even later incarnations of the FIT– not least given significantly lower installation costs. However, and as will be explored later, sudden changes to incentives, together with their decreasing attractiveness, have led to the impression that government is less supportive of solar than it used to be.

Making the decision to proceed

There were three decision-making contexts identified across the study.

1. **Small and micro businesses**

Generally, in smaller companies, decision making rested with the owner of the business and their business partner(s) as relevant. The decisions were straightforward and often undertaken relatively swiftly, providing the economics stacked up. In this content, the owner had usually undertaken the preparatory research themselves.

2. **Medium-sized businesses**

The decision context in larger businesses was more complex. While the ultimate approval rested with the management board, the research and development of the business case was undertaken with others in the company – typically those in operations, facilities, or finance roles.

It was in this context that information around business rates and other fiscal measures was vital. Not only are larger businesses more likely to opt for larger installations; the potential for someone to put forward a case to proceed with these without full knowledge of the commercial implications would likely be a ‘career limiting step’.

3. **Leaseholders**

Leaseholders had the added complexity of needing to obtain the permission of the landlord for the decision. While not without its challenges (such as concerns about damage to the fabric of the building), generally the process was smooth and tied to belief that, providing there was no upfront costs, landlords are happy with such improvements. This was framed more in terms of ‘doing good for the environment’ than the potential to increase the value of the property.

Overall, it was stressed that the incentives for landlords and tenants were misaligned around solar, and more could be done to offer tax breaks for landlords to both initiate and part-fund the process. This would be particularly motivating for small and micro businesses. There currently was no expectation of commercial support from landlords, though potential for support in kind (such as recommendations for installers) was noted by certain respondents.

Finally, understanding planning permissions and the potential need for planning application was viewed as a necessary but straightforward step in the decision process. There was a general assumption that solar installation would fall under permitted development, or that if permission were required it would be granted. Generally, premises were in industrial estates or out of town areas, so solar was unlikely to spoil the character of the area. There was only one instance of a perceived poor planning decision, where a very early adopter who owned a farm was asked to plant trees to block any aesthetic impact from the panels (unfortunately, this would also block sunlight to the panels).

The installation process

Finding a trusted supplier involved a mixture of recommendations, personal research, and advice from third parties.

In the absence of firm guidance, people used intuitive judgements about which installers to choose, generally looking for larger well-known brands (particularly energy suppliers) as well as businesses that had been trading for several years and were expected to be solvent over the longer term.

There was a general belief that, like any other procurement process, gaining 4-5 quotes would be sufficient to make a good choice.

Where independent third parties or government-led schemes such as Solar Together helped identify suppliers it was very welcomed.

While trust was important, there was limited knowledge of MCS or other accreditation providers - though the principles of such schemes were supported. More generally, people used Check-a-trade or Google Reviews to vet quality.

Overall, while finding a trustworthy installer could be better supported through proactive outreach from government with approved supplier lists, it was only a minor barrier to adoption.

Finally, the installation process was generally more complicated than anticipated. The main issue related to less to the installation of the panels themselves, and more around managing the disruption to day-to-day business operations during the process.

On occasion, there were teething problems which were able to be fixed by electricians. But overall quality was deemed to be good.

While several SMEs had warranties in place, ongoing maintenance was not a major concern and panels working reliably since installation was the norm. A very early adopter of the technology noted an inverter had failed after a decade, though this was felt to be in line with general wear and tear.

Overall, running costs, maintenance costs and financial returns have generally been in line with or exceeded expectations since installation. The post-installation experience for SMEs has been very positive.

Business rates and VAT

As noted earlier, potential changes to business rates pose the single largest barrier to the adoption of solar, particularly for medium-sized companies. These comprised just over half of the businesses interviewed. All these businesses were considering installation exceeding 50kW (with a small minority yet to decide). In contrast, planned installations above this size were much less common in small or micro business.

Factors affecting this size of installation included:

- High energy use
- Large roof space
- Sunk cost of installation, with subsequent panels not the main driver of costs.
- Better ROI from the investment
- Better impact on the environment

Most participants were unaware of the prospect of increases in business rates and had not considered this in their decision making (as generally there was a belief that government only provided fiscal incentives for adoption). In the few instances where people had heard about potential changes, details were lacking, and people required more information on the topic. Once explained, a possible increase in rates was a significant barrier for several reasons.

- It blindsided people, many of whom had progressed significantly with plans for adoption and were in the process of sharing these with senior management.
- It not only had the potential to significantly change commercial considerations, but also acted against the grain of a win-win concerning larger installations: bigger returns and better environmental impact – these were very motivating for adoption.
- Raising revenues on business rates and energy efficiency were viewed as some of the least appropriate tax vehicles and issues to choose.

There was palpable disbelief and anger when this issue was raised during the interview:

> *"[long silence] … well, to put it mildly, that's a bit of a bummer. I'm definitely not paying extra business rates. Are the government trying to help people or just make some money?"*
>
> *Medium-sized business, Freeholder, Manufacturing, Considerer*

> *"Well that's quite awkward. Central government needs to be pushing local councils to improve the relationships with local businesses, especially at the moment with the arguments going on with business rates. They need to try and persuade local businesses and smaller businesses to go greener. Any increase in rates would be material to my decision to go ahead."*
>
> *Medium-sized business, Leaseholder, Manufacturing, Considerer.*

> *"My number one recommendation is: do not increase business rates."*
>
> *Medium-sized business, Freeholder, Manufacturing, Considerer*

If government does make changes to rates, it is paramount to be very explicit about doing so and provide tailored guidance to SMEs about the financial implications. Otherwise, there was a significant concern that much time and energy will be wasted planning a decision based on the wrong commercial assumptions.

VAT was a less significant concern for SMEs, though few had explored any VAT implications. All businesses we spoke to were VAT registered, and hence the 5% rate on installation of energy-saving materials (while welcome) was ultimately not a factor in the decision. Similarly, while VAT increases would be less welcome, there was an expectation that any VAT paid around solar would be reclaimed. It should be noted that the potential changes to business rates made people very wary of unexpected changes to VAT rules.

Views on government's support for solar

There was an implicit assumption that government was supportive of solar, which more related to wider communication on climate change and net zero than specific activities in support of solar adoption per se. However, as SMEs gained more experience and understanding of the solar installation process, in certain instances this faith was undermined.

The main concerns included:

- Decreases in the generosity of the FIT scheme over the years (this was the most significant signal).

- The switch from the FIT to the SEG, including rates of return, the move to a variable rather than guaranteed tariff, plus a focus on export only in the SEG (versus export and generation in FIT).
- Abrupt changes to the FIT scheme, making it hard to plan, and creating market volatility described as ‘a boom and bust in solar’.

Overall, solar was viewed as being pushed less by government, relative to other low carbon measures (including electric vehicles and domestic property energy efficiency); and that support had waned over the last few years. But on balance, government was still supportive. As discussed below, this balance would likely tip the other way with any increases to rates and VAT.

Participant recommendations to improve the process

There were five areas of focus suggested by SMEs to improve their experiences and motivations to install solar. They were:

1. **Provide a step-by-step guide.**

There is a lot of information on solar but ensuring that it is relevant to SMEs and timely in terms of stage in the decision process was key.

Government could play an effective role by providing a step-by-step guide to the factors that businesses need to consider when installing solar, help to signpost people to useful materials that provide more detail, and provide lists of recommended installers.

2. **Provide clear examples of costs.**

Businesses wanted more detailed examples and case studies comparing the cost benefits of solar, including different sizes of installation, different energy uses and other ‘hidden costs’ (e.g., scaffolding; additional works to the building; disruption to operations etc.).

3. **Target communication and tailor benefits.**

Given that when SMEs assess the costs and benefits of solar, it is generally a more attractive investment than initially thought, more could be done to make companies aware of the commercial rather than just the environmental benefits of solar. This could be done at a relatively granular level: targeting via known energy use and size of premises. For instance, for the farming community, it was suggested that targeting suitable businesses using a combination of grid status data, proximity to the DNO and suitable roof sizes (identified via satellite data) had the potential to significantly increase uptake.

4. **Align incentives, particularly towards smaller businesses and landlords.**

While access to finances was generally not a barrier, there was a desire for grants to incentivise smaller businesses with modest installation goals and who may be less able to commit to staying in their premises for the medium term. Related, and as noted earlier, the

incentives for landlords are misaligned and potential for tax breaks to encourage investment in solar across property portfolios (in concert with leaseholders to partly fund the costs) was seen an effective way to drive adoption at scale (particularly for small and micro-businesses).

5. **Remove fiscal barriers (or be upfront about them).**

Changes to business rates had the potential to pose the most significant barrier for medium-sized business and ideally rates should not increase. Failing that, it is vital to build awareness and provide upfront information on implications on larger installations. This could be linked to the step-by-step guide highlighted above.

Summary of SME barriers and enablers analysed by COM-B

Figure 14 below displays the primary barriers and enablers faced by the interviewed SMEs on their decision-making journey for solar adoption. These barriers and enablers are grouped into the relevant categories of the COM-B model. Utilizing the COM-B in this way helps to map the behaviours so that they can be used to guide future interventions. The degree to which these barriers or enablers seem to influence the decision to adopt solar are indicted through the colour coded bars. Green bars indicate an enabler or positive influence, and a red bar indicates a barrier or negative influence. One to three bars range from the least to greatest influence.

Figure 14. Barriers and enablers to the adoption of solar amongst SMEs.

COM-B COM-B colour key: Capability Motivation Opportunity	**Barriers/Enablers**	**Degree of Barrier/Enabler**
Physical Opportunity: Financial and material means.	**Area for Installation** The space to install rooftop solar was not an issue among SMEs in the sample. Rather, many of them had large warehouses with plenty of room for many PV panels and costs vs benefits of larger installations were attractive.	
	Planning Permission Considerers expressed minor concerns over planning permission.	
	Capital for Investment/Upfront Cost Upfront costs are generally not a barrier for SMEs, given low rates of borrowing and access to capital. SMEs view rooftop solar as an investment with	

	expected returns over a medium to long-term period. Most Adopters financed the cost and/or paid from cash reserves. While a more significant factor for smaller businesses, of greater concern the relatively short period of time they are likely to remain in a property to justify the investment.	
	Business Rates The most significant barrier for mid-sized businesses was potential increases in business rates which would materially affect the ROI of larger solar installations.	
Social Opportunity: Involves other stakeholders ●	**Advise from other Adopters.** Certain individuals expressed that receiving first-hand accounts and testimonials from adopters was an important part of their consideration.	
	Landlord Involvement While this was not a significant issue for most SMEs interviewed, more could be done to incentivise landlords to play a greater role support the installation costs for solar particularly among smaller SMEs.	
	Distrust in Installer Installers are the primary source of information among most of the SMES but there was also a level of distrust in this information.	
Reflective Motivation: Conscious processing such as deliberate intentions ●	**Financial Returns** Financial returns are the primary motivation for installing rooftop solar among the SMEs interviewed.	
	Environmental (carbon offsetting) Environmental motivations played an important role in the assessment of costs and benefits, stretching the time considered to see an ROI.	

Psychological Capability: Knowledge and understanding 	**Financial Projections/Modelling** More could be done to provide reliable, clear, and targeted information available for SMEs related to the economics of rooftop solar.	
	Business Rates SMEs were unaware of the potential increase in business rates for installations over 50 kWh.	
	Energy Buyback While SMEs were unaware of SEG, most were focused on offsetting energy use.	
	VAT SMEs were unaware of the potential VAT increases, though anticipated claiming VAT back.	
	Installation While SMEs could find an installer relatively easily, more could be done to provide recommended lists of accredited companies.	
	Planning Permissions There were no significant concerns expressed around planning permission topic.	
Automatic Motivation: Emotional influences 	**Uncertainty in Decision Making** Given the extent that psychological capability remains a barrier (as indicated above) SMEs are facing a significant amount of uncertainty in the decision-making process.	

Discussion and conclusions

Potential adoption of Solar PV

Overall, for both households and SMEs, the potential to drive greater adoption of solar is very encouraging.

There are several factors indicating that a renewed focus on this area could make a significant contribution to net zero efforts given:

- the costs solar PV have declined by 60% for an average 4kWp system, from c.£13,000 in 2010 to c.£5,000 in 2019.[26] Schemes such as Solar Together have the potential to further reduce costs by around 20%,[27] bringing potential average costs to potentially below £4000.
- group buying schemes have also seen a push on adoption in urban areas,[28] particularly in London, where solar uptake has been low (five London councils have the lowest % of households with solar PV in the country).[29]
- the experience of those adopting the technology is extremely positive. In this study, over nine in ten household Adopters stated that solar was easy to buy and install, they were confident in financial savings and thought it would be good for the environment. Similarly, the SME Adopters all reported a very positive experience post installation, with running costs, ease of maintenance and commercial returns either at or above expectations.
- relative to certain low carbon measures, solar is relatively less disruptive (for instance, compared to wall and floor insulation); and more familiar and less costly than newer technologies (such as heat pumps).[30]
- for SMEs, a renewed focus on efficiency in the light of economic headwinds, access to finance and low rates of interest, plus the super-deduction on capital allowances provide a unique set of circumstances to push adoption over the next 18 months.
- solar is an effective carbon offsetting technology. MCS research suggests that since 2007 nearly seven million tonnes of carbon (CO2) have been saved from UK installations.[31] That is equivalent to the carbon footprint of UK's entire public sector in 2018 or 50 million flights from London to Edinburgh.

[26] MSC (2021). Renewing Britain. The changing landscape of home-grown energy 2008-2021. Available at: https://renewingbritain.com/
[27] https://www.solarpowerportal.co.uk/news/solar_together_schemes_deliver_savings_again_as_10000_more_join_group_buyin
[28] https://www.london.gov.uk/sites/default/files/appendix_a_solar_action_plan.pdf; https://www.gmcvo.org.uk/news/solar-together-greater-manchester;
[29] https://renewingbritain.com/
[30] BEIS (In press). Future Homes. A Report by Basis Social and Cambridge Zero.
[31] https://renewingbritain.com/

- There is still very significant headroom for expansion – with only 1 million Solar PV systems registered with MCS since 2008.[32] As noted, urban areas could be a focus, as they are ripe for group buying. However, there could be negative spill over effects around attitudes to climate change from the social normalisation of the technology.[33] This should be an area of future research.

Addressing barriers and enablers

Given this environment, addressing barriers and accelerating enablers to adoption will be key.

For homeowners, as noted earlier, these fall into three areas:

- Addressing risks
- Financing and spreading out the costs.
- Ability to make financial gains from installation.

Addressing risks concerns the development a Guarantee Scheme should something go wrong, (one of the top incentives for Considerers in the sample), as well as concerns about a lack of information on trusted installers (which has also been noted in other studies).[34]

It should be noted that warrantees are commonly available from manufacturers of solar PV,[35] so this barrier may in part be addressed by raising awareness of existing schemes. However, from other studies,[36] we know concerns over guarantees often relate to both workmanship as well as the technology, plus concerns over whether businesses will still be trading – a particular concern given the long lifespan of solar. The role of MCS and other accreditation providers may be helpful in his context.

Moreover, the very high rates of satisfaction with panel installation reported in this study, together with a recent study by NREL which looked at 54,500 panels installed between 2000-2015 and found only 5 out of 10,000 panels failed,[37] suggest there may be scope for a government backed scheme given the very low risks involved.

There is also potential to address many of these factors though schemes like Solar Together (given it can support the provision of recommended and MCS accredited suppliers and use group purchasing to drive down warranty costs).

[32] Ibid.
[33] Beattie, G,. Han, Y. and Nauze, A. (2019). Conservation Spillovers: The Effect of Rooftop Solar on Climate Change Beliefs. Environmental and Resource Economics volume 74, pages1425–1451
[34] Schelly, C. and Letzelter, J. (2020). Examining the Key Drivers of Residential Solar Adoption in Upstate New York. Sustainability 12, 2552.
[35] https://www.renewableenergyhub.co.uk/main/solar-panels/how-long-do-solar-panels-last-insurance-for-solar-panels/
[36] BEIS (In Press). Future Homes.
[37] https://www.nrel.gov/news/program/2017/failures-pv-panels-degradation.html

Financing and spreading out the costs of installation concerns the length of time to achieve an ROI on solar given the significant upfront costs, rather than access to finance per se which was reported to be a lower incentive for participants who were Considerers in the sample. There are demonstrator projects currently being undertaken by the Green Finance Institute (GFI) for Property Assessed Clean Energy (PACE) style loans.[38] Such loans have a long payback horizon and importantly have debt tied directly to the property, rather than the owner. PACE products could provide the necessary material and practical support needed to turn good intentions into reality. There is a wealth of information in this study of direct relevance to the demonstrator projects, and scope to share data from this research with the GFI and others on barriers, enablers, sample profiles, as well as the potential for bundling multiple low carbon measures within a single loan scheme.

The **ability to make financial gains from installation** was also a key motivator for participants who were Considerers and may even help to nudge certain Rejectors to think again about Solar – given it was the top incentive for this group. While the SEG was never designed to incentivise the uptake of solar (rather it was set up as a route to market for small scale generators), relatively modest changes to its design, together with a greater focus on awareness raising and marketing, could help maximise its impact. This is explored in more depth below.

Finally, given Considerers in the sample were more likely to report being at an earlier lifestage and planning to make their way onto the property ladder, communications to encourage adoption when moving property, raising awareness of the Solar Together scheme, plus marketing solar in more lifestyle terms could also help drive adoption with this group.

For SMEs, there is a window of opportunity until March 2023 provided through the super-deduction to push solar as a key opportunity for capital expenditure.

Perhaps the most striking finding for SMEs is that **when businesses assess the commercial viability of solar, the economics generally stack up over a 5–10-year horizon**. Given access to capital and financing is not a major barrier, creating a stable policy environment to plan both upfront costs and returns is entirely within the government's control.

As discussed in more depth below, **targeted communications, providing examples of the potential commercial return** for similar types of businesses, could provide a timely nudge to enable SMEs contemplating efficiency measures to actively pursue solar. There is a particular opportunity to drive adoption amongst medium-sized businesses with higher energy use.

For smaller and micro businesses, **the potential to align incentives for landlords to support with upfront costs, plus options for financial support such as grants or PACE loans**, are needed to maximise uptake with this group.

The SME journey can also be improved via a **step-by-step guide to the installation process**, including costs involved, fiscal considerations, together with recommended installers.

[38] https://www.greenfinanceinstitute.co.uk/press-release-green-finance-institutes-coalition-for-the-energy-efficiency-of-buildings-releases-first-report-on-scaling-up-retrofit-financing/

There were several policy questions of interest for the study, which are now discussed.

Are alterations needed to the SEG?

For homeowners in the sample, there are moderate levels of awareness of the SEG amongst participants who were Adopters (42%) and relatively low levels among Considerers (30%). In this context, the SEG is unlikely to be driving adoption for households. However, the ability to make financial gains from selling excess energy back to the grid is motivating and one of the top incentives for Considerers in the sample.

While 72% of participants who were both Adopters and Considerers are willing to change electricity supplier or install a meter capable of taking half-hourly readings to take advantage of the SEG, the perception that you are tied into an energy supplier, and a lack of tariff stability are concerns for over half.[39] The SEG's market- based nature also makes it less of an incentive to install compared with the FIT scheme.

For SMEs, the SEG was not a factor in the decision to install solar for several reasons including:

- Very low awareness of the scheme amongst participants who were Considerers
- Expectation that only minimal surplus energy would be generated.
- The rates of return were felt to be modest.

Given the above, there is scope to make alterations to the SEG to encourage adoption of solar PV. For households, this could include increasing awareness of the scheme, repositioning communications to explicitly highlight the ability to make money from selling surplus energy back to the grid, setting a higher minimal rate of return, and introducing fixed rather than variable tariff for a limited adoption period.

Fixing and increasing rates of return are also likely to be influential small and micro businesses with lower energy uses. Again, much needs to be done to raise awareness of the scheme, and targeted communications are needed if it is to play any meaningful role in the adoption process.

Do potential fiscal changes present barriers to the uptake of solar?

Potential increases in business rates posed the single biggest barrier for SMEs adoption of solar and participants felt it was a priority for government to address this. Rates increases are:

- the most significant concern for medium-sized businesses with higher energy use.

[39] Despite reservations about the perceived restrictions of the SEG, generators are free to choose and change their SEG supplier. Contract lengths, types and exit fees are variable across suppliers and small-scale generators are advised to shop-around to find a tariff that best meets their needs.

- likely to change the fundamental assumptions around the installation ROI.
- not seen as an appropriate tax vehicle for rises with SMEs, who are looking to cut costs and create efficiencies post pandemic (which is the primary driver to consider adopting solar).
- likely to strongly give the impression that government are not serious about incentivising businesses to reduce their carbon footprint.

VAT changes were less of a concern for SMEs, though all the business engaged in the research had a turnover more than £85K and were VAT registered.

For smaller businesses, as for households, given centrality of costs and benefits to the decision, increases in VAT from 5-20% are likely to be a significant cause of friction.

Is a misalignment of incentives between landlord and renters preventing the installation of solar?

For households, while the role of landlords was not explicitly explored in the study, data shows that 23% of leaseholders in the sample would need to consult with a landlord to install solar. The number of leaseholders that were considering adoption was relatively low at 13%. Additionally, 35% of homeowners who have moved into a property with solar installed said it had influenced their decision – albeit from a low base.

For SMEs, incentives for landlords were seen to be misaligned. While this was not an issue for larger companies looking to stay in their current premises for the next 5-10 years, it was a barrier for smaller businesses who may need to relocate to accommodate their growth. The potential to align incentives for landlords to support with upfront costs, plus options for financial support such as grants, are needed to maximise uptake with this group. Beyond offering tax breaks, this issue was not explored in depth. Incentives for landlords could be an area for future research.

What communications are required by government?

For households, participants who were Considerers reported various ways that government could provide support and incentives. For example, 65% of Considerers in the sample said that a government approved list of builders would make them feel more confident in the decision, with 22% ranking government and Local Authorities making it easier to find suppliers in their top three incentives.

Myth busting is also important for homeowners. Almost half of participants who were Considerers reported they were put off by stories they have heard about cowboy builders and a third do not trust builders to do a good job with solar panels. A third of Considerers in the sample also reported that they believe the weather is not good enough for solar.

For SMEs, government can play a critical role to encourage businesses to move from contemplating solar installation to taking the first steps into action. Tailored communications, with examples of potential costs savings, have potential to be a significant enabler. They are likely to have greatest impact for industries with higher electricity uses (such as manufacturing) and for those who own or rent larger properties (such as medium-sized businesses). Government should also provide step-by-step guide on the factors SMEs need to consider when installing solar.

Given that the government is not top of mind for most SMEs during the information gathering stage on solar, website publications are likely to be a necessary but not sufficient step to enable such material to be read. Beyond Search Engine Optimization (SEO), the potential to work with larger energy firms and installers to help disseminate such information is likely to yield greatest return – given such organisations are the main port of call when researching this area. In terms of future research, randomised control trials to test the efficacy of a range of communication approaches is recommended.

Given recent policy changes, do people feel government is support of solar?

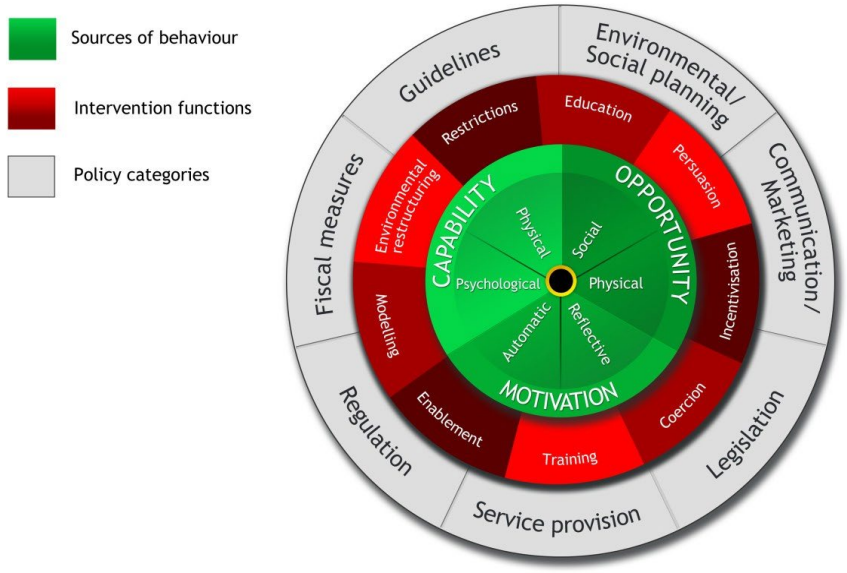
For householders, some 40% of Considerers in the sample reported that they think solar is now a lower priority for government, though we are not able to glean the reasons for this from the research.

For SMEs that have adopted solar, there is a perception that government support for solar has waned, relative to other low carbon measures such as EVs. This was mainly due to changes to the FIT scheme. While there was an appreciation that incentives did need to change as other installation costs decreased, the sudden changes to the scheme leave the impression that government do not understand the need for a stable policy environment to support longer term business investment decisions.

Overall, whilst a government statement or signal of support for solar in the run up to COP26 may go some way to allaying these concerns, of far greater importance is to remove potential fiscal barriers and nudge SMEs, plus provide peace of mind through guarantees and better financing options for households who are considering adoption.

Annex 1. Using the behavioural analysis to develop interventions utilising the COM-B Framework, The Behaviour Change Wheel, and APEASE criteria

Figure 15: The Behaviour Change Wheel



Following a behavioural analysis utilising the COM-B model, the Behaviour Change Wheel, as seen in Figure 15, can be used to help guide the development of appropriate, tailored, and effective interventions and policies that target the behaviours. In this framework, the COM-B analysis is linked to specific intervention types based on function and then to the appropriate policy type.

The APEASE Criteria is a tool to evaluate the intervention in order to develop the most feasible intervention with the greatest chance of success for reaching the desired behaviour change. APEASE should be used at all stages of developing an intervention. The 6 criteria of APEASE are as follows:

Acceptability	How far is it acceptable to all key stakeholders?
Practicability	Can it be implemented as designed within the intended context, material and human resources?
Effectiveness	How effective and cost-effective is it in achieving desired objectives in the target population?
Affordability	How far can it be afforded when delivered at the scale intended?
Side-effects	How far does it lead to unintended adverse or beneficial outcomes?
Equity	How far does it increase or decrease differences between advantaged and disadvantaged sectors of society?

From: UBC Briefing 7: Evaluating behaviour change interventions using APEASE Robert West and Susan Michie, January 2019

Below are two examples (one household, one SME, of how the COM-B analysis conducted can be used to guide the development of interventions, strengthened by the APEASE criteria.

Figure 16. Household Intervention example

Theme: Information	**COM-B**	**Intervention Types**	**Policy types**	**Application of Intervention considering APEASE**
44% of households who were considerers in the sample agree information is complicated 40% said information was confusing 65% said a government approved list of builders would make them feel more confident 46% reported being concerned about cowboy builders	**Psychological Capability** **Reflective Motivation** **Automatic Motivation**	**Education** **Modelling** **Persuasion** Enablement Incentivisation Coercion Environmental Restructuring	Communications / Marketing Guidelines Regulation Legislation Service Provision	Government-backed marketing with clear and tailored guidelines for households. This should include information on process and trusted stakeholders. This could also include examples (models) of other households who have installed rooftop solar. Information coming from the government will be more acceptable than what is currently available. This is both practical and affordable as these efforts can be done through mass communication efforts such as post or online marketing. A randomised control trial (RCT) to test the efficacy of various communications methods could be an area for future study. This information can be tailored to different profiles and be equitable by design.

Figure 17. SME Intervention example

Theme: **Finance**	**COM-B**	**Intervention Types**	**Policy types**	**Application of Intervention considering APEASE**
SMEs were motivated by the ROI of installing rooftop solar. While SMEs were able to work their way through the decision-making journey, the main friction areas were when financial returns were either uncertain or not met.	**Automatic Motivation** **Psychological Capability** **Reflective Motivation** **Physical Opportunity**	**Modelling** **Enablement** **Education** **Persuasion** **Incentivisation** Environmental Restructuring Coercion Training	Communications /Marketing Regulation Guidelines Legislation Service Provision	Provide reassurance of financial returns, and clearly communicating potential fiscal changes. This could be done through targeted marketing efforts with models of similar SMEs and their financial returns. Testimonials of the process, their actual returns, and ongoing maintenance experience could be valuable as most adopters had positive experiences once going ahead with installation, which can act as a positive model for others. This is both practical and affordable as these efforts can be done through mass communication efforts such as post or online marketing. A RCT to test the efficacy of various communications methods could be an area for future study.

Annex 2: Household motivators and barriers

Figure 18: details of motivator and barrier statements

Shorthand ref	Statement	C	M	O
Easy to find info	I could easily find information about installing solar panels	●		
Clear Gov't info	I could clearly understand the information about solar panels provided by government	●		●
Easy installation	The installation process was easy		●	●
Easy to buy	The process of buying solar panels was easy		●	●
Confident no risks to home	I was confident that there were no risks to my home following installation		●	
Confident simple maintenance	I had confidence that the ongoing maintenance of the panels would be simple		●	
Confident in financial saving	I was confident that there would be a financial saving at some point following installation		●	
Thought good for environment	I believed that it would have a meaningful positive impact on the environment		●	
No impact on attractiveness	The presence of the panels did not negatively affect the way my home looks		●	
Confident simple surplus payments	I was confident that it would be simple to receive payments from my energy supplier for any surplus energy I generated		●	●
Had up-front finances	I had the financial resources that made any up-front costs affordable			●
Could spread out costs	I was able to spread out the upfront costs			●
Had Gov't prompts	I received a prompt to take action, for example through a communication from my local authority or government			●
Installed free for surplus payments	I was able to have the solar panels installed free of charge by a company who, in return, received payments from the electricity I generated			●
Simple to find trusted trader	It was simple to find a reliable and trustworthy installer			●
Knew someone with panels	I knew someone who had solar panels installed			●
Gov't messages positive	Messages from government highlighted the value and impact of installing solar panels			●
Had trusted advisor	I had access to a trusted advisor to help me make the decision or guide me through the process			●

Figure 19: Considerers/Rejectors: Q15 motivators and barriers categorized by COM-B

Shorthand ref	Statement	C	M	O
Never thought about it	I've never really thought about installing solar panels before	●		
Information is very complicated	Information about solar panels is very complicated	●		●
Would if easier to install	I'd be more likely to buy solar panels if the installation process was easier		●	
Maintenance concerns	Ongoing maintenance of solar panels is a concern		●	
Too much hassle	Installing solar panels is too much of a hassle to be worth it		●	
Money saving motivation	Using solar panels to save money on my electricity bill is motivating.		●	
Won't get fair price for surplus	I'm concerned I won't get a fair price for the electricity I sell back to the grid		●	
Technology will get cheaper	The technology for solar panels is likely to become cheaper in a few years, so I wouldn't install them now		●	●
For rich people, I can't afford it	Solar panels are generally fitted by rich people, and it makes me think I wouldn't be able to afford to buy them		●	
Weather not good enough	The weather is not good enough for solar panels		●	
Only works in summer	Solar panels only generate electricity in the summer, so it would not save much on my electricity bill		●	
Guarantee repair scheme helpful	A guarantee scheme would allay any repair concerns I have about solar panels		●	●
Govt approved builders helpful	Government approved builders would make me feel confident about installing solar panels		●	●
Concerned about cowboy builders	I've heard stories about cowboy builders installing panels and it puts me off		●	
Don't trust builders	I don't trust builders to do a good job installing solar panels		●	
Property resale concerns	I'm worried about reselling my house if it has solar panels installed		●	
Attractiveness concerns	I'm worried solar panels would make my house look less attractive		●	
No impact on climate change	Installing solar panels won't make any difference to preventing climate change, so there's little point in installing them for environmental reasons		●	

Figure 20: Considerers/Rejectors: Q16 top incentives categorized by COM-B

Shorthand ref	Statement	C	M	O
Tailored information	Having information tailored to me about solar panels.	●		●
Guarantee in place	Having a guarantee in place in case anything goes wrong.		●	●
Buy back of surplus	The financial gains I make from selling surplus energy to the grid		●	
Battery storage	Having access to battery storage so I can use the electricity I generate at different times			●
Spread costs	Spreading the cost out over time.			●
Access finance	Being able to access finance for solar panels.			●
Easier process	Making the buying, installing and maintenance process easier.		●	●
Trusted builders	Having trusted builders for the installation process.			●
Gov't & LA finance assistance	Government and local authority make it easy for me to get finance for solar panels		●	●
Gov't & LA help finding traders	Government and local authority make it easy for me to get suppliers and installers for solar panels			●
Gov't communications	Having a clear indication from government that it's the right thing to do			●
Other local adoption	Having others in my street or village adopt solar panels.			●

Appendix 1 data tables

Table 2: Profile of solar attitudinal segments

	Adopters	Considerers	Rejectors
Base: All respondents	*294*	*300*	*296*
GENDER	**%**	**%**	**%**
Male	61[CR]	38	47[C]
Female	39	61[A]	53[A]
AGE			
18-24	1	9[A]	7[A]
25-34	7	40[AR]	13[A]
35-44	23[CR]	15[R]	6
45-54	17	18	15
55-64	17[C]	9	24[AC]
65-80	36[C]	9	35[C]
REGION			
England	88	88	86
North of England	21	25	24
Midlands	28	26	26
South of England	39	38	36
Wales	5	5	5
Scotland	6	7	9

Question wording: S1. (gender) Are you … ? S2. And how old are you? S3. Which of the following areas do you live in?

KEY: A: significantly higher than Adopter segment; C: significantly higher than Considerer segment; R: Significantly higher than Rejector segment

Table 2 continued: Profile of solar attitudinal segments

	Adopters	Considerers	Rejectors
Base: All respondents	*294*	*300*	*296*
ETHNICITY	**%**	**%**	**%**
WHITE	95[C]	81	91[C]
British/English/Welsh/Scot/NI	91[C]	73	87[C]
Other white background	3	8[AR]	4
BAME	5	18[AR]	7
Mixed	<0.5%	3[A]	1
Asian	3	10[AR]	3
Indian	2	4[R]	1
Pakistani	<0.5%	3[A]	2
Black	1	4[A]	2
Other	<0.5%	1	1
HEALTH CONDITION			
Yes	27	22	24
No	72	75	76
SOCIAL GRADE			
AB	48[R]	40[R]	31
C1	21	30[A]	28[A]
C2	9	13	11
DE	23	17	30[AC]
NET HOUSEHOLD INCOME			
Up to £20,000	13	19[A]	22[A]
£20,001to £30,000	13	19[A]	20[A]
£30,001to £43,000	19	21	23
£43,001to £50,000	9	13	9
£50,000+	39[CR]	24	20

Question wording: Q21. What is your ethnic group? Q22. Do you have any physical or mental health conditions or illnesses lasting or expected to last for 12 months or more? Q20. Which one of the following categories best describes the employment of the main income earner in your household? Q19. What is your household income before tax?

KEY: A: significantly higher than Adopter segment; C: significantly higher than Considerer segment; R: Significantly higher than Rejector segment

Table 2 continued: Profile of solar attitudinal segments

	Adopters	Considerers	Rejectors
Base: All respondents	*294*	*300*	*296*
HOUSING TENURE	**%**	**%**	**%**
Considering buying	-	36[AR]	15[A]
Own or part own	100[CR]	63	85[C]
Own outright	79[CR]	27	60[C]
Mortgage/part own	21	36[AR]	25
Freehold	92[CR]	49	79[C]
Leasehold	8	13[AR]	6
HOUSING TYPE			
House	98[CR]	81	90[C]
Flat/maisonette	2	19[AR]	10[A]
PLANS TO MOVE/BUY HOUSE			
Yes	33	66[AR]	32
No	67[C]	34	68[C]

Question wording: Q3. In terms of your main home, which of the following best describes your situation…? Q4. Is your property leasehold or freehold? Q2. In terms of your main home, which of the following best describes the type of property you live in? Q5. Are you considering moving from your property in the next two years? Q6. Are you looking to purchase your own property in the next two years?

KEY: A: significantly higher than Adopter segment; C: significantly higher than Considerer segment; R: Significantly higher than Rejector segment

Table 3: Which energy-saving measures would consider installing?

	Adopters	Considerers	Rejectors
Base: All respondents	*294*	*300*	*296*
Solar panels	**%**	**%**	**%**
Installed or would consider	100%	67%	-
Already installed	100%	-	-
Would consider	-	67%	-
Mid-point	-	33%	-
Would not consider	-	-	100%
Double or triple glazing			
Installed or would consider	97[CR]	81	77
Already installed	75[CR]	26	58[C]
Would consider	22	54[AR]	19
Mid-point	2	16[AR]	10[A]
Would not consider	1	4[A]	13[AC]
Loft insulation			
Installed or would consider	96[CR]	76	72
Already installed	77[CR]	25	55[C]
Would consider	19	50[AR]	17
Mid-point	2	19[AR]	11[A]
Would not consider	1	6[A]	17[AC]
Energy efficient boilers			
Installed or would consider	91[CR]	78[R]	63
Already installed	56[CR]	16	33[C]
Would consider	35	62[AR]	30
Mid-point	4	19[A]	20[A]
Would not consider	5	3	17[AC]
Wall insulation			
Installed or would consider	90[CR]	73[R]	52
Already installed	63[CR]	21	38[C]
Would consider	27[R]	53[AR]	14
Mid-point	4	21[A]	17[A]
Would not consider	5	6	31[AC]

Table 3 continued: Which energy-saving measures would consider installing?

	Adopters	Considerers	Rejectors
Base: All respondents	*294*	*300*	*296*
Draft proofing			
Installed or would consider	88[CR]	70[R]	61
Already installed	49[CR]	14	31[R]
Would consider	39[R]	56[AR]	30
Mid-point	7	26[A]	20[A]
Would not consider	4	3	19[AC]
Smart heating controls			
Installed or would consider	61[R]	68[R]	35
Already installed	23[CR]	7	9
Would consider	38[R]	61[AR]	26
Mid-point	18	24	22
Would not consider	20[C]	8	43[AR]
Floor insulation			
Installed or would consider	56[R]	63[R]	24
Already installed	22[CR]	7	7
Would consider	34[R]	56[AR]	17
Mid-point	19	27[A]	26[A]
Would not consider	24[C]	10	49[AC]

Question wording: Q7. We now want to ask you about energy efficiency, by which we mean measures to reduce the amount of energy required to heat and power your home. NON-HOMEOWNER (Q6=1): Thinking ahead to when you own a home, how likely or unlikely are you to consider making the following improvements to make it more energy-efficient? HOMEOWNER (Q3= 1-4): How likely or unlikely are you to consider making the following improvements to your home, to make it more energy-efficient?

KEY: A: significantly higher than Adopter segment; C: significantly higher than Considerer segment; R: Significantly higher than Rejector segment

Table 4: Awareness of schemes

	Adopters	Considerers	Rejectors
Base: All respondents	*294*	*300*	*296*
Feed In Tariffs	**%**	**%**	**%**
Aware (NET)	84 CR	43 R	26
Aware of and used scheme	55 CR	6 R	1
Aware of and know about scheme	18 R	14 R	7
Aware of but don't know much	11	23 A	18 A
Not aware of scheme	16	57 A	74 AC
Smart Export Guarantee			
Aware (NET)	42 CR	30 R	9
Aware of and used scheme	18 CR	6 R	2
Aware of and know about scheme	11 R	9 R	2
Aware of but don't know much	13 R	15 R	6
Not aware of scheme	58	70 A	91 AC
Solar Together			
Aware (NET)	32 CR	31 R	9
Aware of and used scheme	16 CR	6 R	1
Aware of and know about scheme	8	11	2
Aware of but don't know much	8	14 AR	5
Not aware of scheme	68	69	91 AC
Green Homes Grant			
Aware (NET)	73 CR	62 R	48
Aware of and used scheme	15 CR	7 R	2
Aware of and know about scheme	22 R	21 R	13
Aware of but don't know much	35	33	33
Not aware of scheme	27	38 A	52 AC

Question wording: Q17. Are you aware of any of the following schemes?

KEY: A: significantly higher than Adopter segment; C: significantly higher than Considerer segment; R: Significantly higher than Rejector segment

Table 5: Attitudes towards the SEG

	Adopters	Considerers	Rejectors
Base: All respondents	*294*	*300*	*296*
	%	%	%
I'd be willing to change my energy supplier if I could take advantage of a better tariff elsewhere			
Agree (NET)	72[R]	72[R]	55
Strongly agree	43[R]	36[R]	24
Somewhat agree	29	36	32
Neither disagree nor agree	15	17	24[AR]
Somewhat disagree	3	3	8[AR]
Strongly disagree	4	3	4
Disagree (NET)	7	6	12[C]
Don't know	6	5	9
I'd be willing to have a smart meter installed to take advantage of the SEG			
Agree (NET)	66[R]	68[R]	36
Strongly agree	44[CR]	31[R]	13
Somewhat agree	22	37[AR]	23
Neither disagree nor agree	14	17	28[AC]
Somewhat disagree	4	6	13[AC]
Strongly disagree	10[C]	5	16[AC]
Disagree (NET)	14	11	29[AC]
Don't know	6	4	7
I'd be worried that there is no minimum contract length and suppliers could change the tariff			
Agree (NET)	51	56	57
Strongly agree	19	24	18
Somewhat agree	32	32	39
Neither disagree nor agree	28	30	29
Somewhat disagree	5	9	5
Strongly disagree	7[AC]	1	1
Disagree (NET)	13[C]	10	6
Don't know	8[C]	4	7

Table 5 continued: Attitudes towards the SEG

	Adopters	Considerers	Rejectors
Base: All respondents	*294*	*300*	*296*
	%	%	%
I don't think it's worth taking up for such a small return			
Agree (NET)	35	32	50 CR
Strongly agree	15	15	19
Somewhat agree	20	17	31 AC
Neither disagree nor agree	24	31	28
Somewhat disagree	17 R	25 AR	11
Strongly disagree	17 CR	6	3
Disagree (NET)	34 R	31 R	14
Don't know	6	6	7

Question wording: Q18. We now want to ask you some questions about the Smart Export Guarantee (SEG). The SEG enables people who have solar panels to sell their surplus energy back to the grid. There are various tariffs available from suppliers and for a typical household, this could mean in addition to bill savings making £100-200 each year from selling back the excess energy they produce. Thinking about the SEG, how much do you agree or disagree with the following statements?

KEY: A: significantly higher than Adopter segment; C: significantly higher than Considerer segment; R: Significantly higher than Rejector segment

Motivators and barriers

Table 6: Attitudes among Adopters who know when solar panels were installed.

Base: All Adopters who know when solar panels were installed (194)	Agree (NET)	Agree strongly	Disagree strongly	Disagree (NET)
Psychological capability	%	%	%	%
I could easily find information about installing solar panels	81	40	1	5
I could clearly understand the information about solar panels provided by government *(ALSO OPPORTUNITY)*	74	43	2	7
Automatic motivation				
The installation process was easy *(ALSO OPPORTUNITY)*	95	60	1	2
The process of buying solar panels was easy *(ALSO OPPORTUNITY)*	92	55	0	2
I was confident that there were no risks to my home following installation (e.g., risk of coming loose or damaging the roof)	86	44	6	8
I had confidence that the ongoing maintenance of the panels would be simple	84	42	0	1
Reflective motivation				
I was confident that there would be a financial saving at some point following installation (e.g., saving on my energy bills)	96	55	1	1
I believed that it would have a meaningful positive impact on the environment	91	51	1	2
The presence of the panels did not negatively affect the way my home looks	88	54	6	6
I was confident that it would be simple to receive payments from my energy supplier for any surplus energy I generated *(ALSO OPPORTUNITY)*	79	47	4	7
Physical opportunity				
I had the financial resources that made any up-front costs affordable	88	58	1	4
I was able to spread out the upfront costs *(ALSO MOTIVATION)*	48	27	19	24
I received a prompt to take action, for example through a communication from my local authority or government	43	25	29	42
I was able to have the solar panels installed free of charge by a company who, in return, received payments from the electricity I generated	42	32	49	54

Table 6 continued: Attitudes among Adopters who know when solar panels were installed.

Base: All Adopters who know when solar panels were installed (194)	Agree (NET)	Agree strongly	Disagree strongly	Disagree (NET)
Social opportunity	%	%	%	%
It was simple to find a reliable and trustworthy installer	80	39	1	5
I knew someone who had solar panels installed	66	42	18	27
Messages from government highlighted the value and impact of installing solar panels *(ALSO MOTIVATION)*	63	34	8	16
I had access to a trusted advisor (family, friend, building or energy professional) to help me make the decision or guide me through the process	54	31	15	31

Question wording: Q14. For each of the following statements, how much do you agree or disagree that it influenced you to install solar panels?

Table 7: Attitudes among Considerers

Base: All Considerers (300)	Agree (NET)	Agree strongly	Disagree strongly	Disagree (NET)
Psychological capability	%	%	%	%
I've never really thought about installing solar panels before	33	11	15[R]	45[R]
Information about solar panels is very complicated *(ALSO OPPORTUNITY)*	44	12	5	24[R]
Automatic motivation				
I'd be more likely to buy solar panels if the installation process was easier	61[R]	20[R]	2	9
Ongoing maintenance of solar panels is a concern	55	8	2	12
Installing solar panels is too much of a hassle to be worth it	30	8	10[R]	36[R]
Reflective motivation				
Using solar panels to save money on my electricity bill is motivating.	76[R]	30[R]	2	9
A guarantee scheme would allay any repair concerns I have about solar panels *(ALSO OPPORTUNITY)*	67[R]	23[R]	2	5
Government approved builders would make me feel confident about installing solar panels *(ALSO OPPORTUNITY)*	65[R]	21[R]	2	7
I'm concerned I won't get a fair price for the electricity I sell back to the grid	47	11	4	16
I've heard stories about cowboy builders installing panels and it puts me off	46[R]	11	6	24
The technology for solar panels is likely to become cheaper in a few years, so I wouldn't install them now *(ALSO OPPORTUNITY)*	43	12	2	12
Solar panels are generally fitted by rich people, and it makes me think I wouldn't be able to afford to buy them	38[R]	10	13	33
The weather is not good enough for solar panels	33	7	10	37[R]
I don't trust builders to do a good job installing solar panels	32	8	7	26
I'm worried about reselling my house if it has solar panels installed	32	9	12	41[R]
I'm worried solar panels would make my house look less attractive	31	8	14[R]	46[R]
Solar panels only generate electricity in the summer, so it would not save much on my electricity bill	29[R]	7	12	39
Installing solar panels won't make any difference to preventing climate change, so there's little point in installing them for environmental reasons	25	9	20[R]	50[R]

Table 7 continued: Attitudes among Considerers

Base: All Considerers (300)	Agree (NET)	Agree strongly	Disagree strongly	Disagree (NET)
Reflective motivation ctd	%	%	%	%
My roof doesn't face the sun, so it wouldn't be worth installing solar panels	26	8	16	43[R]
Physical opportunity				
Upfront costs are a major barrier to installing panels	66	27	2	10
If I could spread the costs over many years, I'd be more likely to buy solar panels	61[R]	19[R]	2	12
I can't afford the upfront costs to buy solar panels	59	24	2	15
It's easy to find information about installing solar panels *(ALSO CAPABILITY)*	43[R]	12[R]	5	20
There are too many options around solar panels and I find it confusing *(ALSO CAPABILITY)*	40	10	4	20
My roof is too small for solar panels	25	6	18	43
Social opportunity				
I don't know who to trust for advice on solar panels *(ALSO MOTIVATION)*	56	16	3	13
If more people I knew had them, I'd be more likely to buy solar panels	45[R]	9	8	25
Solar panels are less of a priority for government than they used to be, which makes me less convinced to install them	40	10	5	21[R]

Question wording: Q15. How much do you agree or disagree with the following statements about solar panels?

KEY: R: significantly higher than Rejector segment.

Table 8: Attitudes among Rejectors

Base: All Rejectors (285)	Agree (NET)	Agree strongly	Disagree strongly	Disagree (NET)
Psychological capability	%	%	%	%
I've never really thought about installing solar panels before.	45[C]	15	7	28
Information about solar panels is very complicated *(ALSO OPPORTUNITY)*	38	10	3	16
Automatic motivation				
I'd be more likely to buy solar panels if the installation process was easier	35	7	10	22[C]
Ongoing maintenance of solar panels is a concern	55	13	2	9
Installing solar panels is too much of a hassle to be worth it	54[C]	16[C]	4	13
Reflective motivation				
Using solar panels to save money on my electricity bill is motivating	42	10	9[C]	23[C]
A guarantee scheme would allay any repair concerns I have about solar panels *(ALSO OPPORTUNITY)*	41	9	8[C]	20[C]
Government approved builders would make me feel confident about installing solar panels *(ALSO OPPORTUNITY)*	42	11	7[C]	19[C]
I'm concerned I won't get a fair price for the electricity I sell back to the grid	43	11	2	14
I've heard stories about cowboy builders installing panels and it puts me off	36	12	9	23
The technology for solar panels is likely to become cheaper in a few years, so I wouldn't install them now *(ALSO OPPORTUNITY)*	41	10	4	13
Solar panels are generally fitted by rich people, and it makes me think I wouldn't be able to afford to buy them	23	8	14	41
The weather is not good enough for solar panels	31	9	7	29
I don't trust builders to do a good job installing solar panels.	32	12	4	21
I'm worried about reselling my house if it has solar panels installed	34	12	11	26
I'm worried solar panels would make my house look less attractive	42[C]	16[C]	9	24
Solar panels only generate electricity in the summer, so it would not save much on my electricity bill	21	7	11	37
Installing solar panels won't make any difference to preventing climate change, so there's little point in installing them for environmental reasons	22	6	11	30

Table 8 continued: Attitudes among Rejectors

Base: All Rejectors (285)	Agree (NET)	Agree strongly	Disagree strongly	Disagree (NET)
Reflective motivation ctd	%	%	%	%
My roof doesn't face the sun, so it wouldn't be worth installing solar panels	27	9	13	34
Physical opportunity				
Upfront costs are a major barrier to installing panels	69	31	4	9
If I could spread the costs over many years, I'd be more likely to buy solar panels	23	8	16[C]	39[C]
I can't afford the upfront costs to buy solar panels	56	23	6	17
It's easy to find information about installing solar panels *(ALSO CAPABILITY)*	28	4	8	25
There are too many options around solar panels and I find it confusing *(ALSO CAPABILITY)*	34	12	4	15
My roof is too small for solar panels	22	9	17	39
Social opportunity				
I don't know who to trust for advice on solar panels *(ALSO MOTIVATION)*	48	14	4	12
If more people I knew had them, I'd be more likely to buy solar panels	28	6	15[C]	35[C]
Solar panels are less of a priority for government than they used to be, which makes me less convinced to install them	41	11	3	14

Question wording: Q15. How much do you agree or disagree with the following statements about solar panels?

KEY: C: Significantly higher than Considerer segment

Table 9: Top 3 incentives for installing solar - Considerers

Base: All Considerers (300)	TOP 3	1st	2nd	3rd
Psychological capability	%	%	%	%
Having information tailored to me about solar panels *(ALSO OPPORTUNITY)*	14	5	6	3
Automatic motivation				
Having a guarantee in place in case anything goes wrong *(ALSO OPPORTUNITY)*	40	15	12	13
Reflective motivation				
The financial gains I make from selling surplus energy to the grid	34	10	12	12
Physical opportunity				
Spreading the cost out over time.	30	13	8	9
Having access to battery storage so I can use the electricity I generate at different times	29	8	10	11
Being able to access finance for solar panels.	21[R]	7	8	6
Social opportunity				
Making the buying, installing and maintenance process easier *(ALSO MOTIVATION)*	31	8	10	12
Having trusted builders for the installation process	30	12	9	10
Having a clear indication from government that it's the right thing to do	13	4	5	4
Having others in my street or village adopt solar panels	10	2	4	4
Government and local authority make it easy for me to get finance for solar panels *(ALSO MOTIVATION)*	27	11	9	7
Government and local authority make it easy for me to get suppliers and installers for solar panels *(ALSO MOTIVATION)*	22	6	8	9

Question wording: Q16. Of the following, what are the top three incentives to encourage you to buy solar panels?

KEY: R: significantly higher than Rejector segment.

Table 10: Top 3 incentives for installing solar – Rejectors.

Base: All Rejectors (285)	TOP 3	1st	2nd	3rd
Psychological capability	%	%	%	%
Having information tailored to me about solar panels *(ALSO OPPORTUNITY)*	17	5	7	4
Automatic motivation				
Having a guarantee in place in case anything goes wrong *(ALSO OPPORTUNITY)*	43	15	16	13
Reflective motivation				
The financial gains I make from selling surplus energy to the grid	44 C	20 C	12	12
Physical opportunity				
Spreading the cost out over time.	27	8	8	11
Having access to battery storage so I can use the electricity I generate at different times	27	8	11	8
Being able to access finance for solar panels.	13	5	3	5
Social opportunity				
Making the buying, installing and maintenance process easier *(ALSO MOTIVATION)*	27	7	10	9
Having trusted builders for the installation process	39 C	13	14	13
Having a clear indication from government that it's the right thing to do	13	3	5	5
Having others in my street or village adopt solar panels	9	3	3	3
Government and local authority make it easy for me to get finance for solar panels *(ALSO MOTIVATION)*	22	8	7	8
Government and local authority make it easy for me to get suppliers and installers for solar panels *(ALSO MOTIVATION)*	19	5	5	8

Question wording: Q16. Of the following, what are the top three incentives to encourage you to buy solar panels?

KEY: C: significantly higher than Considerer segment.

Appendix 2: Sample details

Total sample household demographics

Table 11: Achieve sample vs quota demographics.

Characteristic	Detail	Achieved sample Total (n=889)	Achieve sample %	GB Quota %
Gender	Male	431	48%	49%
	Female	456	51%	51%
	Non-binary / other gender identity	1	<1%	-
	Prefer not to say	1	<1%	-
Age[40]	18-24	50	6%	32%
	25-34	179	20%	
	35-44	131	15%	37%
	45-54	148	17%	
	55-64	147	17%	31%
	65-80	234	26%	
Region	East of England	91	10%	9%
	London	119	13%	13%
	North West	93	10%	11%
	Scotland	67	8%	8%
	South East	135	15%	14%
	South West	81	9%	8%
	Wales	45	5%	5%
	Midlands	143	16%	17%
	North East Yorkshire & The Humber	115	13%	12%
Country	England	777	87%	
	Wales	45	5%	
	Scotland	67	8%	

[40] The age profile of the sample was skewed slightly towards older people, who were more likely to be on the property ladder than those aged under 35 and also to achieve the quotas on Adopters, who had an older age profile.

SME sample

Table 12: SME Sample Characteristics

Sample characteristic	Detail (n=15)	
Solar	Adopter = 7	Considerer = 8
Size of business	Micro or Small = 7	Medium = 8
Tenure	Freehold = 9	Leasehold = 6
Sector	Manufacturing = 4	Service and retail = 4
	Building and construction = 3	Other = 2
	Haulage = 2	

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