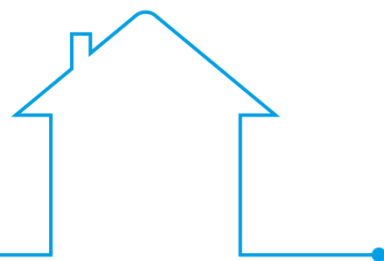




Department
of Energy &
Climate Change

SMART METERS: DEROGATION GUIDANCE

Supporting energy supplier applications for
trials of in-home display alternatives



April 2016

SMART METERS: DEROGATION GUIDANCE

Supporting energy supplier applications for trials of in-home display alternatives

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smart meters: derogation guidance

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Introduction

This document sets out the Department of Energy and Climate Change's (DECC) guidance for those energy suppliers who wish to seek a derogation from the requirement to offer domestic consumers an In Home Display (IHD) as part of a smart meter installation, in order to undertake time-limited trials of alternative engagement approaches in GB domestic properties served by smart metering (the 'trials').

The primary purpose of this guidance is to support applicants (i.e. energy suppliers) in planning and submitting applications and ultimately undertaking and reporting on such trials. This guidance may also be of interest to third parties involved in a supplier's trial, consumer representative groups as well as other stakeholders who have engaged in the consultation process supporting this policy.

As with the existing evidence base for IHDs DECC expects that evidence on both causal mechanisms and outcomes will be needed to understand the impact of a particular alternative approach in benefiting consumers, although individual trials will not be required to measure both. Where suppliers do not wish to carry out large scale trials or undertake energy consumption analysis this guidance outlines methodologies and research questions that will enable trials to provide evidence that can contribute to future policy considerations. For DECC to consider changing policy however we will need evidence on how any specific approach impacts on domestic energy consumption outcomes.

The first section of this document sets out DECC's core application requirements together with practical information on the application and decision making process. An Application template and other useful core information are provided in the Appendices.

Part A of the guidance breaks these requirements into three trial stages and summarises our general approach and expectations. These trial stages match different stages of product development and guidance is provided on how suppliers can match their plans to these. The trial stages are sequential (although they can be combined, or replaced with existing evidence), and build from small scale, exploratory research, through measuring the types and distribution of intermediate impacts, to large scale trials designed to quantify impacts on energy consumption. We anticipate that not all suppliers will progress to the final trial stage (Stage three).

Part B sets out more detail on the methodological approaches we would expect trials to adopt to ensure robust evidence is gathered. The evidence that DECC receives through the trials will inform considerations on whether the IHD mandate remains optimised to deliver consumer benefits, specifically, whether alternative feedback devices and methods can deliver equivalent or greater consumer benefits to IHDs.

1 Background and key information

1.1 Background

1. By the end of 2020 every household and small business will have been offered smart electricity and gas meters by their energy supplier. Amongst other benefits, smart meters can provide consumers with accurate bills, up to date information on their energy use and the ability to switch energy suppliers more easily.
 2. Since 2012, the standard licence conditions for electricity and gas supply (the 'Licence Conditions') have required all domestic consumers to be freely offered an IHD when their smart meter is installed (the 'IHD mandate') so that they have easy access to their energy consumption and tariff information. IHDs provide the consumer with near-real time information on actual energy consumption taken from smart electricity and gas meters through a wireless home area network. DECC acknowledges that there are a number of promising new areas of technology or methods that could act as alternatives to IHDs. However, there is a lack of robust, independent and GB-based evidence on the efficacy of these alternative approaches.
 3. On 4th February 2016 ¹Government announced that it would introduce a derogation process allowing suppliers to apply to undertake trials of IHD alternatives in order to develop an evidence base. The Licence Conditions which establish a derogation mechanism came into force on 30 March 2016.
 4. The Government made it clear that the IHD mandate remains a cornerstone of the Smart Metering Implementation Programme (the 'Programme'). To enable a process through which we can gather evidence on the latest alternative approaches, a trial environment is necessary to limit the risks to consumers from taking up engagement tools where we have little or no evidence on their ability to engage consumers in realising benefits. It is in consumers' interests that we gather robust evidence on alternative (potentially lower cost) approaches in order to proactively inform consideration of whether existing Licence Conditions best support consumers in achieving benefits. We anticipate that to inform any consideration of amending policy, this evidence base should include sufficient quantitative evidence on energy consumption impacts from trials of alternatives.²
 5. The trial application window will close at the end of September 2016 with the first submission date in May.
-

¹ <https://www.gov.uk/government/consultations/smart-meter-in-home-display-licence-conditions>

² See also paragraph's 41 - 43

6. The number of households receiving alternatives will be determined by the scale of trial needed to measure impacts accurately. We will be assessing these on a case by case basis. Our current expectation is that IHDs will remain the primary engagement tool offered to consumers over the trial period.

1.2 Application / trial requirements

7. In assessing any application for a derogation, the core requirements are that all applications must:
 - be received by DECC no later than 30 September 2016;
 - demonstrate a reasonable (appropriate to the stage of trial proposed) expectation that the alternative approach will lead to regular and sustained engagement with energy consumption information and in turn energy savings;
 - set out how the supplier will continue to meet separate requirements in their Licence Conditions in relation to both a consumer's right to request access to their historic daily energy consumption data and obtain any consent needed for a supplier to access that data;
 - include engagement tools using both a customer's electricity and gas smart meter data³;
 - provide full details of the trial proposed in line with expectations set out in this document and in the Application template. This includes details of the customer journey and engagement tools, the trial design, the research questions, research methods to be used and the approach to assuring the trial is robust in design and delivery - these requirements are more extensive and detailed for larger trials;
 - ensure any smart pre-payment meter customers continue to receive relevant prepayment functionality available through the IHD / Home Area Network e.g. ability to check their credit balance;
 - justify the size of trial necessary to provide robust and sufficiently precise findings, including where agile approaches are to be used; and
 - set out how the supplier will communicate information on the alternative to consumers in a clear and intelligible way and ensure it is appropriate to the

³ Although trials may include electricity or gas only consumers

consumers it is offered to (including those with accessibility needs; lower digital literacy, or limited access to the internet or smart phones).

1.3 Practical information

8. This section provides practical information on the application and decision making process:

What is a derogation?

9. A derogation will be issued in the form of a direction (from the Secretary of State for Energy and Climate Change in this instance) relieving a licensee (in this case a supplier) of its obligation to comply with certain Licence Conditions in specific circumstances and to a specified extent. Unless a derogation is granted, suppliers are required to comply with existing rules set out in the Licence Conditions.

Which existing requirements in the Licence Conditions are included here?

10. Where the Secretary of State gives a derogation direction, the relevant supplier would not be required to comply with the general duty and duty on request Licence Conditions⁴ to such extent and subject to such conditions as specified in the direction. In this instance, it would derogate an energy supplier from being required to offer a domestic energy customer an IHD when installing a smart meter. Supplementary Licence Conditions linked to the offer of an IHD would also fall away.

Who can apply for a derogation?

11. Only licensed energy suppliers can seek a derogation. If a derogation is granted it will apply to the licensed party who will be responsible for ensuring compliance by any associated third party to any conditions set out in the direction.

How can I apply?

12. All derogation applications should be submitted on the application template (see Appendix 3) and emailed to IHDAlternativeTrials@decc.gsi.gov.uk as a word document. All trials should have a named project lead who can respond to DECC queries. If you are considering applying we would ask that you register your interest with DECC at the same email address, so that we can keep a pipeline of potential proposals and plan accordingly.

⁴ The general duty is set out in standard licence condition 40.1 for electricity supply and 34.1 for gas supply; the duty on request is in standard licence condition 40.6 for electricity supply and 34.6 for gas supply

What can a derogation cover?

13. A derogation can cover multiple or single trials, multiple research stages or 'agile' trial approaches. The application needs to be clear what you are seeking.

Designing and carrying out research that meets ethical standards

14. DECC requires that suppliers ensure that any research undertaken as part of the trial complies with best practice codes of conduct ⁵ including, specifically;
- That they secure informed consent from customers, for their participation in any trial, at the point at which data is collected, and where their consent to provide energy consumption data is obtained
 - That they protect the data and identity of customers participating in trials, through secure storage of data and anonymised reporting of findings
15. DECC will not assess this as part of the application process; however suppliers should be able to demonstrate compliance with these standards if requested to.

What information about your trial will DECC require to award a derogation?

16. The information we require in order to assess your application is outlined in the Application template and builds on the core requirements set out above.

When should I apply?

17. Applications must be received by DECC no later than Friday 30th September 2016. There will be five application submission points – on the last day of the month beginning 31 May, with the last being 30 September. We would strongly encourage early applications, especially where Stage three (see Part A) trials are proposed.

How quickly will DECC decide?

18. We recognise the need to make decisions quickly and aim to take decisions in 30 working days subject to applications being complete. We will seek any missing information or material requiring clarification as early as possible, though could be expected to extend the approval timing in these instances. We will inform you if this is the case. Equally the number and complexity of trial applications submitted at any one time may also impact approval timelines. Before submitting a formal derogation application, we would strongly encourage suppliers to contact us at IHDAAlternativeTrials@decc.gsi.gov.uk to discuss their proposed approach.

⁵ As an example, see guidance from 'The Social Research Association' and 'The Market Research Society'

Who will decide applications?

19. The Secretary of State will decide whether to approve or reject an application. In practice the approvals will be administered on behalf of the Secretary of State by authorised officials in DECC.

How will I know if I have been successful?

20. Where an application is approved, a direction will be issued by the Secretary of State to that effect. When a derogation is granted, consideration will also be given to whether to place conditions and/or alternative requirements on the supplier. These could include setting a ceiling on customer numbers or requirements for a specific element of trial methodology such as independent peer review. We would expect this to be more common for larger trials. We will arrange a discussion with the applicant, as necessary, to explore and agree any conditions to the approval.

How will I know if I have been unsuccessful?

21. If an application is unsuccessful, DECC will write to the applicant informing them that their application has not been successful and outlining the reasons for rejection. In most instances we would expect to have already spoken with the applicant about the proposed trial. DECC's decisions are final, though an applicant will be able to re-apply (before 30 September 2016).

Monitoring and verification of trials

22. Our approach to monitoring and verification of trials will be proportionate to the scale and complexity of trial being undertaken. Suppliers should assume that for larger Stage two, and in particular Stage three trials (for more detail see Part A of the guidance), DECC will require some interim information about the implementation of trials. Supplier applications should detail any monitoring and verification information that will be supplied to DECC. DECC may outline additional requirements as part of the derogation decision.

Can a trial derogation be revoked?

23. Yes, for example if the supplier fails to submit the evidence requested in the approval direction or if the supplier (and where applicable, its representative) is shown not to comply with any requirements or conditions of the derogation (as set out in the approval direction).

How long will a derogation last?

24. Suppliers will be able to offer consumers' alternatives for the duration of plans submitted and approved by DECC.

When should I submit my final report?

25. We will set a date for evidence submission in your approval direction. This will take account of our intention that evidence should be submitted before 30 September 2017. Most trials will include a requirement to update DECC on delivery progress.

What evidence do I have to submit and in what format?

26. We will describe this in your approval direction, and will be dependent on the type of trial undertaken.

Can I submit other evidence?

27. Any evidence on IHD alternatives can be submitted by suppliers to DECC whether gathered under derogation trials or outside of this process, so long as it is clearly marked as being separate from any trial approved under the derogation process. This may be submitted as part of your application or at a subsequent point (for example, when submitting your trial findings).

Will I be able to extend the derogation?

28. Any supplier-specific derogation extension to conduct trials beyond the period defined in the approval direction will be subject to evidence from suppliers that trials are proving to be successful and that an extension would benefit consumers. Extensions are expected to be by-exception.

How will DECC treat information provided on a mandatory basis as part of the derogation process?

29. Section 105 of the Utilities Act 2000 prevents DECC from disclosing information obtained by virtue of a Licence Condition (e.g. information submitted by a supplier as part of its application for a derogation or its trial evidence submission) where it relates to an individual supplier's business and the supplier has not given consent for disclosure (unless some of the more detailed exceptions to the prohibition contained in the section apply)⁶. This restriction extends to Freedom of Information Requests. Requests for environmental information are dealt with under the Environmental Information Regulations 2004. Under this legislation, there is an exception from the duty to disclose information where the information is confidential or commercially sensitive, although this is considered on a case by case basis in accordance with the public interest.

⁶ This does not extend to organisations listed as eligible to receive such information by the legislation e.g. Ofgem

30. DECC will not disclose to other parties commercially sensitive information submitted by an individual supplier, in a manner in which the particular supplier is identified. DECC may use the information from suppliers to inform policy development and aggregated information may be disclosed or published by DECC at its discretion (excepting commercially sensitive information), including (for example) where this is required by law, where DECC needs to inform Parliament of progress, or where the information supports a particular policy proposal on which DECC needs to consult. DECC are intending to report summary information in our smart metering annual report. Data and information which is released will be anonymised and aggregated as necessary to ensure that it remains appropriately protected.

How will DECC treat information provided on a voluntary basis?

31. Information provided on a voluntary basis and outside the scope of the information required as part of the derogation process, including personal information, may be subject to publication or disclosure in accordance with the access to information legislation (primarily the Freedom of Information Act 2000, the Data Protection Act 1998 and the Environmental Information Regulations 2004). If you want information that you provide to be treated as confidential please say so clearly in writing when you send us your evidence. It would be helpful if you could explain to us why you regard the information you have provided as confidential. If we receive a request for disclosure of the information we will take full account of your explanation and may consult you further at the time of the request, but we cannot give an assurance that confidentiality can be maintained in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not, of itself, be regarded by us as a confidentiality request.

How will DECC store data?

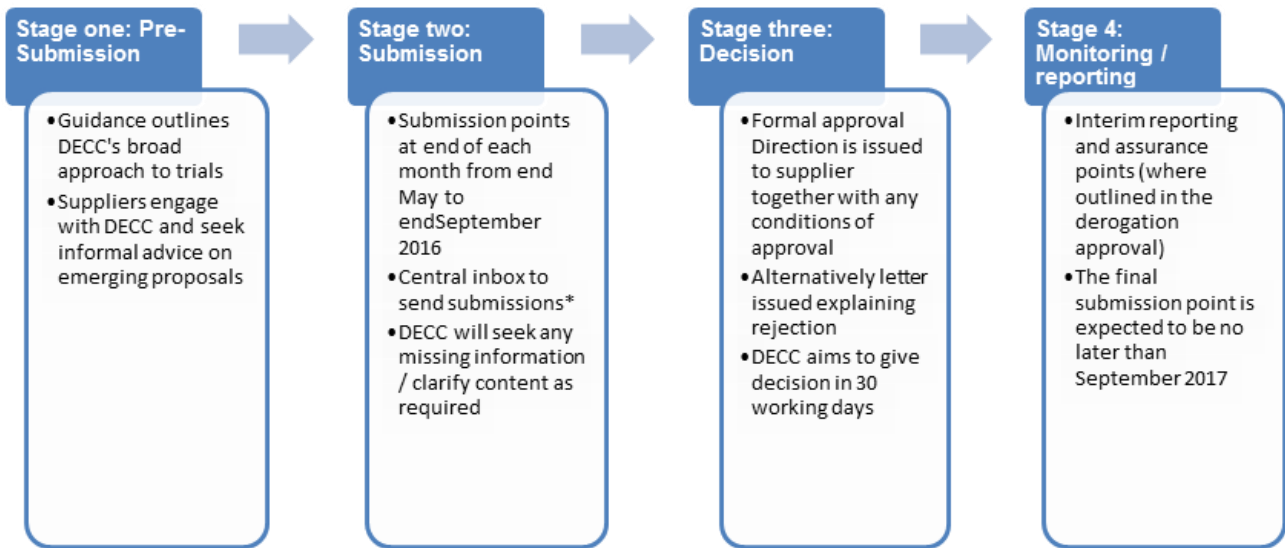
32. The Programme is committed to the safe storage of information and will provide extra protection for data or information that is deemed personal or commercially sensitive, operating in accordance with best practice as set out in the Data Handling Procedures in Government: Report 2008, the Data Protection Act 1998, and the restrictions on disclosure set out in section 105 of the Utilities Act 2000.

What will happen after the evidence is submitted?

33. DECC's overall policy objective is to optimise the level and distribution of consumer benefits. Evidence submitted will be considered in the light of our understanding of how such benefits (in particular energy saving) are delivered, taking account of both feedback provision and of other contributory factors. DECC's assessment of trial results and their relevance to policy will therefore take account of the overall quality of consumer engagement factors, including assessment of any IHD comparator design and associated functionality and of supporting advice provided at installation. Policy considerations can also be

informed by evidence on alternatives' relative effectiveness when compared with IHDs, for identified groups of consumers. Evidence from trials that fully exploit opportunities to support delivery of customer benefits is likely to provide more useful findings about how to optimise benefits. DECC will consider the evidence as it is submitted and determine whether we need to consult on amending our existing policy framework.

Figure 1: Process Summary

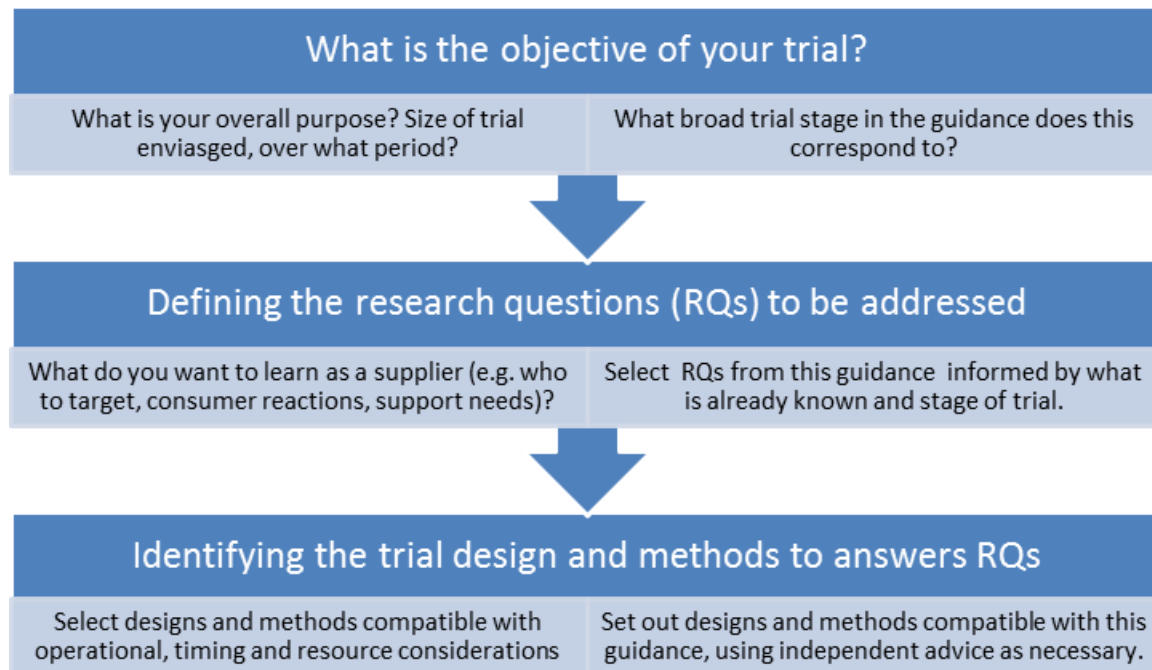


2 Part A: Approach to trialling alternatives to IHDs

2.1 Overview

34. This section outlines three possible stages of product⁷ development, describes the types of research questions that are relevant for each, and suggests appropriate research designs and methods to address them. This process is outlined in Figure 2. Research questions are central to the guidance and how it should be used; they will help define the scope of research designs and identify the specific objective(s) of trial proposals.

Figure 2: Recommended approach to using this guidance



35. Part A provides signposts to the more detailed guidance in Part B, which is designed to provide more information on specific elements to those developing trial proposals. The guidance provides a flexible framework, within which suppliers can ‘mix and match’ research approaches as necessary, and suggest alternatives if they can be demonstrated as robust. In such cases, suppliers may wish to first discuss these with DECC before submitting an application. All applications for derogations will be considered on their merits.

⁷ The term ‘product’ in this case includes services, new engagement tools or any other proposed IHD alternative

2.2 Evidence needs and types of trialling

36. Depending on the type of product to be tested, and its stage of development, there will be a range of different evidence requirements and appropriate trial designs to use. Generally, the different evidence requirements can be segmented to three stages of product development as outlined below:

Stage one: Early product prototype

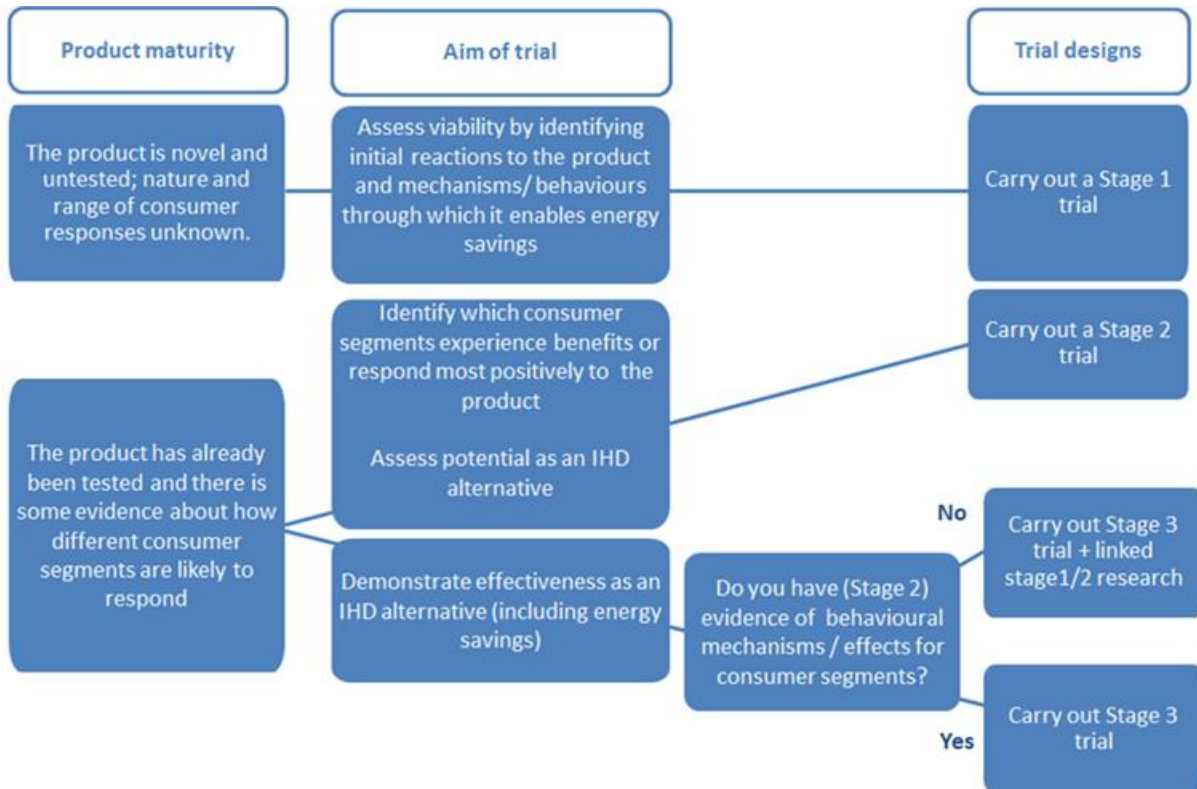
37. This stage is used to test how consumers may react to various new, or under development, product features, performance and innovations of IHD alternatives. This stage is often theoretical, occurring before general marketing, and the early product prototype is also often qualitatively tested with a carefully selected target audience.

Stage two: Product prototype

38. Stage two is used to further assess the potential of the product as an IHD alternative including, potentially, estimates of the size and direction of impacts. Product prototypes are developed versions of a product that are used to test how the product works in practice, including any unintended consequences. The prototype stage is often iterative with new prototypes being built on refinements from the previous version. This second stage represents an intermediate between the exploratory testing of concepts, and the validation stage which quantifies their impacts.

Stage three: Product validation

39. This last stage quantitatively evaluates the impacts of the product, including potentially how these vary by customer segment. It may precede a mass launch to target customer segments.
40. Suppliers should normally follow each phase sequentially, building evidence in each stage. However, it is possible to use existing evidence to justify a large-scale quantitative trial (stage three: product validation) without prototyping. For example, using evidence from earlier development work carried out by the supplier, or evidence on the same intervention from another roll-out. In this case, the details of such evidence need to be provided as part of the application. For more details on Stage Three trials, see section 3 of Part B of this guidance.
41. A simplified decision process to determine which stage is most appropriate for the supplier is shown in Figure 3.

Figure 3: Decision tree for how to work out which trial to run

42. Trials at all three stages (both qualitative and quantitative) can contribute relevant evidence to DECC's assessment of IHD alternatives, we anticipate that quantitative evidence on energy consumption outcomes will be required to inform any consideration of the IHD mandate.
43. As quantitative evidence alone does not easily capture the consumer attitudes and viewpoints that affect engagement or the causal mechanisms that lead to behaviour change and energy savings it should, where possible, be complemented by qualitative findings. Stage one trials, or qualitative research incorporated in trials at other stages can provide detailed findings about the causal mechanism by which outcomes are delivered from.
44. The context, including detailed information about the product and how it was deployed, for qualitative and quantitative findings will be key to understanding how they can inform wider policy. This is covered further in Part B.
45. Moving from Stage one to Stages two and three, the focus shifts from identifying and defining the mechanisms and behaviours through which the product enables energy savings (via qualitative research) to measuring their prevalence and impact (through quantitative methods). This is summarised in Figure 4.

Figure 4: Outcomes and methodologies relevant to each trial stage

Stage 1: Product Concept	Stage 2: Product Prototype	Stage 3: Product Validation
User experience outcomes... <i>'Do users understand the concept, interface and the benefits'</i>	Intermediate behavioural outcomes... <i>'are consumers likely to use it in a way that encourages the right behaviours'</i>	Energy consumption outcomes... <i>'does how consumers use it lead to a reduction in energy consumption'</i>
Small-scale satisfaction or profiling surveys	Statistically representative surveys on intermediate outcomes; small scale data collection of energy outcomes	Quantitative methods
In-home interviews/observations Telephone follow-ups Diary data collection Idea generation discussion groups Qualitative methods	In home interviews and observations, telephone follow-ups and diary data collection	RCT or quasi-experimental study providing statistically representative estimates of changes in energy outcomes for the study population As Stage 2 if not already carried out

2.3 Different types of trials and the requirements for each

Stage one: Early product prototype

Objectives

- Consider how different users interact with and experience the product and whether this is likely to provide similar or other benefits to an IHD
- Develop hypotheses about how different types of consumers⁸ respond to and use the product (for testing in subsequent larger trials)
- Identify any unintended consequences of the product
- Identify potential challenges for deployment on a larger scale

46. At this point, the product is untried and untested. It may have been developed out of evidence on the effectiveness, weaknesses or limitations of other products, or from a theory of consumer behaviour. We envisage that as part of this process, suppliers will have carried out some small scale testing of the early product prototype (e.g. in focus groups) and are now moving to a small scale field trial. This 'Stage one trial' would be aimed at exploring the viability of the product and its potential for wider use with different types of consumers.

⁸ Examples of variables to be used to segment consumers are included in Part B

47. Such a trial would ideally be carried out with a range of different types of consumers, although probably with quite small numbers. Diversity is more important than scale at this stage, to ensure that a Stage one trial captures the range of possible consumer responses and experiences of the product.
48. The aims of trials at this stage are best met by qualitative methods (see sections two and three of Part B for further guidance). The approach would be similar to early-stage market research (such as early stage user experience research), but with an additional focus on understanding practices and behaviours related to energy use and management and whether they are likely to provide benefits. It would likely include face to face or telephone in-depth interviews and in-home observations.

Possible supplier research questions (* also relevant to DECC)	DECC research questions	Typical research methods	Robustness	Timescale
<p>Do consumers engage positively with the product (do they find it attractive, useful and easy to use)?</p> <p>Is there evidence that they continue to use it over a period of time*</p> <p>Are there any technical or consumer issues experienced?</p> <p>What explanation and training, post installation support and other (e.g. technical reliability) expectations or requirements do consumers see as necessary?*</p>	<p>How do consumers actually use the product in practice - what types of practices or behaviours does it lead to?</p> <p>Are these practices or behaviours that are likely to support energy-saving behaviour change (NB these might be either similar or different to those associated with IHDs)?</p>	<p>Non-experimental (does not seek to measure the impact of the alternative) qualitative - for example, in depth interviews carried out in the home with a spectrum of consumers who have used the product for a period and are representative of expected target customer segments.</p> <p>Possibly, small-scale surveys.</p>	<p>Able to capture attitudes and behaviours associated with product.</p> <p>Unable to quantify the impact of the product on energy consumption.</p>	<p><u>Trial duration</u> Between weeks to a few months, depending on the proposed approach</p>

49. Suppliers may decide to carry out such testing outside the derogation framework (e.g. with employees, customers with existing smart meters, or through methodologies such as lab testing) before proposing a Stage two or three trial. Stage one trials may also form part of a broader derogation application covering other stages.

50. Detailed guidance for Stage one trial proposals is set out in section two of Part B. Statistical or evaluation design support, for example from a specialist practitioner or consultant, is not essential. Other requirements (including quality, data protection and ethics) should be met by research being carried out in full accordance with the Market Research Society Code of Practice.

Stage two: Product prototype

51. This second stage sits between the exploratory testing of concepts (to see whether and how they might work) and the validation stage (that quantifies their impact). Stage two therefore contains elements of both and could be a follow-on strand of a Stage one project or an integrated strand of a Stage three project. This is discussed further in the section below on Timing Constraints and Sequencing.
52. The purpose of a Stage two trial is to assess the potential of the product as an IHD alternative. This may include testing, on an intermediate scale, the direction and approximate levels of impacts (including for particular consumer segments) and the practical requirements of large-scale implementation. Initial evidence on impacts can be generated by this kind of trial in relation to levels of adoption, utilisation, behaviours and practices associated with reducing energy consumption. The sample of households included in this sort of study should be at least partially representative of a range of different customer segments in order to be able to generate some evidence on how different groups adopt and experience the product.
53. Due to the time and scale constraints of a Stage two trial, they are unlikely to be able to quantify energy-saving impacts with a high degree of accuracy and precision. Trials at this stage may however be able to give some indication of the intervention's potential impact from the extent and level of behavioural impacts and provide indicative data on energy-saving impacts.
54. Trials at this stage can also provide valuable practical lessons related to the implementation and installation of a product as well as lessons for the implementation of a larger scale trial. For example, a Stage two trial might provide useful lessons about scheduling installations, what works in terms of providing advice and guidance to different groups of the population, or how data collection could be designed for a full, Stage three trial.
55. Data collection for trials at this stage should be carried out with consumers between zero and six months after they receive the product. Data collected earlier in this period would provide a baseline to compare against and help identify where consumer use and engagement is changing over time, as well as the nature of the practices and behaviours adopted after a period of sustained use. Demographic and attitudinal data on consumers should also be collected in order to segment experiences and impacts.

Possible supplier research questions (* also relevant to DECC)	Typical DECC research questions	Typical research methods	Robustness	Timescale
<p>What types of customers are more likely to adopt the product?*</p> <p>What customer attributes (characteristics) are associated with different levels of use and satisfaction?*</p> <p>How does customer satisfaction with the customer journey and support vary with customer type?*</p> <p>How do experiences and impacts vary with customer type (for example, low income or older consumers)?</p> <p>Is it feasible for the product to be installed and trialled at scale?*</p>	<p>Is consumer adoption of energy behaviours and practices related to other aspects of the product customer journey (for example information or advice provided at installation)?</p> <p>How do levels of use, types of interaction, and response to the product, by different consumer segments, compare with those for IHDs?</p> <p>How do practices and behaviours associated with energy saving differ to those associated with a good quality IHD?</p> <p>How does the prevalence of practices and behaviours associated with energy saving (enabled by the product) vary for different consumer segments?</p>	<p>Extensive or longitudinal qualitative research in the home.</p> <p>Qualitative research with installers or other delivery partners.</p> <p>Large scale quantitative social surveys measuring intermediate outcomes (attitudes and behaviours).</p> <p>Small scale collection of energy consumption data</p>	<p>Combination of qualitative evidence on nature of energy saving behaviours and quantitative evidence on prevalence in different segments</p>	<p><u>Trial duration.</u></p> <p>Up to approximately 6 months</p> <p><u>Timing of measurement</u></p> <p>At baseline, 3 and 6 months.</p>

56. Detailed guidance for Stage two trial proposals is set out in section three of Part B along with application requirements in Appendix 3. Statistical advice and guidance on evaluation design and methods is recommended at this stage but not mandatory, although we would expect it where analysis of energy consumption data is proposed. Other requirements (e.g. quality, data protection and ethics) should be met by research being carried out in full accordance with the Market Research Society Code of Practice.

Stage three: Product validation

57. This last stage of trialling potentially precedes a mass launch to target customer segments (subject to compliance with contemporary license conditions). In contrast with the previous two stages, the primary purpose of Stage three is to rigorously quantify the specific impacts of the intervention, including potentially how these vary by customer segment. If unintended consequences have been identified a further purpose will be to establish their prevalence.
58. The objectives from DECC's perspective would be to establish whether or not the product is likely, if deployed as part of a mass roll-out, to provide higher, the same, or lower consumer benefits than the IHD (if provided as an alternative) or additional benefits on top of those provided by the IHD (if provided alongside). This comparison would be against a SMETS compliant IHD and a SMICoP compliant installation visit. Suppliers will be likely to have similar objectives relating both to direct supplier costs and benefits, and to consumer benefits.
59. For these larger trials, DECC stated in the Response that it would expect greater emphasis to be placed on measuring longer-term changes in energy consumption. In general, DECC regards changes in energy consumption measured over periods shorter than 12 months as carrying less weight as evidence. Trials should however include an interim analysis point (or points) to provide indicative findings after 6 months (and potentially at other points). Trial designs will need to reflect seasonal patterns in demand, and DECC would expect any evidence on gas consumption to include the winter heating season.
60. Since the levels of impacts associated with energy feedback are relatively small, such trials will require relatively large samples per segment (hundreds or thousands) in order to provide sufficiently precise answers. However, if high quality, regular data are available (for example from smart meters), and/or if data from before the trial began can be included in analysis, smaller sample sizes may be acceptable, if adequate justification is provided. The research questions and evaluation design and method should be tailored to the planned deployment approach, e.g. whether the product was offered to all customer segments or a particular segment, at or after installation, and with or without customer choice (of IHD and product) being allowed.
61. We anticipate the trial design most likely to combine supplier roll-out plans with quality of evidence is one where a group of customers is randomly selected from the population of planned installations, and offered the choice between the IHD alternative and the IHD. This group is then compared with an equivalent (randomly selected) group who are not given this choice and who receive an IHD installation. However there are other designs that may be appropriate (especially for particular products and delivery models); these are outlined in Section 4 of Part B.

Possible supplier research questions (* also relevant to DECC)	Typical DECC research questions	Typical research methods	Robustness	Timescale
<p>What percentages of customers in different segments positively adopt the product (and use it for an extended period of time)?</p> <p>What is the impact on customer experience and satisfaction (e.g. NPS score) following receipt and use of the product?</p> <p>What are the impacts on supplier costs (e.g. call centre) and benefits (e.g. reduced churn)?*</p>	<p><u>For those segments included in the trial:</u></p> <p>If the product is functionally similar⁹ to your IHD:</p> <p>How does usage (i.e. levels of regular consumer use, measured at different periods of time at installation) compare with those of your IHD (proportion of population and frequency of engagement)?</p> <p>What is the difference in the longer-term energy saving impact from that of your IHD?</p> <p>If the product is functionally different to the IHD, e.g. a home energy report):</p> <p>How do levels of usage and energy saving impact compare with those from your IHD only:</p> <p>a) if provided <u>as a substitute</u> for the IHD;</p> <p>b) if provided <u>as well as</u> the IHD?</p>	<p>Quasi-experimental evaluation</p> <p>Randomised controlled trials (RCTs)</p>	<p><u>Robustness</u></p> <p>The trial design allows for the quantification of the difference in impact on energy saving between an alternative and the currently mandated approach (with other factors held constant)</p>	<p><u>Trial duration</u></p> <p>12 months, including interim analysis points, for example at 6 months (where this period includes a winter heating season)</p>

⁹ By “functionally similar” we mean that the product is designed to be used by the consumer in a similar way to the IHD, e.g. as a means of accessing real-time and historic consumption data. In such cases it is assumed the consumer would regard the product as a substitute for the IHD.

62. The detailed guidance for Stage three trial proposals is set out in section 4 of Part B and application requirements are included in Appendix 3. Independent statistical and evaluation design advice on designs and methods will be expected. Suppliers must also satisfy themselves that the research undertaken is being conducted in accordance with best practice ethical Codes of Practice.

2.4 Timing constraints and sequencing types of trials

63. The Response sets out the timescale for trials applications (deadline 30 September 2016) and states that DECC will specify a date by which suppliers should submit their trial evidence to DECC in the approval direction letter. Suppliers should outline their proposed date for submission in their trial applications, but DECC limit these to 30 September 2017. Given these timing constraints, DECC envisages that interim results will often need to be provided, especially for Stage three trials and we will set these in the approval direction.
64. Evidence about energy-related behaviours and practices is required in addition to data on energy consumption change and engagement levels to assess the effectiveness of products. We anticipate therefore that suppliers wishing to carry out Stage three trials will need to have either conducted Stage two research first, be able to provide evidence from previous work on the product, or include some element of qualitative or process evaluation in their Stage three trial. This could include interviews or a survey administered to a sub-sample of the Stage three trial participants. This will provide interim data on intermediate behavioural changes which DECC's Early Learning Project ¹⁰ and other research suggests are likely to be associated with longer-term behavioural change. The interim data can later be complemented by the results of the Stage three trial, while allowing conclusions to be drawn about the mechanisms driving the quantitative findings.
65. DECC expects that some suppliers may design agile and flexible approaches to trialling, for instance where they propose to use consumer feedback to develop the product. In these situations the overall scope will always need to specify the types of intervention to be deployed and overall numbers of consumers targeted, however suppliers will be able to adapt trials to reflect interim learning and insights of what works. For example, to allow for multiple software solutions to be trialled through the same interface and for these to be refocused as results come in. DECC will monitor changes to the intervention (and the evidence informing them) through the trial. Part A discusses monitoring and verification in more detail below.

¹⁰ <https://www.gov.uk/government/publications/smart-metering-early-learning-project-and-small-scale-behaviour-trials>

In most circumstances we will require interim reporting of results in addition to a final reporting requirement.

2.5 Common research standards

66. Regardless of the supplier's choice of research method, common expectations of rigour and robustness will apply to trials across the various stages of product development. Part B, sections two to four, go into more detail about the specific standards expected at each stage, and how suppliers will be expected to design their trials to meet these standards. Suppliers should also address their intended approach to data collection and reporting, and monitoring and verification of trial design and results.

Data collection and reporting

67. The data collection process should be described regardless of the research method used. Data should be gathered as part of a data management plan.
68. The type of information required about how the trial was conducted will depend on the research method used, but common expectations include: recording how the data was collected; specific materials showing the alternative IHD (such as screen shots of an app or photos of the piece of kit); and information about the research methodology as planned and how the research was carried out, for example, to outline any deviations from the planned approach or troubles in recruiting to the desired sample size. More information is provided in Part B, with examples given in section 2 of Appendix I.

Monitoring and verification

69. Monitoring and verification plans will facilitate suppliers communicating progress or issues with the delivery of their trials, while assuring DECC that trial implementation is following the process set in the derogation approval direction.
70. Our approach to monitoring and verification of trials will be proportionate to the scale and complexity of trials, however suppliers should assume that for larger Stage two, and in particular Stage three trials, DECC will require interim information about the implementation of trials. More information is provided in Part B.
71. Suppliers may also use this reporting to communicate any proposed changes to the trial design to enable an agile delivery. The rationale for this is to enable trials to evolve as new evidence becomes available (for example if a specific feature of an IHD alternative becomes obsolete or if it becomes apparent that data availability is limited). Changes to the intended delivery of the trial design should be notified to DECC in a timely manner. DECC reserves the right to oppose the change in approach, where it is beyond the scope of the trial approval or is otherwise unjustified.

3 Part B: Details for technical users

3.1 Introduction

72. The purpose of this document is to help suppliers design rigorous and valid trials that contribute to a robust evidence base for alternatives to IHDs. We anticipate suppliers will trial a range of approaches, including new products as well as services that help consumers understand and engage with their energy use but do not involve the provision of a physical product (for simplicity we refer to both as products).
73. This section of the guidance builds on Part A and provides more detailed technical information to those developing trial proposals. Suppliers can focus on the guidance relevant to their research questions and stage of product development (as set out in Part A), as the guidance at each stage is self-contained.
74. Although this section goes into greater detail about the methods applicable to each stage, we anticipate suppliers may need to 'mix and match' research approaches as necessary, and suggest alternatives if they can be demonstrated as robust. All applications for derogations will be considered on their merits. We recommend however that suppliers first discuss alternative approaches with DECC.
75. Below, we lay out the questions and issues that suppliers need to consider at each of the three product development stages, including:
- Which DECC and supplier research questions can you look to answer at each stage?
 - What are the appropriate research methods to use at each stage, and why?
 - What are the specific research standards that you need to meet to robustly answer your chosen research questions? This describes the issues you should consider in trial implementation, including the logistics of the trial design (i.e. the type of customers you will include, how many of them, and how long you will run the trial for).
76. Choosing your research questions and your trial design may be an iterative process and you may wish to read more than one section below. However, you should focus on the specific section of Part B that is relevant to the product development stage(s) you are proposing to test.
77. You will need to address the key points above and justify your choices in your proposal. The application template provided alongside this guidance provides a

structure to address these questions, and we suggest that suppliers follow this structure.

Formulating SMART research questions

[Application template sections 3.2, 4.2 and 5.2]

78. For trials at all stages, research questions should be formulated as SMART questions, with clear outcome measures. SMART stands for Specific, Measurable, Attainable, Relevant and Time-bound. Using this structure maximises the likelihood that the research conducted will produce meaningful evidence in the time available, and provides DECC with assurance that the findings can be assessed against the original research objectives. Part A outlines what broad methodologies are applicable to particular questions, and we would expect suppliers to ensure that their research questions are paired with fit for purpose methodologies.
79. This is an example of what this means in practice:
- Broad research question: Does the IHD alternative save energy?
 - SMART research question: Does providing the IHD alternative to all consumers who accept an installation result in higher gas and electricity savings at 3, 6 and 12 months, compared with the alternative of providing an IHD to all consumers who accept an installation?

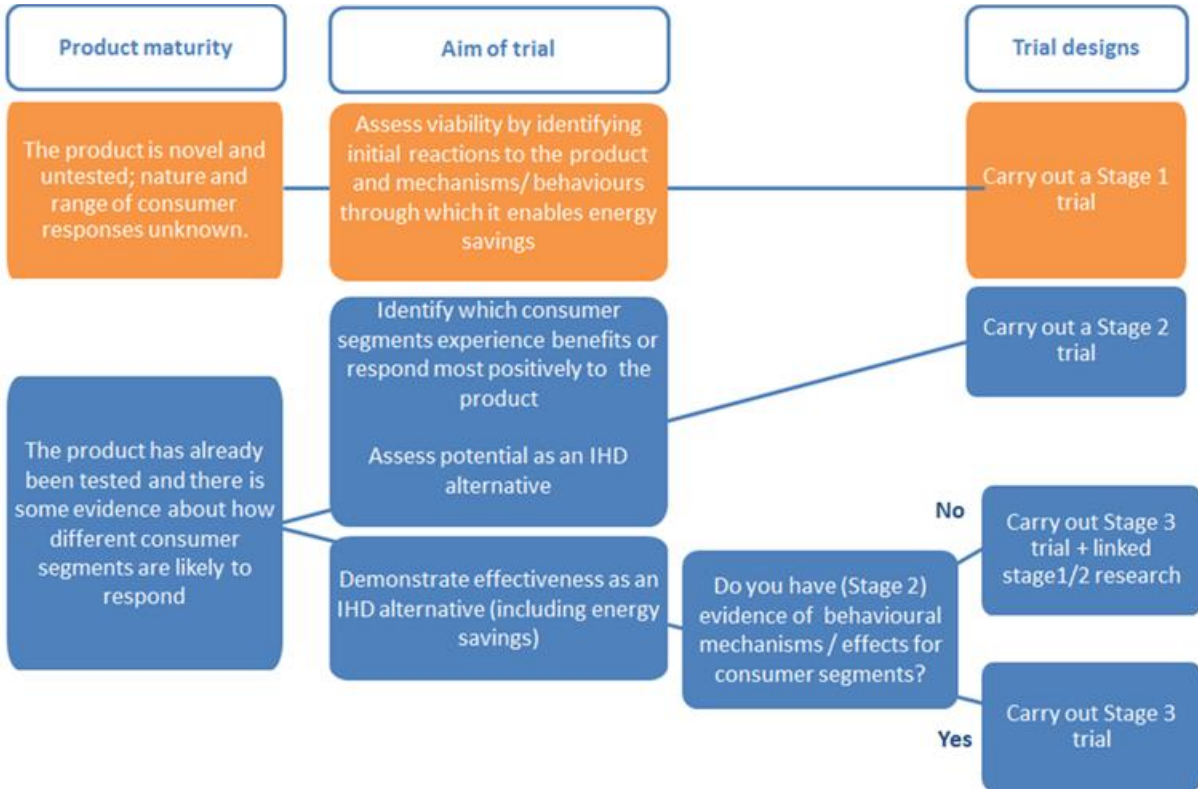
Meta-data (information about the proposed trial and how it was carried out)

[Application template sections 3.3, 4.3 and 5.3]

80. To assess applications, and to interpret evidence collected through them, DECC requires access to a range of data about the planned trial, and then following implementation, how it was carried out. This includes the design of the intervention and product, the recruitment of participants, and the process followed to collect and analyse data. Collectively we describe this as metadata. Requirements are outlined in the application template, and this document contains guidance on what data should be provided for particular methodologies. In all cases we will require detailed information about the product suppliers are trialling, including its functionality and how it is provided to consumers.

3.2 Stage one: early product prototype

Figure 5: approach to stage one trial



Research questions you can answer at the early product prototype phase

[Application template sections 2.1, 2.4, and 3.2]

81. It is important to collect evidence on how customers engage with the IHD alternatives to understand how any energy saving impacts would be achieved. This should include evidence of types of engagement with feedback information that are likely to lead to energy savings (such as knowledge of how to use the product, its routine or experimental use, increased awareness of energy consumption), and evidence on intermediate impacts, such as altered energy behaviours, practices or household dynamics related to energy. These are likely to be correlated with energy savings, which is the outcome of primary interest to DECC. However, at this trial stage, the evidence would be too limited and the timescales too short to draw any robust conclusions on energy savings.
82. Therefore, the research questions of interest to DECC to be answered through a Stage one trial are:

Possible supplier research questions (* also relevant to DECC)	DECC research questions
Do consumers engage positively with the product (do they find it attractive, useful and	How do consumers actually use the product in practice - what types of practices or

<p>easy to use)?</p> <p>Is there evidence that they continue to use it over a period of time*</p> <p>Are there any technical or consumer issues experienced?*</p> <p>What explanation and training, post installation support and other (e.g. technical reliability) expectations or requirements do consumers see as necessary?*</p>	<p>behaviours does it lead to?</p> <p>Are these practices or behaviours that are likely to support energy-saving behaviour change (NB these might be either similar or different to those associated with IHDs)?</p>
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83. Suppliers should explain how they intend to answer these research questions. This will include considering factors such as:

- In what ways do you envisage consumers will respond / engage with the alternative?
- What aspects of consumer and household responses will you investigate (e.g. just the bill payer's, or interactions within the household)?
- What are the practices and behaviours that you will explore and how will you allow participants are able to discuss practices and behaviours not previously considered?
- How will you uncover evidence that these practices or behaviours are likely to contribute towards relevant outcomes, such as energy-saving behaviour change? This is about collecting evidence on whether the product is likely to have the intended impact.

Research methods you can employ in the early product prototype stage

[Application template sections 3.1, 3.4]

84. Non-experimental qualitative research methods¹¹ are most appropriate for products in an early stage of development. These methods allow suppliers to address research questions in depth, understanding why certain behaviours and practices are adopted, exploring barriers to engagement and allowing for recommendations of how the IHD alternative could be amended to better suit customers' needs. We focus here on methodologies that will require a derogation to carry out, although it is possible that suppliers may obtain Stage one evidence

¹¹ This refers to exploratory research, where suppliers have not developed a clear hypothesis to test, but are interested in exploring which behaviours and practices may be taking place

through research (for example lab testing) that does not require one. Where this is carried out, suppliers should, where relevant, reflect the standards outlined in this section.

85. We outline below the factors that should be considered when designing a Stage one trial using non-experimental qualitative research methods. At this stage, some limited quantitative data could also be collected such as demographics to profile participants or rating scales on the relevance of specific practices or behaviours. While these will not robustly quantify levels or distributions of outcomes, they could be used to inform follow-up qualitative interviews. If suppliers intend to include any quantitative elements to this research they may wish to consult the later sections on Stage two mixed methods approaches.

Duration

86. Stage one trials are intended to be short-term evaluations, varying between weeks to a few months, depending on the proposed approach. Suppliers are expected to choose an appropriate length to enable sufficient data collection based on the considerations set out above and to justify their choices.
87. Suppliers will also need to consider whether they will gather data once for each person (cross-sectional) or more than once (longitudinal) and select the appropriate methods at each 'wave' of data collection. The former may be more straightforward and allow a greater number of people to be observed, while the latter may allow suppliers to assess how use of the product evolves and endures over time.

Study population

88. Suppliers will need to decide whether to trial the product on a cross-section of consumers or with a specific segment. In their application, suppliers must state their choice clearly and outline their rationale for the decision. At Stage one the sample drawn is likely to be small but diverse.
89. Qualitative samples do not attempt to be statistically representative; instead they aim to ensure that sufficient diversity is included in relation to the characteristics that are likely to influence different behaviours and experiences. It is important, therefore, for suppliers to be clear about the rationale for the selection of these criteria and their relevance to the wider policy questions these trials are aiming to address. For example, we know from the Early Learning Project¹² that technical capability affects interactions with IHDs. Therefore, when trialling a device that

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https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/407568/8_Synthesis_FINAL_25feb15.pdf

aims to improve or simplify the user experience, it would be expected that the sample included participants with the full range of technical capability.

90. It is also important to consider incorporating comparison into the research design. Comparison allows the research to identify the presence or absence of behaviours or influencing factors in different households. This can be done by ensuring variation within a sample or designing specific case studies testing different alternatives. Comparison increases the value of research findings by allowing variations between and within groups to be explored and for the role of contextual factors to be identified.
91. Other factors to consider are how participants will be engaged in the research and to anticipate and manage attrition levels. Suppliers should explain what tactics and incentives they will use to encourage customers to participate in the trial and ensure this does not create any systematic bias in the sample, for example encouraging only early adopters of technologies would skew the results towards more engaged audiences.

Data collection method

92. Stage one trials could usefully incorporate a wide range of qualitative research methods. Qualitative data can be collected through interactions with or observations of participants by a researcher. Alternatively, it can be collected by the participants recording their thoughts and experiences themselves. The former allows more control over the data that is collected and increases breadth and depth through probing questions; the latter can enable real-time data collection in a way that is not shaped by the researcher's presence. Both types of data are potentially of use in Stage one trials.
93. Researcher-prompted interactions could include interviews in the home or over the telephone, focus groups or researchers observing participants in their home. Considerations include:
- Who is being studied: are the population geographically dispersed or clustered, immobile or willing to travel? Are there potential power or status issues that might inhibit openness?
 - What is being studied: complex or sensitive motivations and decisions, abstract concepts or sub-conscious behaviour and wider context?
 - The nature of the data required: detailed personal accounts, group interactions or naturally occurring in-situ behaviour? New ideas or an understanding of a specific process unfamiliar to researchers?
94. Suppliers will need to consider these questions carefully in selecting a data collection method and explain their rationale. Below we describe circumstances in

which three data collection methods are appropriate, with an example relevant to the collection of data at Stage one of the development of a product or service related to IHDs.

95. From a practical perspective, depth interviews are the most appropriate method in Stage one trials where a sample is geographically dispersed and less willing or able to travel, for example when testing the effectiveness of a particular product for older people or those with a disability that affect mobility. Even if participants are clustered or able to travel, interviews would still be appropriate where individual, personal accounts need to be explored in detail and in wider context. Complex decision-making processes are also typically best explored through one to one interviews. Stage one trials are likely to require these types of detailed personal accounts to understand decisions and interactions with a service or product. It is expected that interviews will feature heavily in supplier applications to conduct this type of trial.
96. An additional question, however, is whether interviews take place face to face, over the phone or online. The choice involves a trade-off between depth and reliability of data and the resources and time available. Conducting interviews face to face enables researchers to build rapport with participants, encouraging more open accounts. It also allows researchers to use stimulus materials or in situ prompts to be used more effectively for collecting data on complex processes. Telephone interviews do not typically elicit the same depth but they are cheaper and easier to arrange.
97. In some cases, the extra time and resource required to conduct interviews face to face may be disproportionate to the increase in the quality of the data achieved. For example, telephone interviews may be considered sufficient if the product or service is simply the provision of information through a report or an app in relation to an existing, simple IHD. Equally, online discussion groups could be appropriate if participants are required to discuss changes they would recommend to an early prototype, particularly if an initial interview has already taken place face to face. However, collecting data on a new, complex IHD with multiple features and potential impacts would be difficult over the phone and probably online. Collecting data online is also unlikely to be effective if researchers have not had prior engagement with participants in order to build rapport. Evidence collected in this way would not be considered representative of groups with low technological literacy, are not frequent internet users or do not have access to the internet.
98. Group discussions are more appropriate for studying or generating data out of group dynamics and interactions, in particular where creative ideas are required. They are also particularly useful where abstract concepts or issues that are unlikely to be front of mind for participants are being discussed. Practically, of course, group discussions can only be organised where a sample or sub-sets of a

sample are clustered and participants are able to travel short distances without much inconvenience.

99. It is unlikely that Stage one trials would collect data exclusively through focus groups as the detail of personal experience would be diluted. Despite this, group discussions may be useful to complement depth interviews in a Stage one trial. Drawing together a sub-set of participants into a group setting following a series of in-home interviews could generate additional insight into how to revise or improve their product or service. In addition, group discussions might be appropriate for gathering insight from those involved in administering the intervention, such as installers or those providing advice.
100. Stage one trials may also benefit from in-home observations, particularly where combined with depth interviews. Observations in the home allow researchers to record in-situ behaviours, for example how and when a consumer engages with an IHD or alternative, potentially eliciting behaviours or influences that are sub-conscious or difficult for participants to articulate. As participants become used to using IHDs or alternatives they may develop behaviours that are habitual, such as checking or changing the IHD each time they engage in another behaviour, such as turning on the kettle or switching the lights in a particular room. This may be related to where the IHD has been installed rather than any particular interest in the energy being consumed. Understanding this process and the factors at play may only be fully possible through a hybrid of observation (to identify the habitual behaviour) and depth interviewing (to probe and explore the underlying reasons for the behaviour).
101. Despite the value of data collected through in home participant observation, the method is resource intensive. Suppliers may also want to consider mechanisms that enable participants to record their own data. A diary approach may be appropriate for Stage one trials in this context, allowing participants to record their feedback on interacting with an IHD alternative in real-time. Paper-based or online-based diaries may be appropriate for different groups and may be most effectively utilised immediately after an intervention and then referred to in subsequent interviews or observations. Suppliers should, however, consider the burden this potentially puts on participants and use such an approach sparingly.

Using quantitative methods

102. Quantitative methods are unlikely to be used extensively in Stage one trials, though they may be of use to complement qualitative methods. For example participants may answer quantitative-type questions to 'score' their experience of using an IHD or the level of impact that an intervention has had. Scores would not then be used as data from which to generate insight, but as stimulus material for subsequent investigation through qualitative research.

103. For guidance on the development of questions for quantitative surveys see Appendix I.

Analysis

104. Qualitative data analysis requires a combination of rigorous discipline and creative thinking to order and make sense of what is often a set of tangled participant accounts. The result should be a clear narrative for the sample as whole that also identifies differences between and within sub-groups and is rooted in the evidence collected. To produce this narrative, qualitative analysis should strike a balance between induction (ideas emerging from the data) and deduction (a structure imposed on the data in order to ensure it meets the specific policy questions to be addressed. To meet these challenges, any approach to qualitative analysis should be comprehensive (consider all data collected), systematic (treat each piece of data in the same way) and transparent (provide an audit trail from the evidence to the assertions made by researchers).
105. It is recommended that analysis involves both data management and data interpretation. Data management involves organising the data into piles that are 'about the same thing' and data interpretation is the process by which researchers assess what this means for individual participants, groups of participants and the study population as a whole¹³.
- Data management is carried out by organising and summarising the data under key headings relevant to the research questions being addressed. This is the deductive element of the process. For a small sample this can take place on a case by case basis; for larger samples a matrix display, possibly using qualitative data analysis software, is advisable.
 - Data interpretation involves three steps. Firstly, researchers detect and separate individual pieces of data in each participant's account; secondly, these data are categorised on the basis of similarities in the essence of their meaning (this is likely to involve a number of iterations); thirdly, categories are classified into higher level themes. This is the inductive part of the process.
106. This approach to qualitative analysis typically produces three broad sets of outputs:
- Categories of things: for example, attitudes towards energy savings, ways of interacting with an IHD, types of impact of an IHD intervention.

¹³ Lewis J. et al (2014) 'Generalising from qualitative research' in Ritchie J. et al (eds) *Qualitative Research Practice*, London: SAGE

- Typologies of people: mutually exclusive categories people in the sample based on a unique combination of characteristics. For example, a typology might emerge that segmented the sample into groups such as 'IHD advocates', 'IHD sceptics', 'occasional users', 'opportunistic users'.
- Explanatory accounts and models: combining case and theme analysis can lead to the development of explicit explanations, for example, how participants describe why they like or dislike a particular aspect of an IHD. More sophisticated and complex explanatory models can also be constructed by researchers. These models can show how different factors combine to influence attitudes, behaviours or experiences. For example, linking attitudes towards energy savings, competency with technology and household context with energy consumption outcomes for different types of household.

107. A worked example is included in Appendix 1.

Research standards to meet to robustly test the concept of the IHD alternative

[Application template sections 3.1, 3.3]

108. Qualitative research at the early product prototype stage needs to demonstrate reliability and validity in order for wider inference to be drawn from the research findings. Validity and reliability are defined and demonstrated differently for qualitative research than for quantitative research:
- Validity: concerns the extent to which phenomena (in this case, behaviours and experiences receiving and interacting with the product or offer) are understood accurately and as participants intended.
 - Reliability: concerns the replicability of research methods and findings, i.e. whether broadly similar findings would be generated if the study was repeated.
109. We outline below the key factors to consider when designing the Stage one trial and set expectations for how validity and reliability can be demonstrated throughout the research process:
- Research design: should allow for the full range and diversity of experiences and behaviours to be explored in sufficient detail to address the proposed research questions.
 - Sample: should be representative of the diversity in the wider population in relation to the characteristics likely to affect experiences and behaviours; and include all relevant perspectives where necessary and feasible.
 - Recruitment: should conform to ethical standards and not introduce any systematic bias or exclude (without justification) certain groups from participating.

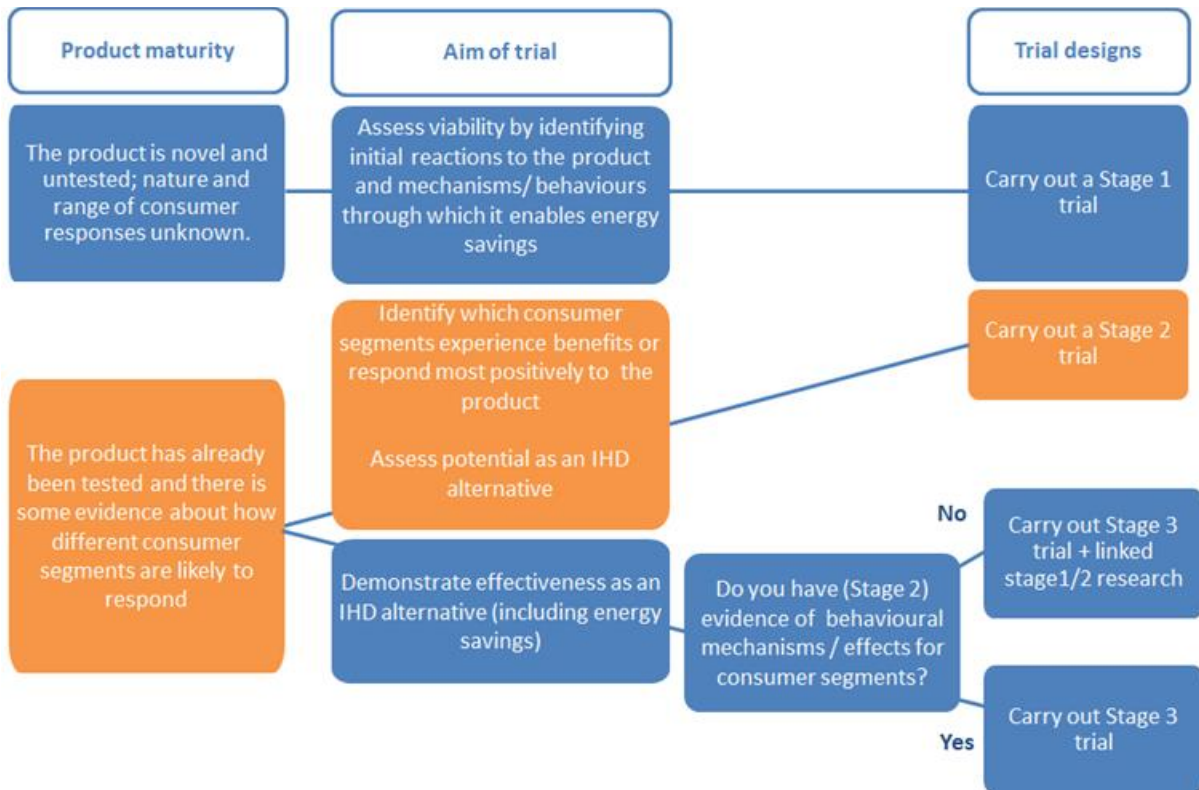
- Data collection: should be carried out consistently and thoroughly, minimising the influence of the environment or set-up on ability to fully explore participant account; data should be recorded accurately through digital sound recording and/or transcription.
- Analysis: should be systematic, comprehensive and transparent, generating thematic outputs, illustrated by raw data from individual participants.
- Reporting: should be at the level of thematic categories not individual stories, display depth and connections across different pieces of analysis and demonstrate the evidence from which these interpretations are drawn.

Meta-data and research instruments

110. Requirements for meta-data from qualitative research trials are outlined below. The rationale of collecting meta-data and documenting the research approach is to enable the results to be interpreted against broader evidence on mechanisms and impacts of interventions. Thus the following details will need to be provided and suppliers will need to explain how they would intend to collect them:
- details on the smart meter customer journey: how the customers were recruited by the supplier for a smart meter install, literature provided, details on the installation process and advice given at the time of installation
 - details of the actual intervention (e.g. screen shots, examples of what consumers received)
 - consent forms used
 - sample design and achieved sample
 - length of interviews, mode of interview (whether phone or face to face, etc.)
 - topic guides and other fieldwork instruments used
 - survey questions and specification of data fields; and
 - analysis framework
111. When submitting an application, suppliers must indicate how they will collect this data and by outlining their experience and expertise in developing materials such as consent forms, survey questionnaires and topic guides. A sample meta-data record is included in section 2 of Appendix I. This should be adapted to the specific surveys or topic guides that the suppliers will intend to adopt.

3.3 Stage two: product prototype

Figure 6: approach to stage two trial



Research questions you can answer at the product prototype stage

[Application template sections 2.1, 4.2, and 4.4]

112. A Stage two trial can meet a number of objectives: to gain further qualitative understanding of attitudes and behaviours through more detailed or longitudinal research; to measure quantitatively, including comparisons where relevant to IHDs, intermediate outcomes; to test, on a small scale, the direction and approximate levels of energy consumption outcomes; and identifying practical requirements of large-scale implementation.
113. Intermediate outcomes are a key focus at this stage. Outcomes of interest include consumer attitudes and behaviours that are likely to underpin engagement with the IHD alternative in a way that will lead to a reduction in energy consumption. For example, these might include behaviours that suppliers encourage customers to take up through advice provided at the smart meter installation, or those identified through Stage one research.
114. Stage two may provide the link between Stages one and three: where interventions appear to be usable and acceptable to consumers in Stage one, Stage two is typically used to further test and develop hypotheses about how the product or offer will lead to desired outcomes such as reduced energy consumption. Comparisons to consumers with IHDs are relevant, and Stage two trials may compare levels of intermediate outcomes (for example engagement with

energy consumption information) and measure indicative energy consumption outcomes between the two groups.

115. Trials at this stage therefore include scaled down versions of Stage three trials. Run over shorter timeframes, they may be large enough to conduct indicative quantitative analysis of energy consumption outcomes, as well as providing robust conclusions about the intermediate outcomes of different groups of consumers or households. They may be augmented with qualitative or survey data collection, to collect outcome data and inform product development ahead of a large scale Stage three trial. They also provide important lessons for the implementation of a product or service, the feasibility of collecting useful data at a scale and duration required for a Stage three trial.
116. Therefore, the main research questions of interest to DECC to be answered through a Stage two trial are:

Possible supplier research questions (* also relevant to DECC)	Typical DECC research questions
What types of customers are more likely to adopt the product?*	Is consumer adoption of energy behaviours and practices related to other aspects of the product customer journey (for example information or advice provided at installation)?
What customer attributes (characteristics) are associated with different levels of use and satisfaction?*	How do levels of use, types of interaction, and response to the product, by different consumer segments, compare with those for IHDs?
How does customer satisfaction with the customer journey and support vary with customer type?*	How do practices and behaviours associated with energy saving differ to those associated with a good quality IHD?
How do experiences and impacts vary with customer type (for example, low income or older consumers)?	How does the prevalence of practices and behaviours associated with energy saving (enabled by the product) vary for different consumer segments?
Is it feasible for the product to be installed and trialled at scale?*	

117. It will be important for suppliers to explain how they intend to answer these research questions. This will include considering factors such as:
- How to design a relevant and robust comparison?
 - What are the practices and behaviours (outcome measures) that you will focus on (these may be informed by stage one or other evidence)?

- How will you assess or measure whether these are likely to support energy-saving behaviour change?

Research methods to employ during the product prototype stage

[Application template sections 3.1, 3.4]

118. Methods used to achieve these aims are likely to include a mix of quantitative methods (to provide initial evidence on adoption, utilisation, behaviours and outcomes) and qualitative methods (to help explain quantitative findings through a deeper understanding of user experience in comparison to an IHD). To maximise learning prior to a stage three trial, suppliers may wish to model their stage two design on the options outlined in the following section of this guidance. Given that a range of methods may be used, this section provides an overview of considerations when using multiple research designs (broadly, mixed methods approaches), along with a brief overview of specific aspects of qualitative and quantitative designs that are relevant. These methodologies are covered in more detail in Stages one and two respectively.

Duration

119. Stage two trials are carried out over a longer time period than Stage one and allow some assessment of how customer's use of the product might change over time. We anticipate trials at this stage will focus on the period between three and six months following the installation visit, with potential baseline data collection in the period immediately following installation. This may include repeat (or longitudinal) data collection, for example to examine the link between customer experiences at installation and engagement with the product over time.

Integrating research methods

120. To maximise the value of a mixed method approach, suppliers should consider how methods integrate when designing the research at the outset of a study. An integrated design has a number of features:
- Research questions are broken down into specific quantitative and qualitative research objectives. For example, if the question is: 'how does the level of interaction with an IHD alternative differ in comparison to a standard IHD?', two different objectives fall out of this: a quantitative objective to measure the level of interaction and types of interactions and a qualitative objective that would aim to explain the factors affecting interaction and explain any differences between groups of consumers.

- Characteristics used as stratification variables¹⁴ in a quantitative sample should be used as sample criteria for a qualitative sample. This means that qualitative and quantitative analysis can be carried out with the same sub-groups. For example, if quantitative analysis is proposed by size of household or tenure, then the qualitative sample should include minimum quotas for these groups, in order to help explain differences in outcomes identified by the quantitative analysis.
- Data collection instruments or processes should aim to collect evidence on the same phenomena. For example, if quantitative data is being collected on utilisation or energy outcomes, qualitative data collection should aim to uncover the underlying factors driving levels of utilisation and how the IHD alternative is being used to generate the outcomes measured.
- Quantitative and qualitative data should also be reported in an integrated manner. A richer understanding of the phenomena being studied can be provided by a narrative approach to reporting that draws on qualitative and quantitative data in parallel. This is made possible by ensuring that the previous features are followed.

Sample design

121. Suppliers will need to justify why they would choose to trial the IHD alternative with the general population or with specific target customer segment(s) at this stage and how they will generate a comparison group.
 122. Once the study population is defined, suppliers will need to outline their rationale for drawing a quantitative sample from that population. At Stage two the quantitative sample size and design will depend on the nature of the outcomes being studied. For quantitative research addressing intermediate outcomes, samples should support analysis that is statistically representative of the study population, i.e. the target of the intervention. If suppliers do not have in-house statistical advisors, DECC would suggest that suppliers seek external independent advice on how to carry out statistical calculations to establish what a suitable sample size would be for a trial of this kind.
 123. Where energy outcomes are being assessed, the sample needs to be large enough to support some indicative comparative and sub-group analyses, but does not need to be large enough to support precise analysis (i.e. where estimates have small accompanying errors).
 124. It is also important to be strategic with the choice of the sample:
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¹⁴ Stratifying a sample is a practice used to ensure there is an equal proportion of customers of the same kind in different groups. This ensures greater comparability between such groups. Stratification is achieved for example by setting quotas within each group for different customer characteristics (i.e. the stratification variables), such as size of household or tenure

- Specific population segments: it is important to consider which population segments would be included in the trial and the justification for this (note, it is acceptable that some IHD alternatives may be applicable only to particular population segments), and to be clear about their defining characteristics, using “common currencies” where possible (examples of these are provided in Appendix 1, Section 1). For example, this would mean being clear about the fact that the IHD alternative may only be offered to certain customers and what their characteristics are.
- Self-selection: another factor to consider is that if the IHD alternative is offered as an alternative, people choosing not to have it cannot represent the control group. Careful thought needs to be given about managing self-selection bias, which is covered in more detail in Section 4.

Quantitative data collection

125. We identify three main groups of quantitative data that could be collected during a Stage two trial. Ideally, these categories will have been developed through a Stage one trial or equivalent research:

1. Quantitative measurement of user experience outcomes: these include scales or other quantifiable measures of attitudes and personally stated preferences or satisfaction, most often collected through surveys. For these studies this would include experiences and satisfaction of the installation process, and behaviours and practices related to usability of the IHD alternative quantified through a rating of the helpfulness of the feedback provided by the IHD alternative, on a scale 1-5¹⁵. It might also provide useful evidence to include or attitudinal questions related to energy efficiency, borrowed from surveys like DECC’s Public Attitudes Tracker.
2. Quantitative measurements of interim or final behavioural outcomes: this would aim to measure the prevalence of practices and behaviours related to the IHD alternative that were identified through a Stage one trial (or existing evidence) as contributing to relevant energy outcomes. These may include measures of frequency of engagement with the IHD alternative, that may be automatically recorded if the IHD alternative is an IT product, or other measures of relevance such as early impact on energy consumption and the behaviours and practices leading to this. Examples would be the number of times in a week that a customer has interacted with the IHD alternative, and the length of the interactions; and

¹⁵ Other behaviours and practices that would be quantifiable may include: other scales for satisfaction over different features of the IHD alternative frequency of actions, the length of time and frequency of engagement with the IHD alternative, the number of people in a household engaging with it

3. Other quantitative measures relevant to the implementation and delivery of the product: these include summary statistics of the population studied (i.e. household composition, etc.), summary statistics of the IHD alternative (i.e. duration of installation process, etc.) and summary statistics of the settings of the trial (i.e. external temperature and other relevant external data).

126. Please refer to the section on meta-data for further details other quantitative data of relevance that DECC would recommend to collect, including examples of behavioural and attitudinal questions drawn from DECC's Early Learning Project.

Qualitative data collection

127. For guidance on choices of qualitative data collection, please see the previous section on Stage one trials.

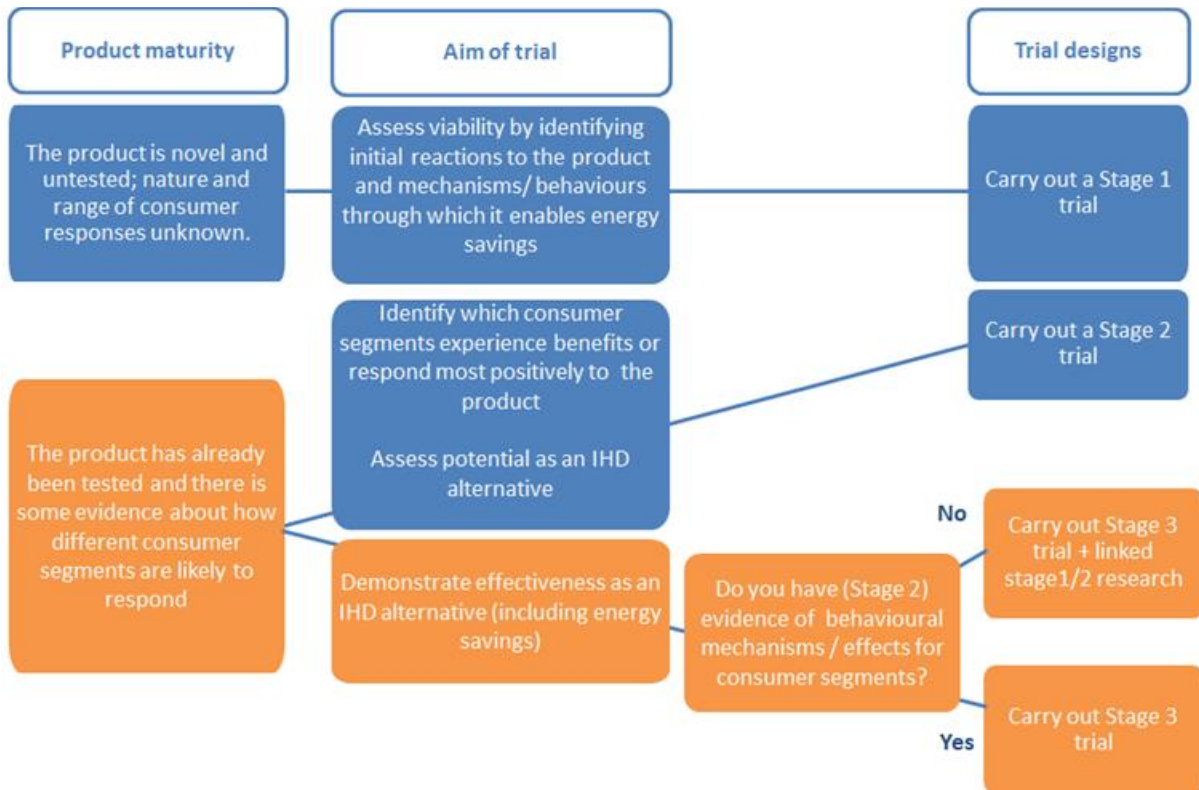
Research standards to meet to robustly test the prototype of the IHD alternative

[Application template sections 3.1, 3.3]

128. Please refer to the standards from Stage one for qualitative research and the relevant standards from Stage three for quantitative research. Section 1 of Appendix I provides guidance on how to measure key participant and household characteristics using surveys. Please refer to the meta-data sections of Stage one and Stage three trials for further detail on meta-data requirements.

3.4 Stage three: product validation

Figure 7: approach to stage three trials



Research questions you can answer at the product validation stage

[Application template sections 2.1, 5.2, and 5.4]

129. One of the smart metering programme objectives is to promote cost-effective energy savings, enabling all consumers to better manage their energy consumption and expenditure and deliver carbon savings. The IHD is a primary tool for this, in combination with other programme elements such as explanation and advice. Answering research questions about whether any IHD alternatives will deliver comparable or additional energy savings needs to be done robustly. This means that trials at this stage should be able to offer good estimates of the size of relative savings, compared with an IHD counterfactual and not just directional effects.
130. Quantitative methods, building on randomised controlled trials or quasi-experiments (for example differences in differences, regression discontinuity designs etc.) can enable trials to draw causal inferences about an IHD alternative and observed changes in energy consumption. It should be noted that the counterfactual or comparison group for these controlled trials or quasi-experiments should be consumers receiving an IHD, and not a “do nothing” control (who have traditional meters). We would expect the IHD control, at a minimum, to be SMETS capable and SMICOP compliant.

131. The DECC research questions that suppliers should aim to answer through a Stage three trial are the following:

Possible supplier research questions (* also relevant to DECC)	Typical DECC research questions
<p>What percentages of customers in different segments positively adopt the product (and use it for an extended period of time)?</p> <p>What is the impact on customer experience and satisfaction (e.g. NPS score) following receipt and use of the product?</p> <p>What are the impacts on supplier costs (e.g. call centre) and benefits (e.g. reduced churn)?*</p>	<p><u>For those segments included in the trial</u></p> <p>If the product is functionally similar¹⁶ to your IHD:</p> <p>What is the difference in the longer-term energy saving impact from that of your IHD?</p> <p>How does usage (i.e. levels of regular consumer use, measured at different periods of time at installation) compare with those of your IHD (proportion of population and frequency of engagement)?</p> <p>If the product is functionally different to the IHD, e.g. a home energy report):</p> <p>How do levels of usage and energy saving impact compare with those from your IHD only:</p> <p>a) if provided <u>as a substitute for</u> the IHD;</p> <p>b) if provided <u>as well as</u> the IHD?</p>

132. Suppliers would be expected to consider which of these research questions they aim to address, suggest any amendments they would need to make to be able to answer them and explain their choices.

Research methods to employ during the product validation stage

[Application template sections 2.1, 2.4]

¹⁶ By “functionally similar” we mean that the product is designed to be used by the consumer in a similar way to the IHD, e.g. as a means of accessing real-time and historic consumption data. In such cases it is assumed the consumer would regard the product as a substitute for the IHD.

133. For projects at this stage, we anticipate that proposals will be for quantitative research methods. Only direct measurements of final outcomes (i.e. energy consumption measured through meter data) combined with an appropriate trial design and a robust analytical strategy would enable suppliers to identify causal relationships between the installation of an IHD alternative and energy savings relative to an IHD.
134. These are likely to be large trials involving hundreds or possibly thousands of individuals per segment. The size of the trial would ensure that most of the variation in energy consumption between any two people with an IHD (in the control group) and an IHD alternative (in the treatment group¹⁷) due to differences in family composition, or their properties, or seasonality, would be accounted for. This would then enable evaluators to identify robustly only the portion of the change in energy consumption that is due to the difference between the devices.
135. There are a number of trial designs and analytical strategies that would suit a Stage three trial. These include randomised controlled trials (RCTs) and quasi-experimental designs. The main difference between these two designs is how customers are allocated to receive the IHD or the IHD alternative. In a 2-arm RCT (an RCT in which a single intervention is compared to a control, or "treatment as usual" condition), each customer in the sample would have the same probability of being assigned the treatment as every other customer. In a quasi-experimental design, the random allocation does not occur which decreases the robustness of the trial, and alternative designs are sought to recreate a suitable counterfactual sample of customers. More information is included in the "self-selection" section below. For quasi-experimental designs, the ability to make a causal inference depends on to what extent the control group is a representative of the intervention group; this is a key area that DECC will seek assurance on.
136. We see three broad options for how Stage three trials would be carried out. Well-designed studies of any of these types should be able to produce accurate results (that is, results that reflect the true effect of an intervention), although for some, particularly quasi-experimental methods, this may be more difficult, making bias more likely and requiring additional data collection and analysis to rectify this. Hence we recommend either option 1 or option 2 (depending on whether it is proposed to offer consumers a choice of product) over option 3. This is because options 1-2 are likely to be both more robust and also more straightforward to implement.

¹⁷ Note that from here onward we refer to 'treatment group' as the group receiving either the IHD alternative or the IHD alternative in addition to the IHD, if suppliers have designed the IHD alternative to be used in conjunction with the IHD

Option 1: A two-arm RCT, in which suppliers randomly select which customers are offered an IHD and which ones the alternative. The installation of either device follows this allocation, with no choice offered to participants.

Option 2: A two-arm RCT, in which suppliers randomly select those customers are given a choice between an IHD and the IHD alternative; and which customers are offered the IHD. Those participants from the first group who choose the IHD alternative are given that alternative, but analysis follows an 'intention to treat' model¹⁸, where all participants who were offered the choice are compared to those participants who were not offered it at all. This design will have reduced power per customer as many 'treatment group' participants will receive the same intervention as the control group. The extent to which this will cause problems for analysis will depend on the take-up rate of the IHD alternative in the trial and the number of potential participants available. The power can be increased by targeting a higher (e.g. greater than 20%) take-up of the alternative.

Option 3: A quasi experimental design, in which suppliers offer their product to a group of customers who are then matched to an IHD control group¹⁹. Historical consumption data and other variables are used in the matching to ensure the two groups are broadly similar. Given the complexity of these designs, including the difficulty of controlling for attitudinal differences between the two groups, we suggest that suppliers interested in conducting this kind of research contact DECC to discuss their proposal in detail prior to submission.

Duration

[Application template section 5.4]

137. For these larger trials, DECC stated in the Response that it would expect greater emphasis to be placed on measuring longer-term changes in energy consumption. In general, DECC regards changes in energy consumption measured over periods shorter than 12 months as carrying less weight as evidence. Trials should however include an interim analysis point (or points) to provide indicative findings after six months (and potentially at other points).
138. Having a total trial duration of 12 months combined with interim measurements of impacts at six (and if possible intervening) months will enable the evaluation to look at, for example, whether the effects of an IHD alternative in comparison with an IHD, or indeed of an IHD itself, have attenuated over a longer time period, or if the dynamic properties of these effects are different. For example, if an IHD alternative leads to different purchasing decisions (for example of Major Domestic

¹⁸ An intention to measure the average impact of the IHD alternative on energy consumption across the sample of customers who would have been offered one, including those who declined it. This measurement has strong external validity, as if the IHD alternative were to be offered in the same manner to the whole population, a similar willingness to take up this product would be observed

¹⁹ We outline a subset of quasi-experimental methods in this guidance. Where you feel another method would be appropriate we would encourage you to discuss it with DECC early in the planning and design process.

Appliances), while an IHD leads to different householder behaviour, it may take longer for the effects to be realised for the alternative than for the IHD itself. Similarly, if an IHD alternative takes the form of an App, it might be effective for a few months while consumers remember to use it, but then the effect might fade away, while an IHD, which could be more visible, may produce more persistent effects.

139. Trial designs will need to reflect seasonal patterns in demand, and DECC would expect any evidence on gas consumption to include the winter heating season with a minimum of three winter months (potentially in addition to any summer months). There is also the possibility to extend data collection beyond the deadline for the results on the trial stage - for example for a follow up study testing durability of effects.
140. We outline below which factors suppliers will need to consider when designing their Stage three trials. We also describe in more detail when it would be desirable to include small-scale qualitative research elements, in a section titled "Why were the trial outcomes observed?"

Research standards to meet to robustly validate the effectiveness of the IHD alternative

141. This outlines key principles and factors of robust quantitative research. It explains how suppliers are expected to consider each of the key factors that constitute the implementation and the analysis of the chosen trial design, and explain the motivation for their choices.

Sample size and inclusion criteria

[Application template sections 5.6]

142. It is important to have a sufficiently large sample, especially if meter readings or energy consumption data are not gathered frequently (i.e. only twice in six months). Unless suppliers have in-house statisticians, DECC recommends seeking external independent advice on how to carry out statistical calculations to establish what a suitable sample size would be for a trial of this kind. How the sample size has been determined, the sample size used and the rationale for these choices should be set out in section 5.5 of the template. These calculations can be used to determine whether a study has enough "power" - the probability of detecting an effect statistically, given that one exists. This would enable suppliers to design the trial in a way that would be sufficiently powered to detect an effect size of interest on energy consumption.
143. It is DECC's intention to collect evidence of the impact on energy consumption of the proposed IHD alternatives compared to the supplier's own IHD.
144. In order to do so, suppliers should design trials that would be large enough to detect the effect sizes that are likely to be seen. Evidence from the ELP and

elsewhere on IHDs indicates that they reduce energy consumption in the region of 2-3%, and DECC would want to learn whether the IHD alternatives are better or worse than this baseline. Therefore, stage three trials should be powered to detect an impact on energy consumption of 1% from the IHD alternative.

145. It is also important to be strategic with the choice of the sample:
- Specific population segments: it is important to consider which population segments would be included in the trial and why, and to be clear about their defining characteristics, using DECC "common currencies". For example, this would mean being clear about the fact that the IHD alternative may only be offered to specific groups of customers and what their characteristics are. Further to this, the same considerations about the sample size apply to the size of each of the sub-samples, constituted by the different population segments.
 - Control group(s): a control group, who receive an IHD, is recommended as this would enable a comparison of the IHD alternative to the IHD. Further, a group of customers receiving both the IHD and the IHD alternative should also be added if the IHD alternative is functionally different²⁰ and therefore would be likely to be used in addition to the IHD.
 - Self-selection: another factor to consider is that if the IHD alternative is offered as an alternative, people choosing not to have it cannot represent the control group. Careful thought needs to be given about the arising issue of self-selection, which we turn to in the next section.

Self-selection bias

[Application template section 5.7]

146. The criteria used to allocate customers to the treatment and control groups will have an impact on the ability to measure a robust impact of the IHD alternative on energy consumption. The principle to follow here is to create a treatment group and a control group of customers that are essentially the same (in terms of their willingness to engage with the IHD alternative and in terms of their baseline energy consumption).
147. Randomising the distribution of the IHD alternative and comparing energy savings between the IHD alternative treatment group and the rest of the (IHD) population will enable a robust estimate of the impact of the IHD alternative. This is option one described above. However this design may face practical constraints and/or ethical concerns (i.e. if customers do not have the technology to allow an IHD alternative (for example a phone or internet access), then they cannot receive it, or
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²⁰ As opposed to functionally similar: see Part A page 2 for an explanation of what we mean by 'functionally similar'.

if customers want an IHD the supplier may be (or feel) obliged to offer it to them). Leaving it up to the customers to choose whether they want an IHD alternative will create self-selection bias, which will prevent a causal estimate being identified. Instead, estimating an intention to treat effect will overcome this (described in option 2 above).

148. In principle it is possible to rely on propensity score matching and other quasi-experimental designs to construct an artificial comparison group (this is option 3 described above). Expert advice may be needed to carry out these methodologies, and their appropriateness will depend on the data available.

Ensuring the control group does not become unrepresentative

149. Where trials use a randomised design suppliers should outline measures to ensure the control group remains representative throughout the study period. Issues that could threaten this include:
- Cross-trial (or inter-trial) contamination: This risk exists when two or more trials are being run in the same area. While a clear risk for groups receiving the product, control groups are also at risk. They should therefore represent business as usual, and should not be included in any other trials being run by the supplier.
 - Contamination: Interaction between trial participants in the intervention and control groups that affects the outcome variable. For example, if customers in the control group gain access to either your product or aspects of it, by knowing people in the treatment group, the trial will no longer be able to isolate its impact. Non-compliance: In this situation customers switching between treatment and control groups impacts on the quality of trial findings. This could happen where customers are offered, or request, the feedback device they were not initially offered at the beginning of the trial.
150. In general, where a control group is identified at the outset of a trial, it should then be maintained throughout your trial. Switching members of the control group will limit your trial's ability to identify the impact of the product. Recruitment to, and any attrition from, your intervention and control groups should be reported to DECC via a participant flow diagram (Appendix 1).

Data availability and frequency of measurements

[Application template sections 5.3, 5.5]

151. IHD alternatives might enable better and more frequent energy consumption measurements than for the average customer. For the trial, it is important to have a common frequency of measurement of energy consumption, capturing the same time periods, for both the treatment and control groups.
152. Suppliers would be expected to suggest how they intend to measure energy consumption for the treatment and control groups.

153. Repeat measurements for the same customers would be necessary to enable suppliers to measure a change in energy consumption. However these would need to take into account the impact of seasonality (i.e. by collecting data over 12 months or by collecting frequent measurements or by controlling for Heating Degree Days - more is included on this in the next section).
154. Historical data may also be useful to control for differences between intervention and control groups characterised by existing energy consumption, and can help to significantly reduce the total sample size required for the trial.
155. Suppliers would be expected to explain the frequency of the measurements they intend to carry out and the quality of data available.

Other data of interest

[Application template sections 5.3, 5.5]

156. Changes in energy consumption may be due to a number of things, beyond the interaction with an IHD or an IHD alternative. For this reason (and depending on the trial design used) it may be important for suppliers to include other measurable factors, such as external temperature ²¹ or the energy efficiency of the customers' homes in their data analysis. The importance of including additional contextual factors is less important where a robust randomised controlled trial is being conducted than when conducting quasi-experimental evaluations where extraneous factors are much more likely to introduce bias.

Analysis of data

[Application template section 5.8]

157. The analytical strategy to test the hypotheses implied by the research questions would need to be robust and reflect the design of the trial. Regression analysis using panel data, controlling for customer level fixed effects (or, if baseline data are not available, other characteristics or demographics) and other explanatory variables as explained above would be the recommended approach. Expert advice may be needed to carry out this analysis, particularly if a quasi-experimental method is adopted.

Qualitative research to help explain trial findings

158. Where there is a prior absence of good evidence on mechanisms, DECC will expect suppliers to carry out elements of qualitative research to understand the
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²¹ If the study is not a randomised control trial, it will be important to ensure that external temperature is not having an impact on energy demand that is different for the treatment and control groups. In this case, it is good practice to transform your dependent variable (e.g. electricity demand in kilowatt hours) into a measure of electricity consumption that is standardised according to the Heating Degree Day method. For more information on Heating Degree Days, visit:
<http://www.carbontrust.com/resources/guides/energy-efficiency/degree-days>

nature of customers' engagement with the product, the importance of contextual factors, and the reasons why a null effect may be detected. This qualitative element to a large scale evaluation should be considered at an early stage to ensure that it is fully integrated into the design of the quantitative research. We recommend that suppliers should read the relevant section in this guidance in section three and four of Part B for guidance on designing qualitative research.

Meta-data

[Application template section 5.10]

159. An example meta-data record is included in section 2 of Appendix I. This outlines, for example, how to describe the way in which the intervention was implemented, including the features of your product and any supporting materials or advice provided alongside it.

Why were the trial outcomes observed? (Integrating a Stage two with a Stage three trial)

160. Stage three trials measure the size of the effect of IHD alternatives on energy consumption. Suppliers should also undertake an evaluation of causal mechanisms and intermediate impacts to identify whether an intervention was implemented and has worked as intended as well as collect evidence to support or refute the logic or theory behind an intervention, particularly by identifying contextual factors that help/hinder desired outcomes. Suppliers should make it clear how they intend to collect this data, which should be presented alongside the final results in the form of accompanying meta-data.

Appendix 1: Helpful information for conducting research

A1. Example survey questions

Collecting demographic data that supports analysis of population subgroups and comparison across different trials

Evidence obtained from trials will be interpreted by DECC relative to the consumer groups included in the research. Demographic data will be required to demonstrate the characteristics of these groups. As DECC will be drawing on a range of trials to inform policy, common classifications that support analysis across different trials will be useful.

This is not intended as an exhaustive list but illustrates the measurement methods of a number of variables that you may wish to record when collecting data from consumers. Please note that any physical inspections of properties should be carried out following the English Housing Survey physical inspection method.

Applicable to all research stages:

The following data should be available from administrative records and therefore can be included in analysis at low cost and without respondent burden. These are relevant at all stages to show which consumers have been included, and how they compare to the suppliers wider consumer base.

Variable	Category
Payment type (for gas and electricity separately if required)	Pre-payment Standard credit Direct Debit
Customer supply	Electricity only Gas and Electricity
Priority Service Register flag	Yes/No
Region	PES Electricity supply regions

Where primary data collection is being carried out (qualitative and quantitative//survey research)

Appendix 1: Helpful information for conducting research

More detailed data are available where primary data are being collected from consumers. They fulfil different roles depending on the research stage. At stage one, where qualitative research is being carried out, they should be included to demonstrate how particular groups have been included in research, or how diversity has been included in your sample. At stages 2 and 3, where survey data collection is carried out they will be used to carry out statistical comparisons of different groups, or to demonstrate that representative samples have been obtained. Where this is the case, it is important that, where possible consistent questions and classifications are used.

The table underneath provides example questions, drawn largely from the [English Housing Survey](#) that can be used.

Characteristic	Description	Question wording source
Demographics and individual characteristics:		
Sex	What is your sex? Male Female	English Housing Survey
Date of birth	What is your date of birth? Day, month, year	English Housing Survey
Tenure	Do you (or your household) own or rent this accommodation? Own outright Buying it with the help of a mortgage or loan etc...	English Housing Survey
Dwelling type	What type of accommodation is this? Detached Semi-detached Terraced etc...	Census 2011
Highest level of education	What is the highest level of qualification that (you/name) (have/has) received from school, college or since leaving education? Please include any work-based training. Degree-level qualification At school part-time A-levels or equivalent etc...	English Housing Survey
Disability	Do you have any physical or mental health conditions or illnesses lasting or expected to last for 12 months or more? Yes No Don't know Refusal/don't wish to say	English Housing Survey
Energy bill payer	Are you responsible or jointly responsible	Ofgem Customer Engagement with the

Appendix 1: Helpful information for conducting research

	for the gas or electricity bills in your household? Yes - solely Yes - jointly No	Energy Market Survey
Internet use	When did you last use the internet, was it... 1. Within the last 3 months? 2. Between 3 months and a year ago? 3. More than 1 year ago? or 4. Never used it? 5. Don't Know	Labour Force Survey
Household characteristics:		
Year property built	When was this property built? Before 1850 1850-1899 1900-1919 etc...	English Housing Survey
Main method of heating home	What is the heating system that your household uses to heat the majority of your home in the winter? Central heating Storage radiators Gas fires Electric heaters Etc...	Energy Follow Up Survey 2011
Energy efficiency measures installed	I'd like you to think back over the last 12 months about all of the work that you [or your landlord/freeholder] have done to your home over that time. Please could you look through this card and tell me which jobs you [or your landlord/freeholder] have done to this property over that period. Put in central heating / storage radiator where only had fires or heaters before Replace central heating boiler etc...	English Housing Survey

Questions that can be used to compare consumer attitudes or measure interim outcomes

Attitudinal segmentation and measurement	The following example questions are taken from DECC's Early Learning Project consumer research survey, this is available from DECC's website and contains full questionnaire text.
I am now going to read out a number of statements that other people have made about the energy they use at	<ul style="list-style-type: none"> • I have tried to reduce the amount of energy I use at home • I think there is more I could do to reduce the amount of energy I use at home • I am more concerned about having a warm and comfortable home than saving energy • I believe it is important to save as much energy at home as possible • I feel in control of how much gas I personally use (

<p>home. Please tell me to what extent you agree or disagree with each one? Please just read out the letter that applies.</p>	<ul style="list-style-type: none"> • I feel in control of how much electricity I personally use • I know what uses the most electricity in my home • I feel in control of what I spend on my energy bills
<p>How often, if at all, do you now look at the following features on your in-home display? Please just read out the letter that applies.</p>	<ul style="list-style-type: none"> • Information on your past electricity usage (the kilo-watts measure) i.e. how much electricity you have used over the last week or month • Information on your current electricity usage (the kilo-watts measure) i.e. how much electricity you are using at that point in time • Information on your past gas usage (in meters cubed) i.e. how much gas you have used over the last week or month • Information on your current gas usage (in meters cubed) i.e. how much gas you are using at that point in time • Information on how much you have spent in the past on electricity (the money display) i.e. how much you have spent on electricity over the last week or month • Information on how much you are currently spending on electricity (the money display) i.e. how much you are spending on electricity at that point in time • Information on how much you have spent in the past on gas (the money display) i.e. how much you have spent on gas over the last week or month • Information on how much you are currently spending on gas (the money display) i.e. how much you are spending on gas at that point in time • Information on how much carbon you have emitted
<p>Thinking back over the last couple of years how often, if at all, do you personally tend to do each of the following things? Please just read out the letter that applies.</p>	<ul style="list-style-type: none"> • Leave the lights on when you are not in the room • Boil the kettle with more water than you are going to use • Wash clothes at 30 degrees or lower • Try to keep rooms that you are not using at a cooler temperature than those you are using • Leave the heating on when you go out for a few hours
<p>Thinking now about your home, how much do you agree or disagree with these things that other people have said?</p>	<ul style="list-style-type: none"> • I'm the type of person who likes to have the newest gadgets in my home • It's not worth me doing things to help the environment if others don't do the same • I'm always looking out for new ideas to improve my home

A2. How to record meta-data (sample meta-data collected for a relevant research with qualitative and quantitative elements)

How was the data collected?

The following is an example of how the data collection method should be described. For a more comprehensive, real-world example of meta-data, applicants are advised to consult DECC's methodology section of the Energy Follow Up Survey (EFUS) 2011 report.²²

Electricity and gas consumption in kilowatt hours was measured using smart meters installed in participants' homes at the start of the study.

Select participant demographics and characteristics were obtained through the administrative data held on customers (the full list of variables collected and how they are measured should be provided e.g. name, address, occupancy, dwelling type and payment method are collected when the participants switched their gas supply to us through an online form or telephone conversation with a member of staff).

A further group of participant and household characteristics were collected by means of an online survey administered to participants in week 1 and then again in week 6 of the study (the questionnaire used to measure additional variables must also be reproduced in full when results are reported). The average survey response rate across both survey waves was 46% meaning that there are missing observations for this section of the data.

To obtain data on how participants interacted with the device, face-to-face focus groups were held with between 8-12 participants at each of the different study locations, Bristol, Manchester and Cornwall. The focus groups were transcribed by a research assistant and anonymised transcripts are available upon request. The topic guides used to prompt discussions during the focus groups are reproduced in full in an appendix to the submission.

Description of the IHD alternative

The following is an example of the level at which the IHD alternative should be described²³

The IHD alternative being tested is an online game. The gaming platform was created by a professional software development company for the purpose of the trial.

The game, called Power House, had several elements of successful social games, including points for desirable energy behaviours, leaderboard that recognize achievement, challenges, and contests, all accessible through a homepage that also displayed the player's daily home energy consumption (Figure 1). The main part of the game was a cutaway three-story virtual home that had 12 rooms (Figure 2). The goal of the game was to follow one family member (and eventually an entire family of four) around the home, turning appliances on and off with clicks of a mouse (e.g., the dishwasher, lights, computers), as the game provided information about what household tasks the characters were trying to complete. During play, the game showed realistic information about the amount of energy each appliance used. Eventually, and similar to several commercial games in this style, all the characters were present in the home at the same time and it became increasingly difficult to manage the simultaneous appliance usage of the four family members. The goal of the game was to see how long you could keep the characters active before the family overloaded electrical use in the virtual home. Power House is fully described in Online Appendix A (at www.linktothegame.com), including a link that allows readers to play the same game used in the research.

Figure 1 The Game

²² This is available at

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/274780/11_Methodology.pdf.

²³ This example description of the IHD alternative is reproduced in its entirety from a study conducted by Reeves, B., Cummings, James J., Scarborough K. J., Yeykelis, L. (2015). "Increasing Energy Efficiency With Entertainment Media: An Experimental and Field Test of the Influence of a Social Game on Performance of Energy Behaviors", *Environment and Behavior*, Vol. 47 (1), 102-115.

The screenshot displays a user dashboard for 'KUMA REALITY GAMES'. At the top, it features logos for Stanford University, seriosity, and KUMA REALITY GAMES, along with the tagline 'Saving the planet, one game at a time'. The user's profile shows a score of 5268 and a highest game score of 5268. The dashboard includes several interactive elements: 'Play Game', 'Upgrade my House' (with 20 Upgrade Bucks), 'Challenge a Friend', 'Launch R-LEA Challenges' (with 0 R-LEA Bonus Points), 'MarketPlace (Coming Soon)', and 'Carbon Offsets' (with 0 offsets). A section for 'ACHIEVEMENTS' shows 1/100 completed. The main content area is titled 'What's Happening in the Game' and displays 'Your Home's Real World Energy Consumption' for Saturday, July 14, 2012. The graph shows 'Your Consumption' (yellow line) and 'Your Average' (blue line) over a 24-hour period. The user's consumption was significantly higher than their average on that day, peaking at approximately 70 kWh around 12 PM. A notification states: 'You used 7.90% more electricity yesterday than your daily average. That earns you a 0 kW bonus in the Game's Electricity Monitor! See your Game Tachometer for details.' Below the graph, there are links for 'Real-Life Energy Action Challenges' and 'MarketPlace (Coming Soon)'.

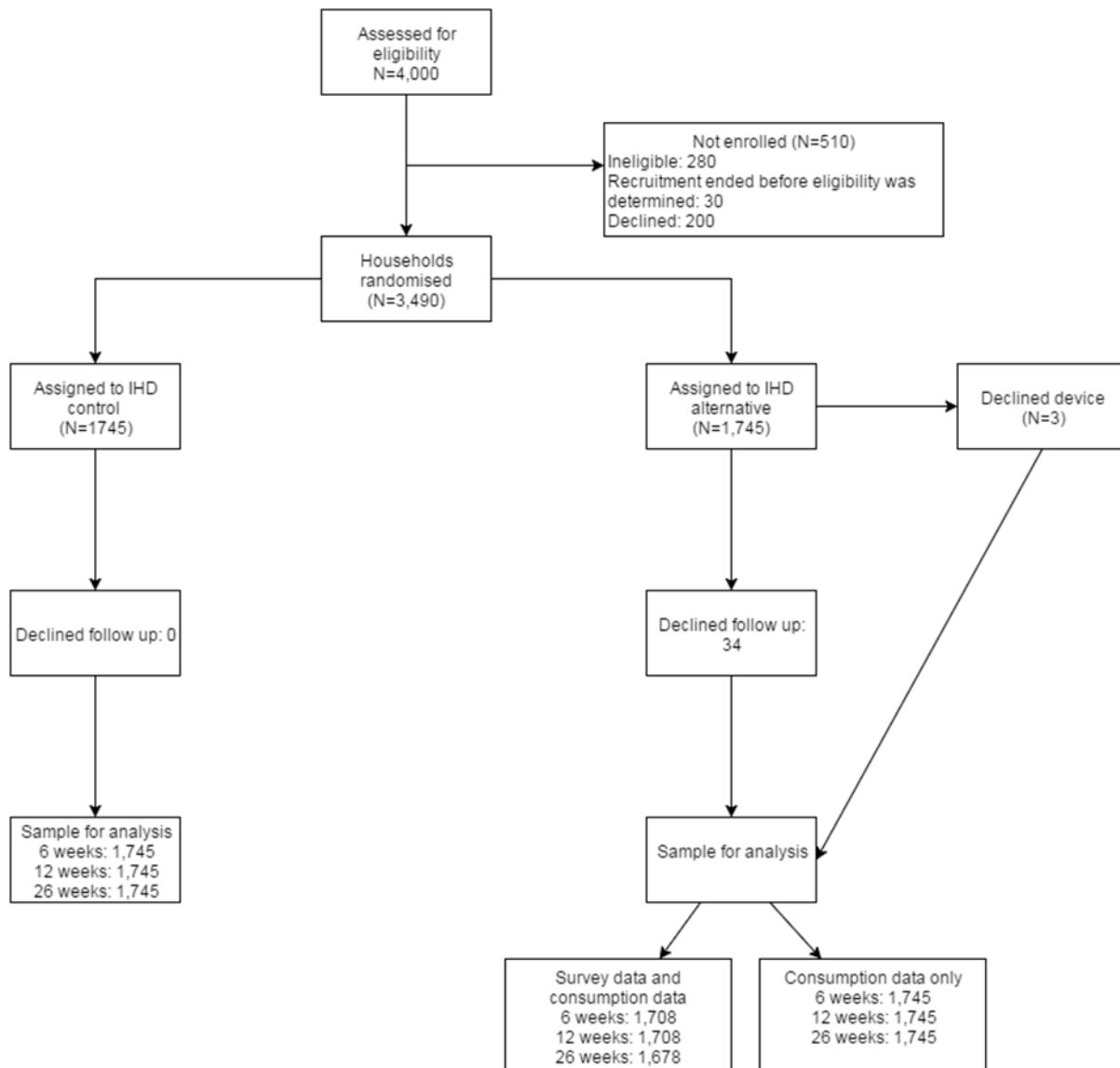
Game image reproduced from Reeves, B., Cummings, James J., Scarborough K. J., Yeykelis, L. (2015). "Increasing Energy Efficiency With Entertainment Media: An Experimental and Field Test of the Influence of a Social Game on Performance of Energy Behaviors", Environment and Behavior, Vol. 47 (1), 102-115.

How the trial was conducted

Use the trial protocol template in Appendix 2 to create meta-data on how the trial was conducted. This template also provides relevant examples to guide you. For trials involving the use of control groups a participant flow diagram will also be required (example include in the following section).

A3. Example participant flow diagram

When creating this diagram for submissions, you do not need to specify the likely sample size at each stage or the proportion not enrolled after screening for eligibility. This is only



relevant once the trial has been conducted and you are reporting your results.

A4. Example descriptive statistics table

Characteristics of study sample				
Household characteristics	Number of observations	Entire sample	Control - IHD	Treatment - IHD alternative
		%	%	%
Tenure:	1645			
Owner occupied (outright/mortgage)		69	69	69
Rented (council)		15	15	15
Rented (private)		15	15	15
Type of accommodation:	1645			
Detached house		28	28	28
Semi-detached house		29	29	29
Terraced house		24	24	24
Purpose-built flat or maisonette		13	13	13
Converted flat or maisonette/rooms		3	3	3
With business premises/other		3	3	3
Main method of heating home:	1200			
Gas central heating		68	68	68
Electric (night storage)		24	24	24
Heat pump		1	1	1
District heating		0.1	0.1	0.1
Other electric heating		2	2	2
Other gas heating		1	1	1
Other		3	3	3
Don't know		0.2	0.2	0.2
Payment method:	1645			
Credit (any type)		80	80	80
Pre-payment meter		9	9	9
Fuel Direct		0.1	0.1	0.1
Other		10	10	10
Region:	1645			
South East		20	20	20
East Midlands		14	14	14
West Midlands		13	13	13
Eastern		12	12	12
London		12	12	12
Scotland		8	8	8
South West		7	7	7
Yorkshire and Humber		6	6	6
North West		5	5	5
Wales		2	2	2
North East		1	1	1
* Note: Providing sample characteristics for intervention groups (as well as the total sample population) is relevant for evidence gathered using randomised control trials and quasi-experimental research designs and qualitative analysis. Suppliers should report a table of this type in their results reports. The sample size for each variable should be recorded so that it is easy to see whether there is any missing data.				

A5. Example qualitative analysis output

<p>Categories of things: Example study - advice on how to use heating controls</p>
<p>A study aimed to explore various different types of advice given to tenants about their heating controls. Alongside an RCT designed to measure the impact of the advice, a qualitative process evaluation was carried out to help understand the quantitative findings. One piece of thematic analysis captured key factors that might help explain different outcomes in the experiment. The analysis of the qualitative data categorising a number of ‘sets of factors that had a bearing on extent to which :</p> <ul style="list-style-type: none"> ● Existing knowledge of heating controls ● People characteristics (age, household, etc.) ● Aspects of the engineers’ delivery ● Aspects of the engineers’ affiliation <p>Capturing this information in this structure allowed further themes to be extracted and comparisons made between sub-groups to help explain quantitative impacts.</p>
<p>Typologies of people: Example study - customers’ experiences of smart meters</p>
<p>Through categorising the reasons for having a smart meter installed, it was possible to develop a typology of customers that characterised three different types of attitudes and behaviours that were in evidence after the installation.</p> <p>Three different types of people emerged:</p> <p>Enthusiastic engagers: these were people who actively signed themselves up to be one of the first with a smart meter, for a variety of reasons. These could be because of a desire to be more in control of money and/or energy use; to be the one with the latest smart technology; or because of the benefits it might give someone with a disability, such as blindness. These people were most engaged in following their energy use and making changes, as they had the initial instinct and drive to make use of one.</p> <p>Reactive engagers: these were those who had been recommended a smart meter as secondary to another product or service. For example, they may have been told when renovations in the home were taking place, or ringing to get another product, such as Hive, or possibly recommended by friend or family members. Their smart meter engagement was more limited than enthusiastic engagers, as their primary interest appeared to be in another product, and the smart meter became just an added benefit</p> <p>Non-engagers: these are people who had had one installed due to upgrades or having moved in where there was one already installed. Therefore they did not have much choice in the matter. These people were therefore the least knowledgeable and least engaged in their smart meter from the beginning and this continued into their use of it</p>
<p>Explanatory accounts and models: Example study – customers’ experiences of smart meters</p>
<p>Explanatory models link two or more sets of thematic analysis, such as categories of behaviours or types of people.</p> <p>In a study that looked into customers’ experiences with smart meters, by linking various pieces of thematic analysis it was possible to construct a framework for understanding how a range of factors interact to determine a customer’s attitudes and behaviour towards their smart meter. The factors included circumstances relating to the installation, such as whether someone had been present at the installation, how they came to have a smart meter and how long it had been installed, as well as demographic factors such as household composition and social grade. These two sets of factors interacted to determine the impact upon over all engagement, satisfaction</p>

and/or a person's energy efficient behaviours.

For example, how a customer was contacted about smart meter installation had an impact. Where it had been proactively requested it, participants were more engaged and satisfied overall, except where other factors had an influence. Those who had been told they had to have it replaced saw it as unnecessary except where they saw immediate benefits. This indicated that a consumer's prior knowledge and expectations of smart meters influenced their experience of engaging with the product and, ultimately, its impact on energy consumption outcomes.

Appendix 2: Data management planning

There are a number of ways that you could go about managing your data. The following form provides a template that you could follow or adapt to suit your particular project. It is based on the template used by the UK Data Service which also provides a free online tool for data management which you could use.²⁴

Project name	e.g. Data management plan for IHD alternatives trial
Principal investigator	[insert name]
Organisation	[insert organisation name]
Data Collection	<ul style="list-style-type: none"> • What data will you collect or create? • How do you plan to collect or create the data?
Documentation and Meta-data	<ul style="list-style-type: none"> • What documentation and meta-data will accompany the data? <p><i>Note that, DECC requires three types of meta-data:</i></p> <ol style="list-style-type: none"> 1. How was the data collected? (this may differ from the planned data collection strategy and deviations from planned strategies must be recorded) 2. Description of IHD alternative 3. How was the trial conducted? <p>It is also good practice to ensure that data is accompanied by a codebook that outlines what the variables represent - this ensures that the data could be used by people within your organisation (subject to data sharing restrictions), regardless of whether they were involved in the data collection process. Without such a codebook, the data is virtually meaningless (for example, it is not self-evident whether a variable called 'tenure' is referring to dwelling type (detached, semi-detached etc.) or type of ownership (homeowner, rented from council, rented from housing association etc.) as tenure is used to refer to both in different contexts.</p>
Ethics and Legal	<ul style="list-style-type: none"> • How will you manage any ethical issues? • How will you manage copyright and Intellectual Property Rights

²⁴ Visit <http://dmponline.dcc.ac.uk/> to access the UK Data Service's free online data management plan tool. Another good resource is the 'Managing and Sharing Research Data - A Guide to Good Practice' by Corti, L., Eynden den, V., Bishop, L., Woollard, M.(2014) available at: <https://us.sagepub.com/en-us/nam/managing-and-sharing-research-data/book240297>.

Compliance	(IPR) issues?
Storage and Backup	<ul style="list-style-type: none">• How will the data be stored and backed up during the research?• How will you manage access and security?
Selection and Preservation	<ul style="list-style-type: none">• How will you share the data, if at all?• Are any restrictions on the data sharing required?
Responsibilities and Resources	<ul style="list-style-type: none">• Who will be responsible for data management?• What resources will you require to deliver your plan?

Appendix 3: Application template

Instructions for completing this form

All derogation applications should be submitted on this template and emailed as a word document to IHDAAlternativeTrials@decc.gsi.gov.uk.

All trials should have a named project lead who can respond to DECC queries. If you are thinking of bringing an application forward we would ask that you register your interest with DECC at the same email address, so that we can keep a pipeline of potential proposals and plan accordingly.

Suppliers should complete all fields relevant to the stage of trial they are proposing. Where information cannot be provided, please outline why this is the case. You may wish include annexed information to your application, including for example, previous research findings or supporting material about your product.

How will DECC treat the information provided in this form?

Once complete DECC will treat this form as Official Sensitive Commercial. The Programme is committed to the safe storage of information and will provide extra protection for data or information that is deemed personal or commercially sensitive, operating in accordance with best practice as set out in the Data Handling Procedures in Government: Report 2008, the Data Protection Act 1998, and the restrictions on disclosure set out in section 105 of the Utilities Act 2000

More information about how DECC will treat information provided as part of this process is included in the application guidance.

DEROGATION APPLICATION: IHD ALTERNATIVE TRIALS	
Section 1 – Applicant information (all trials)	
1.1. Project title	
1.2. Submission date	
1.3. Organisation submitting application	
1.4. Lead contact(s) / contact details (email / telephone number)	
1.5. Version history	
1.6. Confirmation that the information in this application is correct.	Name and role of person confirming that the information in this form is accurate (digital signature)
Section 2 – Trial overview (all trials)	
2.1. What trial stage (or stages) from DECC’s guidance does your application cover?	Outline whether your application contains single or multiple trials and the stage(s) they cover.
2.2. Description of the IHD alternative	<p>Detailed description of the functionality of the IHD alternative, and the IHD provided by the supplier if the trial aims to compare the two (with screen shots/specifications where relevant).</p> <p>Information about any other elements that constitute “the IHD alternative intervention”. So in addition to the description of the IHD alternative, this would include any other communication, guidance provided</p>

	<p>to customers before, during and after the installation.</p> <p>Please include specific details about how your alternative is accessible for consumers, how you will communicate information on the alternative to consumers in a clear and intelligible way, and how you will ensure it is appropriate to the consumers it is offered to (including those with accessibility needs; lower digital literacy, or limited access to the internet or smart phones).</p>
2.3. Historic data	<p>Set out how you will continue to meet requirements in Licence Conditions in relation to a consumer's right to request access to their historic daily energy consumption data.</p>
2.4. Project Overview	<p>A brief outline of the proposed trial approach, including:</p> <ul style="list-style-type: none"> • Sample size, duration. • Planned reporting date(s).
2.5. Rationale for proposed trial	<p>Explain why this stage is appropriate, including summaries of, or references to, existing evidence (if applicable).</p> <p>Explain why the sample size and duration outlined in 2.4 are required.</p> <p>Outline why you expect the alternative to support consumer energy savings, drawing on and referencing existing evidence or theory.</p>
2.6. Participants	<p>Participants (including the split between alternative and control group where relevant)</p> <p>Outline and justify your choice of participants and the method for participant recruitment. Include details of recruitment strategies used, any characteristics (including whether customers are dual or single fuel) targeted for inclusion and the rationale for these.</p> <p>When justifying the method, applicants must outline how they feel that the chosen method addresses issues of selection bias.</p>
2.7. Informed consumer consent for data	<p>Please outline how you will secure consumer</p>

<p>collection and sharing</p>	<p>consent for;</p> <ul style="list-style-type: none"> • Their data to be collected as part of any follow-up research • Matching of their data to any additional data held by the supplier • Access (by the supplier and/or research agency) to energy consumption data (as defined under condition 47 of the standard electricity licence conditions and 43 of the standard gas licence conditions)
<p>2.8. Outline of relevant expertise of conducting research of this kind/independent peer review/expertise used</p>	
<p>2.9. Third party partner(s)</p>	<p>(where applicable) Brief description of role.</p>
<p>2.10. Data sharing</p>	<p>In some instances DECC will share your application with our consultant support the Behavioural Insights Team for further advice. Please confirm your acceptance.</p>
<p>Instructions:</p> <p>Fill out the section applicable to your trial stage/stages from DECC’s guidance. Where your proposal includes multiple stages of research, fill out the relevant templates, cross referencing where relevant.</p>	
<p>Section 3</p> <p>(To be used for stage one and two research that does not use a randomised or quasi experimental design)</p>	
<p>3.1. Research methodologies used and proposed sample sizes</p>	<ul style="list-style-type: none"> • Recruitment strategy (sample criteria including characteristics and locations) • Proposed mode of data collection • Timing of data collection

3.2. Research questions	<p>Which DECC questions this research will answer and where alternatives are proposed, the rationale.</p> <p>Please reference the specific questions outlined in the tables in the guidance.</p>
3.3. Meta-data (information about how your trial was conducted) and research instruments	<p>Outline what meta-data you will make available to DECC, including;</p> <ul style="list-style-type: none"> • research instruments (e.g. consent forms, topic guides, survey) • progress updates • methodological summaries and analysis plans
3.4. Analysis plan	Use of software/coding frames
3.5. Reporting plan	Details of how, in what format (for example written reports, presentations or briefings), and when you will report findings to DECC.
<p>Section 4</p> <p>(To be used for stage two and three research that incorporates a randomised or quasi experimental design)</p>	
5.1. Trial arms (groups receiving different interventions) and interventions for each	<p>Precise details of the interventions intended for each group and how and when they will be administered. This section can build on sections 2.2 and 2.5.</p>
5.2. Research questions	<p>Which DECC questions this research will answer and where alternatives are proposed, the rationale. Please reference the specific questions outlined in the tables in the guidance.</p>
5.3. Objectives/hypotheses	<p>Specific objectives and hypotheses to be tested. These should be formulated following the SMART format (see guidance Part B - Formulating SMART research questions).</p>
5.4. Outcome measures	<p>Precise details of the primary and secondary outcome measures as well as how they will be measured.</p>
5.5. Other data collection measures	<p>Precise details of how any additional data collection will be performed. For example, mode and length of interview or survey (face to face, telephone), as well</p>

	as any administrative and monitoring data.
5.6. Sample size and composition	<p>How the sample size has been determined and the sample size used. This includes providing a summary of the power calculations carried out to motivate the choice of the sample size.</p> <p>For qualitative research, the a rationale should be provided for the sample criteria and categories</p>
5.7. Method used to allocate participants to groups as part of quantitative trial	<p>Method used to allocate participants to groups (e.g. numbered containers/envelopes or computer software) and who will be responsible for carrying out the randomisation or allocation. This should be illustrated visually using a participant flow diagram. See Part B, appendix 1.3 for an example of a participant flow.</p> <p>Participants should state clearly which trial type they decided to use – option 1 (A 2 arm RCT, in which suppliers randomly select which customers are offered an IHD and which ones the alternative), option 2 (A 2 arm RCT, in which suppliers randomly select which customers are given a choice between an IHD or the IHD alternative, and which customers are offered the IHD) or option 3 (A quasi-experimental design, in which suppliers use a matched control group).</p> <p>Applicants should justify their trial choice and, if using option 3, outline the statistical expertise that they will be able to draw on, to analyse the results.</p>
5.8. Analysis methods	<p>Analysis methods to be used to compare outcome(s) across groups of customers receiving either an IHD, or an IHD alternative. Methods for additional analyses such as subgroup analyses and adjusted analyses. The estimating equation to be used should also be specified.</p> <p>Approach to qualitative analysis and data management.</p>
5.9. Reporting plan	Details of how, in what format (for example written

	<p>reports, presentations or briefings), and when you will report findings to DECC</p>
<p>5.10. Meta-data (information about how your trial was conducted) and data management</p>	<p>Outline the data management plan, paying particular attention to how meta-data will be recorded throughout the trial and updated throughout the trial's lifecycle (in case of deviations from the protocol).</p> <p>Outline when meta-data will be made available to DECC, including;</p> <ul style="list-style-type: none"> • research instruments (e.g. consent forms, topic guides, survey) • progress updates (for a stage three trial we anticipate these will include updates on trial recruitment, and attrition/operational issues) • methodological summaries and analysis plans

