Department for Business & Trade

Economic analysis: understanding the costs and benefits of smart data use cases

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The following report was written by The Public Service Consultants (The PSC). The findings do not necessarily reflect the views of the Department for Business and Trade or the UK Government.

Contents

Executive summary

The UK Government is supporting the development of new Smart Data schemes across the economy, building on commitments in the Labour Party manifesto[1] and powers set out in the Data (Use and Access) Act. Under the Data (Use and Access) (DUA) Act 2025, the government now has powers to require firms to participate in Smart Data schemes. These schemes enable the secure sharing of business data –such as a firm's standard product and pricing details – and, at a customer's request, customer data, such as information about the goods and services provided to the customer by the firm. Firms can also voluntarily set up and participate in Smart Data schemes, agreeing common standards and processes for data sharing. To assess the value for money offered by Smart Data in different sectors of the economy, this analysis estimates the costs and benefits of five potential Smart Data use cases. Smart Data use cases are specific applications of data sharing through Smart Data schemes to address identified user needs. **Our analysis estimates these five use cases could deliver £26.3 billion in net social value to the UK between 2028-2043, while contributing £3.6 billion annually to GDP by 2043 (~0.13% growth from 2024).[2]**

The most significant benefits are projected for use cases providing digital information for homebuying (£14.1 billion net present value) and improving consumer experience of online groceries (£7.2 billion net present value). A use case to digitise trade finance also shows strong potential (£3.6 billion net present value), while energy sector use cases – aiming to support green home upgrades (£745 million net present value) and support verified electricity emissions reporting (£685 million net present value) - demonstrate more modest but still positive returns. The DUA Act could unlock data sets within those use cases, but there is a chance that not all data sets will be unlocked using the DUA Act and other steps would likely also need to be considered to achieve the benefits as set out in this report. This research provides assumptions-based analysis of what Smart Data schemes could look like, and the benefits and costs of those, but any regulations will be subject to further consultation, options assessment and more refined impact assessments.

Extrapolating from these use cases to scheme-level impacts suggests **Smart Data schemes could generate £71.2 billion in net social value from 2028-2043,** with schemes in homebuying (£28.7 billion) and retail (£24.6 billion) showing the greatest potential out of the schemes analysed within this project[3]. **Annual GDP contributions from Smart Data schemes by 2043 could reach £9.6 billion (~0.34% growth from 2024),[4]** primarily driven by homebuying (£4.2 billion), international trade (£2.1 billion) and energy (£2.1 billion).

Key benefits across use cases include enhanced market efficiency, reduced transaction failures, improved consumer choice and reduced carbon emissions. However, implementation costs and risks vary significantly. Government entities, scheme governance bodies and data owners often bear substantial upfront costs, particularly for digitalisation initiatives, while benefits are more diffused among consumers, relevant industries and the wider economy. Smart Data schemes in some sectors, like retail, show small risks of negative GDP impacts that require careful consideration.

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[1] Labour Party, 2024. The Labour Party Manifesto 2024.
[2] House of Commons Library, 2025. Gross domestic product (GDP): Economic indicators. Calculated using 2024 UK GDP data (GDP = £2,848 billion)
[3] These figures are based on the following individual use case projections: Digital information for homebuying: £14.08bn NPV, £2.06bn annual GDP by 2043; Digitising trade finance: £3.61bn NPV, £0.93bn annual GDP by 2043; Consumer experience of online groceries: £7.19bn NPV, £0.26bn annual GDP by 2043; Supporting green home upgrades: £0.75bn NPV, £0.09bn annual GDP by 2043; Verified electricity emissions reporting: £0.68bn NPV, £0.22bn annual GDP by 2043.
[4] House of Commons Library, 2025. Gross domestic product (GDP): Economic indicators.

The analysis demonstrates that while Smart Data schemes require significant investment and coordination, they offer substantial potential returns across multiple sectors. However, benefits vary considerably between use cases and careful consideration should be given to sector-specific challenges and implementation approaches.

These findings suggest homebuying could be a priority sector for implementing a Smart Data scheme, as it promises the largest benefits in terms of both net social value and GDP. Smart Data schemes in energy and international trade could also offer substantial net social value and GDP benefits. However, implementing a Smart Data scheme in energy will likely be more straightforward than in international trade, where engagement with international partners will be required to yield the greatest benefits. Meanwhile, a Smart Data scheme in retail could deliver very significant net social value, but 9% of the scenarios modelled in the Monte Carlo analysis indicated a risk of negative GDP impacts which may be counterproductive to the government’s broader growth agenda – although this may be counterbalanced if multiplier impacts were also taken into account. In all cases, implementation approaches will need to be tailored to each sector's specific challenges and opportunities.

1. Introduction

Smart Data is defined as "the secure sharing of customer data with authorised third-party providers (ATPs) upon the customer's request to provide innovative services for the consumer or business user, such as automatic switching or better account management."[5] The UK Government is supporting the development of new Smart Data schemes across the economy, building on commitments in the Labour Party manifesto[6] and powers set out in the Data (Use and Access) Act. Under the Data (Use and Access) Act 2025, the government now has powers to require firms to participate in Smart Data schemes. These schemes enable the secure sharing of business data – such as a firm's standard product and pricing details – and, at a customer's request, customer data, such as information about the goods and services provided to the customer by the firm. Firms can also voluntarily set up and participate in Smart Data schemes, agreeing common standards and processes for data sharing. Smart Data schemes have the potential to unlock a range of potential use cases.

Smart Data schemes vs. use cases: What's the difference?

Smart Data schemes are the overarching governance and technical frameworks that enable secure, standardised sharing of customer data within specific sectors of the UK economy, such as finance or energy. Within a Smart Data scheme, there may be many different uses of the data for customers. For example, within this report we look at two different energy use cases but expect that they would fall into the same Smart Data scheme.

In contrast, **Smart Data use cases** are the specific, practical applications of data sharing enabled by these schemes. Each use case is designed to meet a defined user need – like helping consumers find cheaper energy tariffs, enabling smoother home-buying processes, or supporting SMEs in tracking supply chains. There may be numerous use cases enabled by each Smart Data scheme.

To assess the value for money offered by Smart Data in different sectors, this analysis estimates the costs and benefits of five potential Smart Data use cases:

1. Digital information for homebuying
2. Digitising trade finance
3. Consumer experience of online groceries
4. Supporting green home upgrades
5. Verified electricity emissions reporting for SMEs

By examining costs and benefits at the use case level, we provide detailed insights into how Smart Data can create value in practice, helping policymakers understand the concrete impacts of their proposals for new Smart Data regulation. The primary focus of our analysis is the question:

What is the potential net value to UK society of implementing each of the five selected Smart Data use cases over fifteen years from implementation?

We also provide an assessment of four secondary research questions for each use case:

[5] Department for Business & Trade, 2024. Regulatory Powers for Smart Data: Impact Assessment.
[6] Labour Party, 2024. The Labour Party Manifesto 2024.

1. How is the projected net value of the use case distributed between different market actors?
2. What proportion of the use-case's projected net social value is likely to occur without a corresponding Smart Data scheme, either through ongoing market activity ('Business As Usual') or existing government commitments ('Do Minimum')?
3. How do the selected Smart Data use cases contribute to the UK Government's mission to 'kickstart economic growth', as measured by GDP?
4. What is the indicative projected net social value and GDP contribution of the associated Smart Data schemes?

This report outlines our methodology in more detail before summarising findings for each of the five use cases. The analysis within this report was completed to understand an initial estimate of the costs and benefits of potential Smart Data use cases across five sectors, using assumptions on scheme design, governance and use cases. As policy develops further the Department for Business and Trade (DBT), will continue to work with Government departments to define the scope of these assumptions, which could affect the costs and benefits as outlined in this report. One example of this, is DBTs work on the Smart Data Guidebook, which aims to make implementation of Smart Data schemes easier, which could lower costs. As set out by the Better Regulation Framework, any further policy work will also be accompanied by further analytical work (including Options Assessments and Impact Assessments).

2. Methodology

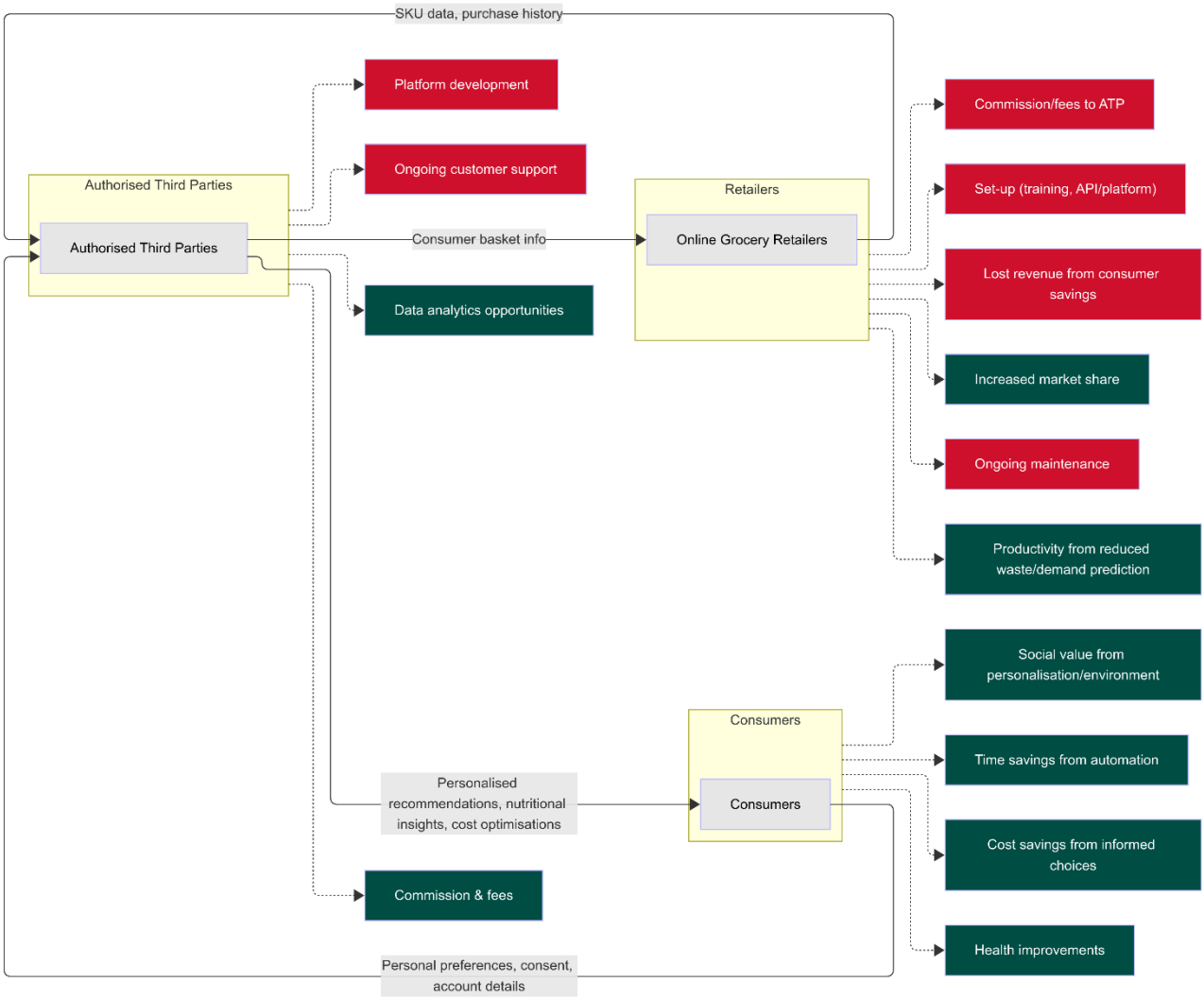
This section provides a high-level overview of how we answered our primary and secondary research questions. Full technical details, including estimation methods for each cost and benefit type, are included in the Technical Annex and referred to where relevant in later sections.

2.1 Value Chain-based Simulation Modelling (VCSM)

At the heart of our analysis is Value Chain-based Simulation Modelling (VCSM): a method that maps how value flows through the ecosystem of actors engaged in each use case and simulates the resulting economic and social impacts. The process begins with mapping key actors and their data flows through value chain analysis, before identifying the arising costs and benefits through stakeholder interviews and market research. We then model these costs and benefits, using values from interviews, consumer surveys and desk research, running 1,000 simulations to understand the range of possible outcomes.

VCSM has been used as it enables us to capture both direct and indirect behavioural responses across the systems and model their uncertainties and interdependencies. This is especially useful for Smart Data use cases, where interactions between actors influence outcomes in complex ways or are heavily dependent on areas of uncertainty (e.g. adoption rates).

See below for an example value chain, from the *Consumer experience of online groceries* use case. Actors are shown in light grey, costs in red, and benefits in dark green. Further value chains can be found in Technical Annex A.



We have also drawn on guidance laid out in HM Treasury's The Green Book[7] wherever appropriate. This approach ensures alignment with public sector evaluation requirements while capturing the unique characteristics and challenges of data-driven initiatives in the modern economy.

VCSM allows us to assess the detailed, real-world effects of Smart Data use cases and produces two complementary outputs for each use case: Net Present Value (NPV) and Gross Domestic Product (GDP) contribution. Together, these two metrics allow us to assess both the broad net social value of Smart Data use cases and their contribution to economic growth, enabling informed decision-making by policymakers.

2.1.1 Net Present Value (NPV)

The NPV figures reported here capture the **total net benefit to UK society** of each use case over 15 years following use case implementation (2028–2043), including both market and non-market outcomes. The 15-year time horizon was chosen to provide sufficient time to capture both the initial implementation phase and subsequent benefit realisation period, starting from the legislation date and typically including a few years for implementation followed by a longer period for rollout and

[7] HM Treasury, 2022. The Green Book.

adoption of the use cases. The start date of 2028 was chosen as it is expected to be the earliest that Smart Data schemes are implemented. NPV figures are calculated by subtracting the estimated costs of the use case in question from the estimated benefits. Relevant benefits include productivity and cost savings, time savings for consumers, health improvements and environmental benefits. Meanwhile, relevant costs include all implementation and ongoing costs borne by different market actors to establish or comply with Smart Data schemes, alongside losses in revenue in some instances.

2.1.2 Gross Domestic Product (GDP) contribution

The reported GDP figures isolate the subset of benefits that represent **new or 'additional' economic activity** which directly contributes to UK Gross Domestic Product. GDP figures therefore include market-based efficiency gains (e.g. reduced costs, increased output), new revenue or productivity growth for economic sectors, labour and capital productivity increases, and reallocations of consumer spending. We exclude non-market benefits (like wellbeing improvements or emissions reductions) unless they lead to measurable market output. We also do not include demand-side multiplier effects, to avoid double-counting.

The final outputs of our analysis (both NPV and GDP) are presented in real terms (2028 base year prices) with all **future values discounted to present value** using a standard 3.5% Social Time Preference Rate.[8] Where necessary, these outputs incorporate optimism bias corrections.[9]

2.2 Answering our primary research question

Our analysis followed a structured, repeatable process across all five use cases to answer our primary research question: **What is the net value to UK society of implementing each of the five selected Smart Data use cases over fifteen years from implementation?**

We followed five steps: (1) selecting use cases, (2) defining use case scope, (3) identifying costs and benefits, (4) quantifying costs and benefits, and (5) quantifying uncertainty. The remainder of this section outlines each of these five steps in more detail.

2.2.1 Selecting use cases

We selected five use cases across energy, retail, property, and international trade, in collaboration with DBT). These use cases were first proposed by industry players via submission to DBT's Smart Data Discovery Challenge in 2024.[10] The five use cases were chosen to represent diverse user needs, different types of data sharing, and a mix of consumer, business, and environmental benefits. Each use case had to be:

1. Actionable within a plausible Smart Data scheme
2. Representative of broader opportunities in the sector
3. Supported by enough evidence to support cost-benefit modelling

The DUA Act could unlock data sets within those use cases, but there is a chance that not all data sets will be unlocked using the DUA Act and other steps will also need to be considered to achieve the benefits as set out in this report. This research provides assumptions-based analysis of what Smart Data schemes/use cases could look like, and the benefits and costs of those, but any

[8] HM Treasury, 2022. The Green Book.
[9] HM Treasury, 2013. Green Book supplementary guidance: optimism bias.
[10] Department for Business & Trade, 2025. Smart Data Discovery Challenge: significant insights and outcomes.

regulations will be subject to further consultation, options assessment and more refined impact assessments.

Details of what data is used within each scheme can be found in Technical Annex A.

2.2.2 Defining use case scope

Following Green Book principles, we started by defining the scope of the five agreed Smart Data use cases. Specifically, through qualitative research interviews with use case owners (i.e. those who had submitted the relevant use case proposal to the Smart Data Discovery Challenge) and expected participants, we mapped out the actors involved, the data sets they held, data flows between actors, and the use case objectives, defined as SMART (Specific, Measurable, Achievable, Realistic, and Time-limited) goals.

Still, several methodological challenges arose in establishing clear use case boundaries, primarily due to the interconnected nature of data systems and uncertainty regarding future developments. Without robust boundaries, the analysis risked inconsistency and reduced comparative value across initiatives.

To address these challenges, we apply a structured four-part framework, agreed with DBT, to determine what should be included in our analysis. This framework ensured consistent analysis across use cases while capturing their unique characteristics and implementation requirements. It includes:

1. **Temporal Test:** Verify data flows occur within our fifteen-year time horizon. Include data flows that partially occur within this period with appropriate apportionment. Exclude flows entirely outside this timeframe.
2. **Geography Test:** Confirm data flows involve at least one UK entity or have benefits/costs borne by UK entities. Include international flows with UK impact but exclude those with no UK entity involvement or impact.
3. **Attribution Test:** Assess whether data flows can be wholly or partially attributed to enabling the use case. Include both fully and partially attributable flows (with appropriate apportionment) but exclude non-attributable flows.
4. **Dependencies Test:** Evaluate whether any dependencies are at least probable or have reliably estimated probabilities. Include flows with probable dependencies or those with quantifiable uncertainty but exclude flows with unquantifiable dependencies.

2.2.3 Identifying costs and benefits

Once the scope of the use cases was agreed, we conducted value chain mapping to identify a long list of costs and benefits that could be reasonably expected from the use case for each of the relevant actors. We then held qualitative research interviews with 63 subject matter experts, policy specialists, and key industry stakeholders to validate our emerging lists of costs and benefits and provide an initial indication of which were likely to be most material. We also conducted a consumer survey of 100 UK citizens for the consumer facing use cases.

Below is a table breaking down the interviewees spoken to over the course of the economic modelling – note that some interviewees were relevant to multiple use-cases.

Interviewee Type	Digital information for homebuying	Digitising trade finance	Consumer experience of online groceries	Supporting green home upgrades	Verified electricity emissions reporting for SMEs
Authorised Third Party	2	1	1	0	2
Subject Matter Expert	4	2	3	4	8
Consumer	2	7	0	0	6
Data Holder	14	0	6	8	4
Total	**22**	**10**	**10**	**12**	**20**

Given the number of potential benefits and costs of each use case and the variability of their expected impact and estimate reliability, we developed a two-dimensional prioritisation matrix to prioritise which impacts would be included in the analysis. This matrix was based on the materiality of the expected impact and our ability to reliably assess that impact. It classified benefits and costs into four categories:

1. **Top Priority** (high impact, simple to assess): Include in the analysis.
2. **Likely Important** (high impact, complex to assess): Include in the analysis with higher degrees of uncertainty.
3. **Review Later** (low impact, simple to assess): Include in the analysis only when impact would be material to affected actor.
4. **Exclude** (low impact, complex to assess): Mention in the report's narrative but exclude from analysis.

This approach allowed us to focus our detailed analysis on the most significant and measurable impacts while maintaining awareness of other potential effects that may require further investigation as data becomes available.

2.2.4 Quantifying costs and benefits

To quantify the included costs and benefits, we combined data from a range of sources:

1. **Official government reports and statistics**: We relied extensively on UK government sources to underpin our modelling, including ONS productivity and capital data, DESNZ carbon values, DfT benchmarks for time savings, and NHS valuations for health impacts. We also drew on the outputs from several previous government consultations on Smart Data.
2. **Online sources and industry reports**: Online sources and industry reports provided additional inputs where official sources were limited, including Open Banking adoption trends, retail pricing benchmarks, and property market statistics.
3. **Qualitative insights from stakeholder interviews:** We conducted interviews with 63 professionals from across the data-sharing ecosystem, including property service providers, fintech firms, grocery retailers, energy providers, and trade finance specialists. Our interviewees included senior leadership (CEOs, Directors, Heads of Departments),

technical experts (Chief Data Officers, Heads of Standards), and policy specialists (Policy Directors, Principal Experts) from both private sector and regulatory bodies. These conversations informed critical assumptions on implementation costs, process time savings and scheme adoption rates.

4. **Results from a survey of 100 UK consumers:** A bespoke survey captured behavioural intentions and preferences from a nationally representative sample of UK consumers. It provided data on time spent shopping or planning meals, willingness to adopt new services, and perceived value in areas like homebuying or energy upgrades. These findings directly informed assumptions around adoption (how many consumers and businesses take part in the case), willingness to pay, and non-market benefits like health and convenience.

Where multiple sources existed, we employed triangulation techniques to reach a reasonable assumption value, noting the differing reliability of different sources.

2.2.5 Quantifying uncertainty

To appropriately capture the uncertainty in our estimates, we have built our models using Monte Carlo simulation techniques. This involves identifying key variables with significant uncertainty and defining their probable distribution of values and assigning confidence grades[11] based on the framework below:

Step 1. Assign confidence grade (CG) to assumption/input based on level of uncertainty			**Step 2. Adjust assumption/input mean, and standard deviation, in Monte Carlo simulation**	
CG	**Definition**	**Example**	**Mean Adjustment**	**Standard Deviation**
A	Empirical evidence from directly relevant real-world evidence	Existing Perseus cost estimates	0%	4% of mean (+-2%)
B	Large-sample size studies or triangulation of 3+ lower confidence inputs/assumptions.	Home efficiency upgrade costs	-5%	10% of mean (+-5%)
C	Some empirical data, but from limited sample sizes / pilot studies, or revealed preferences.	Estimated time savings, costs savings and emissions reduction from Mealia	-10%	20% of mean (+-10%)
D	Primarily based on WTP / behaviour changes estimated from consumer surveys.	Use-case adoption rates.	-25%	40% of mean (+-20%)
E	Expert speculation or theoretical assumptions with little or no empirical support.	Health improvement for Mealia use-case.	-40%	50% of mean (+-25%)

[11] The standard deviations used in this framework are derived from a confidence grading system. More detail on this system can be found in Technical Annex B.

The simulation then runs a thousand iterations, randomly sampling from these distributions to build a comprehensive picture of possible outcomes. This allows us to move beyond simple point estimates to understand the full range of potential results and their relative probabilities. The outputs include confidence intervals for key metrics and sensitivity analyses showing which variables have the greatest impact on outcomes.

2.3 Answering our secondary research questions

2.3.1 How is the projected net value of the use case distributed between different market actors?

To calculate the net value for different market actors, we will analyse each use case's costs and benefits separately for the key actors identified in our value chain maps. This approach allows us to understand how value is distributed among different actors while capturing both positive and negative impacts specific to each group. By examining the net effects at this detailed level, we can better assess which market participants benefit most from each use case implementation.

We have adopted the Office for National Statistics' (ONS) Standard Industrial Classification (SIC) 2007 Divisions as our basis for defining actors. This is because it provides a widely recognised and standardised way to group similar economic activities, while aligning with ONS growth multipliers for broader economic impact analysis. This approach helps manage complexity by allowing us to net off distributional effects within sectors (such as shifts between different types of retailers) while still capturing meaningful cross-sector impacts. However, it's important to note that SIC classifications are typically based on a company's dominant activity, which means secondary activities of diversified businesses may not be fully reflected in this sectoral analysis.

However, we make two important exceptions to the SIC classification, in order to highlight two more specific actor types that are established because of Smart Data schemes, specifically:

1. **Authorised Third Parties (ATPs):** Separated due to being a new type of market participant with specific Smart Data scheme costs and uncertain industry classification.
2. **Scheme Governance:** Separated to maintain flexibility in governance design (public vs private funding options) and capture specific scheme establishment costs.

2.3.2 What proportion of the use-case's projected net social value is likely to occur without a corresponding Smart Data scheme, either through ongoing market activity ('Business As Usual') or existing government commitments ('Do Minimum')?

To assess the net social value that would occur without additional government intervention, we modify our analysis in two ways:

1. **For the "Business As Usual (BAU)" scenario**, we calculate the net value to UK society for each use case, including only those benefits and costs that would occur without any government intervention.
2. **For the "Do Minimum" scenario**, we calculate the net value including only those benefits and costs that would occur through existing government commitments, without additional Smart Data regulation.

This approach allows us to establish clear benchmarks for assessing the incremental value of additional government support. By comparing these scenarios to our "Do Maximum" analysis (where a Smart Data scheme is introduced by government), we can identify which benefits and costs are specifically dependent on government-driven Smart Data schemes versus those that would occur naturally or through existing commitments.

2.3.3 How do the selected Smart Data use cases contribute to the UK Government's mission to "kickstart economic growth", as measured by GDP?

To calculate indicative impacts on growth we modify our Net Present Value calculations by focusing exclusively on market benefits that represent new economic value creation within the UK economy and therefore contribute to GDP. This means we only include costs and benefits that can be directly valued through market prices and represent a net increase in measured economic activity, while excluding non-monetisable impacts such as social benefits (carbon prices, Quality-Adjusted Life Year (QALYs) etc.).

The model will include analysis of relevant supply-side effects. Supply-side effects include changes in supplier behaviour, industry innovation, and market structure.

Due to complex economic interconnections, we use a conservative approach when attributing growth effects to Smart Data initiatives. We only include macro-economic impacts that directly link to measurable micro-level changes in costs or benefits, supported by empirical evidence. For instance, we count productivity gains only when specific business process improvements can be demonstrated, rather than assuming broad sector-wide effects.

Our analysis excludes demand-side effects when calculating GDP impacts from Smart Data use cases. This approach aligns with HM Treasury and Office for Budget Responsibility (OBR) methodology to avoid double-counting, as these bodies model economy-wide demand effects separately. While demand-side effects are excluded from GDP calculations, they remain included in our Net Present Value (NPV) calculations and are discussed qualitatively in our commentary around the headline figures.

2.3.4 What is the indicative projected net social value and GDP contribution of the associated Smart Data schemes?

While legislation and regulatory frameworks could be implemented at the level of sector-wide Smart Data schemes, our primary analysis focuses on the costs and benefits of specific Smart Data use cases. To understand the likely economic impact of Smart Data schemes, we therefore use a use case's estimated share of scheme-level impacts to 'scale up' our analysis from individual use cases to the overall 'scheme level.'

Given the inherent uncertainty in estimating a use case's share of scheme-level impacts, we employ a triangulation methodology that draws on multiple approaches to arrive at more robust estimates, including drawing on: (1) a breakdown of API calls from Open Banking, (2) a longlist of potential Smart Data use cases in each sector, and (3) qualitative judgements from three separate members of the research team.

To avoid false precision while acknowledging the uncertainty in our estimates, we employ a "T-shirt sizing" approach where use cases are classified into broad size categories based on their estimated share of scheme-level impacts. The size categories are:

1. **Small:** 7.5% of scheme-level impacts
2. **Medium:** 22.5% of scheme-level impacts
3. **Large:** 50% of scheme-level impacts

For each size category, we define plausible ranges and use probabilistic modelling to understand how variations within these ranges affect our overall value estimates. This provides more meaningful and defensible results than attempting to specify exact percentages.

2.4 Key Assumptions

Through Monte Carlo simulation and sensitivity analysis of our modelling approach, we have identified several critical assumptions that significantly drive both net social value and GDP estimates across all use cases.

Market adoption patterns consistently emerge as the most sensitive assumption across all use cases. Our projections follow an S-curve pattern (showing slow initial adoption, followed by rapid mainstream uptake, and eventual levelling off as the market saturates), validated through multiple sources: historical Open Banking adoption trajectories since 2018, survey data from 100 UK consumers on adoption intentions, and extensive stakeholder interviews validating adoption assumptions.

Implementation costs and timelines emerged as another key driver of our final estimates. Our baseline approach leverages the example of Open Banking, although this is likely to be a conservative estimate due to declining technology costs, improved standards, and better security protocols. We adjust implementation costs based on each sector's relative size, measured through sector Gross Value Added (GVA) and number of large firms compared to banking. Where available, we refined these estimates using stakeholder interview data to break out specific components including API development and maintenance, security infrastructure, and data standardisation efforts.

Economic conditions rely on ONS datasets as baselines, including sector GVA estimates for supply-side changes, total actual weekly hours worked for labour activity, and gross capital stocks for baseline capital levels. The Cobb-Douglas production function – a macroeconomic model that shows how output depends on capital (like machines and equipment), labour (workforce) and productivity – incorporates ONS-derived capital and labour weights for supply-side estimates. This widely-used function helps understand how changes in these inputs affect total production. For calculating the wider economic effects of consumer time savings – in addition to the value of increase leisure time – we assume that 40% of consumer time savings convert to productive economic activity.[12] For consumer cost savings, we assume that the marginal propensity to consume is similar to the Bank of England's 11-12% estimate[13], and all saved capital freed through efficiency gains is productively reinvested in the following year.

The research also assumes that the use cases analysed within this report are part of mandated schemes, using the DUA Act. This is an assumption made to understand the potential secondary legislation impacts but any mandated Smart Data schemes will require further policy and analytical work including consultation and impact assessments.

One area that will need to be clarified as schemes progress relates to the existence and type of charging allowed within the scheme. Within this report, assumptions were made around charging and commercial models within Smart Data schemes. The key assumptions were:

1. Data Holders will not charge ATPs for access to the data.
2. ATPs can charge for access to their services. Where the use cases in this report are already under development within industry, this research aimed to replicate the commercial models proposed by industry, where these are known. These assumptions are:

    a. Digital information for homebuying – This use case does not charge the consumer for access to the service; however, the ATPs do charge either commission or fixed service fees to the Property Service Providers who gain customers or offer improved services through the use case.

    b. Digitising trade finance – Within this use case, it is assumed that the ATP will charge membership fees for the service to the following actors within the use case: Exporters, Importers, Transport and Storage Companies, Banks, Financial Institutions and Insurers.

[12] Aksoy et al., 2023. Time Savings When Working From Home.
[13] Bank of England, 2022. Financial Concerns and the Marginal Propensity to Consume in Covid times.

c. Consumer experience of online groceries – The use case does not charge the consumer for access to the service; however, the analysis assumes that products bought from Online Grocery Retailers would be subject to a commission fee from the ATP.

d. Supporting green home upgrades – This use case does not charge the consumer for access to the service; however, the analysis assumes that Construction Services are charged a commission fee from the ATP for any business they receive due to the use case

e. Verified electricity emissions reporting for SMEs – Within this use case, the analysis assumes that both SMEs and Banks and Financial Services will pay membership fees to the ATP to access the service.

Although the research makes these assumptions, the future reality could be different which would change the distribution of costs and benefits among different parties engaged with any Smart Data scheme. The DUA Act allows for different commercial models to be explored and, ahead of future scheme development, further policy and analytical work will be completed to understand whether charging and commercial models should be introduced within individual Smart Data schemes and, if so, what this should look like.

Further information on assumptions and use of Green Book methodology can be found in Technical Annex C and B.

3. Findings

This analysis estimates that the 5 Smart Data use cases in question could deliver **£26.3 billion of net social value** to the UK in the 15 years from 2028-2043 (2028 prices), alongside making a **£3.6 billion contribution to annual GDP** by 2043. Use cases which digitise information for homebuying and improve consumer experience of online groceries appear to offer the largest potential net social value (£14.1 billion and £7.2 billion respectively). While digitising information for homebuying is also projected to be the largest contributor to GDP (£2.1 billion by 2043), digitising trade finance is projected to have the second largest contribution to GDP (£0.9 billion), with a more modest contribution for consumer experience of online groceries (£0.3 billion).

Analysis of benefit-cost ratios across the five use cases demonstrates strong economic viability, with all use cases showing ratios significantly above 1.0. Digital information for homebuying shows the highest return on investment with a benefit-cost ratio of 9.81, meaning that for every £1 of cost incurred, nearly £10 in benefits are generated. Even the use case with the lowest ratio – verified electricity emissions reporting for SMEs at 4.84 – still shows substantial positive returns. These ratios reflect the efficiency of Smart Data interventions in creating value, with relatively modest costs compared to the substantial benefits generated through improved market efficiency, environmental benefits, and enhanced consumer experiences.

Use Case	Benefit/Cost Ratio
Digital information for homebuying	9.81
Digitising trade finance	6.50
Consumer experience of online groceries	5.21
Supporting green home upgrades	5.26
Verified electricity emissions reporting for SMEs	4.84

Further analysis reveals that comprehensive government legislation – represented by the Do Max scenario – is crucial for unlocking this potential value. Across all five use cases, the Do Max scenario consistently delivers substantially higher economic and social benefits compared to both Business-as-Usual and Do Minimum approaches. Our research with market participants found that without legislative requirements, market participants often lack sufficient incentives to voluntarily share data or invest in digital infrastructure, leading to slower or more fragmented adoption.

The value of Smart Data unlocked by current planned initiatives (Do Min scenarios) varies significantly across the different use cases. For verified electricity emissions reporting, Ofgem's planned Consumer Consent initiative means that Do Min still captures 64% of Do Max value by providing a standardised framework for energy data sharing. Similarly, digitising trade finance maintains significant value under Do Min (18% of Do Max) due to market participants' existing incentives to adopt digital solutions. However, both digital homebuying and online groceries use cases show minimal or no value under Do Min, with homebuying achieving just 3.5% of Do Max value and online groceries delivering no benefits without legislative requirements. It is important to note that this assessment was undertaken prior to the announcement of Government's reform package for home buying and selling[14]. These findings demonstrate that while existing regulatory

[14] MHCLG, 2025 Home buying and selling reform

initiatives and market forces can drive adoption in some sectors, achieving transformative benefits across the economy requires the comprehensive approach enabled by full Smart Data legislation.

Use Case	Do Max	Do Min	Business As Usual
Digital information for homebuying	NPV: £14.08bn GDP: £2.06bn	NPV: £0.49bn GDP: £0.27bn	NPV: £0.00bn GDP: £0.00bn
Digitising trade finance	NPV: £3.61bn GDP: £0.93bn	NPV: £0.66bn GDP: £0.22bn	NPV: £0.66bn GDP: £0.22bn
Consumer experience of online groceries	NPV: £7.19bn GDP: £0.26bn	NPV: £0.00bn GDP: £0.00bn	NPV: £0.00bn GDP: £0.00bn
Supporting green home upgrades	NPV: £0.75bn GDP: £0.09bn	NPV: £0.44bn GDP: £0.09bn	NPV: £0.00bn GDP: £0.00bn
Verified electricity emissions reporting for SMEs	NPV: £0.68bn GDP: £0.22bn	NPV: £0.44bn GDP: £0.17bn	NPV: £0.09bn GDP: £0.03bn
Total	**NPV: £26.31bn** **GDP: £3.56bn**	**NPV: £2.02bn** **GDP: £0.75bn**	**NPV: £0.74bn** **GDP: £0.25bn**

Extrapolating from those use case-specific estimates, Smart Data schemes in homebuying, international trade, retail and energy could deliver **£71.2 billion of net social value** to the UK from 2028-2043 and make a **£9.6 billion annual contribution to GDP** by 2043. Since our analysis only considered four potential Smart Data schemes, these estimates are broadly in-line with previous estimates.[15] These estimates build on the impact assessment of the Data (Use and Access) Act, which provides a £10 billion NPV estimate over 10 years in 2024 prices for a broader package of data reforms, although the impact assessment does not include the economic impact of Smart Data, which will instead be conducted in future impact assessments alongside sector-specific secondary legislation[16]. While the Smart Data use cases can function independently, Open Finance would enhance their impact. For example, Open Finance would streamline mortgage applications in homebuying by providing access to financial records, improve credit assessments in trade finance through comprehensive business data, and support cross-sector data sharing for emissions reporting in energy.

The analysis suggests the greatest net social value could be seen from Smart Data schemes in homebuying (£28.7 billion) and retail (£24.6 billion), with lower net social value offered by Smart Data schemes in energy (£9.5 billion) and international trade (£8.4 billion). Meanwhile, the greatest GDP contributions could come from Smart Data in homebuying (£4.2 billion), with moderate GDP contributions from Smart Data in international trade (£2.1 billion) and energy (£2.1 billion) and significantly lower GDP contributions in retail (£1.1 billion).

[15] Ctrl Shift, 2018. Data mobility: The data portability growth opportunity for the UK economy.
[16] Department for Science, Innovation and Technology, Department for Business and Trade and Department of Health and Social Care, 2024. Data (Use and Access) Bill: impact assessment

Use case estimates	Total NPV (2028-2043)	Annual GDP contribution (by 2043)		Scheme estimates	Total NPV (2028-2043)	Annual GDP contribution (by 2043)
Digital information for homebuying	£14.1 bn	£2.1 bn	→	Homebuying	£28.7 bn	£4.2 bn
Digitising trade finance	£3.6 bn	£0.9 bn	→	International trade	£8.4 bn	£2.1 bn
Consumer experience of online groceries	£7.2 bn	£0.3 bn	→	Retail	£24.6 bn	£1.1 bn
Supporting green home upgrades	£0.7 bn	£0.1 bn		Energy	£9.5 bn	£2.1 bn
Verified electricity emissions reporting for SMEs	£0.7 bn	£0.2 bn	→			
Total[17]	**£26.3 bn**	**£3.6 bn**		**Total**	**£71.2 bn**	**£9.6 bn**

The remainder of this section outlines our findings for each of the five use cases we assessed in more detail. For each use case, we provide a response to our primary research question before addressing each of our four secondary research questions.

3.1 Digital information for homebuying

3.1.1 Use case summary and value chain

The homebuying and selling process in the UK is often slow, opaque, and prone to failure, leading to frustration for buyers, inefficiencies for property professionals, and financial losses across the sector. This Smart Data use case envisions an Authorised Third Party enabling real-time, secure sharing of verified property information by providing digital property packs to homebuyers, property service providers and mortgage lenders. This property pack could include material facts at the point of marketing (for example, address and property type) and additional legal information (for example, legal boundaries, smart home systems). By streamlining data flows between key stakeholders, this initiative aims to reduce transaction failures, cut costs, and enhance market liquidity.

Several data flows and associated costs and benefits were excluded from the scope of our analysis to maintain a focused and manageable assessment. The analysis did not consider utilities data (including EPCs, smart meter data, broadband speeds/availability, and water/sewage information); this was because interviews did not consider them essential for use case roll-out and also avoided overlap with other use cases. Additionally, the potential productivity benefits from Smart Data-enabled analytics for property platforms and lending insights for banks/lenders were kept out of scope, as their expected benefits would be hard to reliably quantify. Another assumption that this research makes is that the Smart Data clauses in the Data (Use and Access) Act provide a legal basis for the sharing of the data required for digital information for homebuying

[17] Please note figures in this table may not sum to totals due to rounding.

use case, as defined by this research. If the Government were to decide to implement a Smart Data scheme in the property sector, the exact data that would be included in the scheme would be discussed further as part of a consultation and would need to be set out in secondary legislation. This analysis estimates the benefits and costs based on the assumption that the necessary data for this use case would be unlocked using either the DUA Act or other vehicles.

The table below provides a summary of the use case's data flows for key actors, and their associated costs and benefits considered by our analysis. This does not include the costs and benefits associated with actors that don't actively participate in data exchanges (scheme governance, wider economy etc.).

Within this analysis, we assume that the use case does not charge the consumer for access to the service; however, the ATPs do charge either commission or fixed service fees to the Property Service Providers who gain customers or offer improved services through the use case. Although the research makes these assumptions, the future reality could be different which would change the distribution of costs and benefits among different parties engaged with any Smart Data scheme.

Actor	Data flows	Costs & Benefits
Standard Industrial Classification: Consumers		
Home sellers	**Provides:** Property details to estate agents; Ownership transfer to conveyancer; Consent for data sharing to ATPs.	**Benefits:** • Quantified: Willingness to pay for reduced stress from faster exchanges and better purchase decisions • Quantified: Increased leisure time from reduced admin • Quantified: Fewer failed transactions • Not Quantified: Reduced sunk costs
Home buyers	**Receives:** Initial property listings from estate agents; Comprehensive digital property packs from ATPs; Transaction updates from ATPs; Transfer of ownership from conveyancer. **Provides:** Mortgage application to mortgage lenders.	
Standard Industrial Classification: Government		
HM Land Registry	**Provides:** Property titles and deeds to ATPs.	**Costs:** • Quantified: Development of APIs • Quantified: Digitalisation of records • Quantified: Monitoring compliance **Benefits:** ▪ Quantified: Reduced administrative burden and more efficient processing
Local Authorities	**Provides:** Local Land Charges data (LLC1) to ATPs, revealing any charges or obligations affecting a property; CON29 data (standard set of enquiries used in property conveyancing) to ATPs, covering additional property information (e.g. planning history, building control regulation).	
Standard Industrial Classification: Property service providers		

Estate Agents	**Receives:** Comprehensive digital property packs from ATPs. **Transfers**: Property details from home sellers to ATP. **Provides**: Initial property listings to homebuyers.	**Costs:** • Quantified: Set-up costs including staff training, process redesign and platform integration • Quantified: Commission / fees paid to Authorised Third Parties **Benefits:** • Quantified: Faster transaction cycles, Increased productivity and streamlined processes • Quantified: Fewer failed transactions • Quantified: Increased price of services reflecting value-added services
Conveyancers	**Receives:** Comprehensive digital property packs from ATPs. **Provides:** Transfer of ownership records to home sellers, home buyers and ATPs.	
Standard Industrial Classification: Financial services		
Mortgage Lenders	**Receives:** Comprehensive digital property packs from ATPs; Mortgage applications from home buyers.	**Costs:** • Quantified: System updates for mortgage processing and API integration **Benefits:** • Quantified: Better risk assessment • Quantified: Increased liquidity from faster transaction cycles and fewer failed transactions • Quantified: Increased pipeline conversion from fewer failed transactions and faster transaction times
Standard Industrial Classification: Authorised Third Parties (ATPs)		
Authorised Third Parties (ATPs)	**Receives**: Consent for data sharing from home seller; Property titles and deeds from HM Land Registry; Local Land Charges data (LLC1) and CON29 data from Local Authorities; Property details from estate agents; Transfer of ownership records from conveyancers. **Provides:** Comprehensive digital property packs to home buyers, estate agents, conveyancers and mortgage lenders.	**Costs:** • Quantified: Set-up costs (incl. platform and security protocols development) • Quantified: Ongoing costs (incl. customer support, and consent management) **Benefits:** • Quantified: Commission / fees paid from Property Service Providers

Please note that this is not an entirely comprehensive list of the actors involved in homebuying and selling transactions, and therefore potential actors in this use case. In particular, property search providers are excluded as a separate entry in the list above as they may be prime candidates for

adopting ATP roles in this use case. Mortgage advisors are also excluded as we had limited information to estimate the costs and benefits for them, and these costs and benefits are not expected to be material for the use case value as a whole.

Beyond the direct actors involved in data flows, this use case is expected to generate significant broader economic value through several channels. Our analysis has quantified multiple benefits, including job creation throughout the property value chain and wider economy as transaction volumes increase, an increase in labour supply from consumer time savings, and an increase in capital stock resulting from greater consumer savings.

Additionally, there are several potential benefits that, while not quantified in our analysis, could have substantial impact. These include enhanced stability of the financial system through reduced property transaction failures and improved transparency (which decreases systemic risk), as well as innovation and growth in the property technology sector as new services are enabled by standardised property data access.

3.1.2 What is the potential net value to UK society of implementing each of the use cases over fifteen years from implementation?

Our analysis projects that this use case could deliver **£14.1 billion in Net Present Value (NPV) to the UK** over the 15-year period from 2028 to 2043. This equates to an average of £939 million in annual value, stemming from increased efficiency, reduced transaction failures, and improved market liquidity. With a benefit-cost ratio of 9.81, this use case demonstrates exceptional value for money in terms of returns relative to costs incurred by actors.

Top three benefits (NPV impact):

1. Greater efficiency in property transactions for estate agents and conveyancers, reducing administrative burdens and delays.
2. Fewer failed transactions, cutting wasted costs for property service providers and consumers.
3. Enhanced liquidity for financial services businesses, as reduced transaction failures free up capital previously earmarked for mortgages that do not proceed.

Top three costs (NPV impact):

1. Developing digital property records within government, including digitising Local Land Charges data (LLC1) and CON29 data currently held in a variety of formats across local authorities.
2. Creating APIs to facilitate seamless data sharing among property service providers.
3. Ongoing maintenance of government digital records to ensure accuracy and reliability over time.

3.1.3 How is the projected net value of the use case distributed between different market actors?

This Smart Data scheme would generate benefits across multiple sectors, with the most significant gains potentially seen by property service providers, financial services businesses, and homebuyers. However, government entities will likely bear large implementation costs: developing and maintaining digitalised property records required for the homebuying process, including LLC1 and CON29 data, will be expensive. This information is currently held in a variety of formats across Local Authorities, including in paper-based records in many instances, and will require substantial investment from HM Land Registry and Local Authorities to enable this use case.

It is important to note that part of the process of opening up the LLC1 data has already started. HM Land Registry's Local Land Charges (LLC) programme[18] is an ambitious geospatial data programme, transforming the LLC services currently delivered separately by 331 local authorities in England and Wales by transforming and digitising more than 25m data items into a single national digital LLC Register. This new LLC Register and search service provides instant, high quality data and standardised search fees, saving an average of over 12 days and nearly £11 per search. By September 2025, 127 local authorities had transferred to the Local Land Charges Register, with 3 more in the pipeline.

In terms of CON29 data, the Ministry of Housing, Communities and Local Government (MHCLG) is working with HM Land Registry, holding pilots with 9 local authorities, testing the impact of improving access to key data in the home buying and selling process.[19] Centred on local searches, which are carried out by buyers' conveyancers once an offer has been accepted, the pilots are focusing on two data categories which frequently cause delays in CON29 searches; highways and building control data. The pilots will last for 10 months, completing in spring 2026.

Actor	Potential Net Present Value (2028 – 2043)
Property Service Providers (estate agents and conveyancers)	**+ £6.09 billion** – Driven by efficiency gains and fewer failed transactions.
Consumers (Homebuyers & Sellers)	**+ £1.73 billion** – Due to a smoother homebuying and selling process, reduced stress and fewer failed transactions.
Financial Services	**+ £1.70 billion** – Freed-up capital from reduced mortgage transaction failures enables reinvestment.
Government	**- £765 million** – Primarily covering digitalisation and data maintenance costs.
Scheme Governance	**- £260 million** – Costs related to establishing and governing the Smart Data scheme.
Authorised Third Parties	**+ £920 million** – Revenue generated from managing secure data-sharing platforms.
Whole Economy Impact	**+ £4.66 billion** – Wider benefits from improved market efficiency and spillover effects.
Total	**+ £14.08 billion**

3.1.4 What proportion of the use-case's projected net social value is likely to occur without a corresponding Smart Data scheme, either through ongoing market activity ('Business As Usual') or existing government commitments ('Do Minimum')?

In the "Business-as-Usual" scenario, no government intervention occurs to establish a Smart Data scheme for homebuying. This assumes existing paper-based processes continue, with no coordinated effort to digitise property information or streamline data sharing between stakeholders.

[18] HM Land Registry (2025): Local Land Charges Programme
[19] HM Land Registry (2025): HM Land Registry launches new property data pilot

Under this scenario, we project zero additional net social value or GDP contribution, as the status quo inefficiencies in the homebuying process persist.

The "Do Minimum" scenario envisions MHCLG pursuing plans to digitalise property records independently, without a coordinated Smart Data scheme. This scenario focuses primarily on basic efficiency improvements from government digitalisation while excluding broader benefits that would come from mandatory data sharing, such as enhanced market liquidity or revenue gains from new business models, as financial services and property services have no requirement to share data. This scenario also assumes lower adoption (half that of the "Do Maximum" scenario) and a longer 5-year implementation period. Key assumptions include, due to reduced incentives:

- Government digitalisation of LLC1 and CON29 data, though with slower implementation
- Basic time savings for consumers through streamlined processes
- Supply-side efficiency gains for property service providers and financial services businesses
- Limited government efficiency improvements in data management

Our analysis suggests the "Do Minimum" scenario could deliver £491 million in Net Present Value over the 15-year period (2028-2043), representing 3.5% of the value achieved in the Do Maximum scenario. Property service providers are expected to see the largest gains (£833 million NPV) offset by significant government costs (£978 million NPV) for digitalisation. The GDP contribution under this scenario reaches £272 million annually by 2043.

However, this represents only a fraction of the potential benefits available under full scheme implementation. The "Do Minimum" scenario excludes several valuable benefits, including:

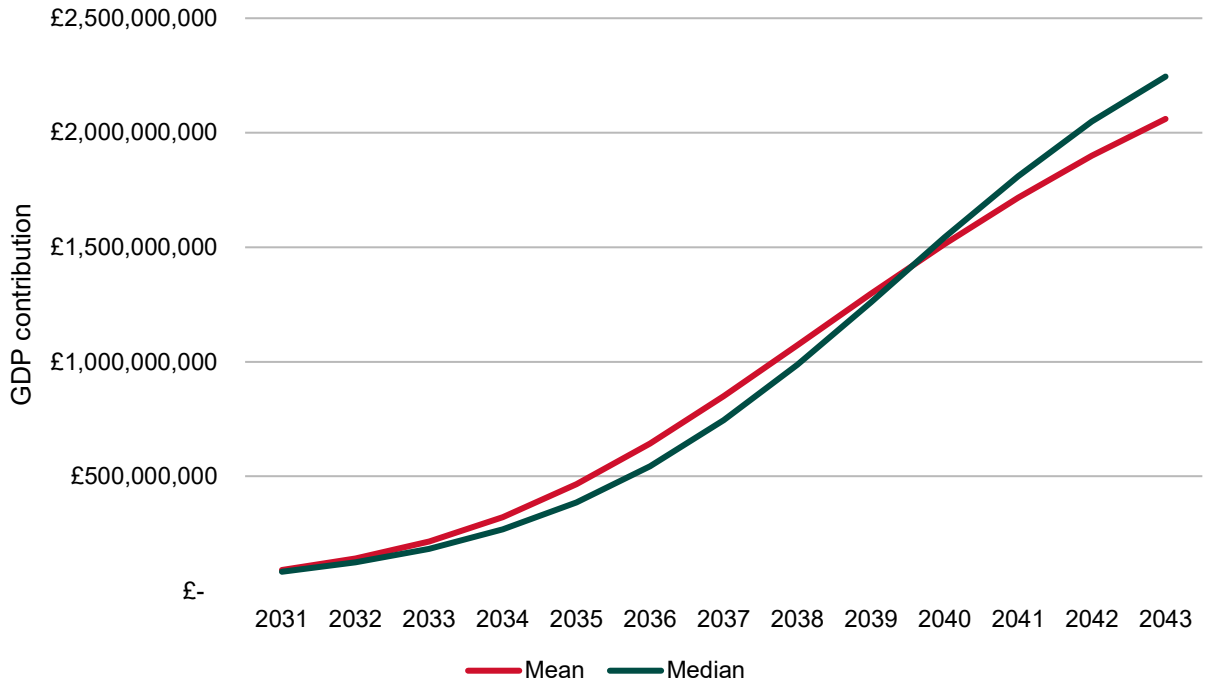
- Enhanced market liquidity benefits for financial services businesses
- Revenue opportunities from new business models and services
- Broader economic gains from increased market efficiency
- Net social value improvements from reduced stress and uncertainty for homebuyers

This comparison demonstrates that while even limited intervention can deliver positive returns, a more comprehensive Smart Data scheme implementation would unlock significantly greater economic and social benefits.

3.1.5 How does this use case contribute to the UK Government's mission to "kickstart economic growth", as measured by GDP?

Our analysis suggests this use case could offer a sizeable boost to the UK economy, adding £2.1 billion annually to GDP (0.07% of GDP in 2024)[20]. The impact begins modestly in 2031 (£91 million) but accelerates rapidly, crossing £465 million by 2035 and £1.51 billion by 2040. The greatest increases in GDP contribution year-on-year are seen from 2038-2040, after which growth in GDP contribution begins to slow as the year-on-year increase in the number of property transactions serviced by the use case begins to slow. This GDP growth is primarily driven by enhanced productivity in property services and increased liquidity for financial services, enabling reinvestment capacity in the mortgage market.

[20] House of Commons Library, 2025. Gross domestic product (GDP): Economic indicators. Calculated using 2024 UK GDP data (GDP = £2,848 billion)



3.1.6 What is the indicative projected net social value and GDP contribution of the associated Smart Data scheme?

Scaling up from the Net Present Value of this use case, we estimate that a full-fledged Smart Data scheme in homebuying could unlock **£28.7 billion in net social value** for the UK between 2028 and 2043. Using the same approach, we estimate the GDP contribution of a Smart Data scheme in homebuying will be approximately **£4.2 billion** by 2043 (0.15% of GDP in 2024).[21]

While these estimates provide valuable insights, they should be interpreted with caution. Since they rely on scaling up the value offered by individual use cases to a scheme level, they are highly uncertain (see Section 2.1.2 for more detail on this methodology). The digital information for homebuying use-case was assumed to represent ~50% of a Smart Data scheme in the property sector, based on comparisons to Open Banking, a long-list of potential use-cases and qualitative assessments. Indeed, at the 95% confidence level, our analysis suggests that the NPV contribution of a Smart Data scheme in homebuying from 2028-2043 could fall anywhere between £4.2 billion and £56.8 billion. Similarly, our analysis suggests the positive GDP impact could fall between £1.2 billion and £6.4 billion.

However, importantly, all of the 1000 scenarios modelled suggested a homebuying Smart Data scheme would have a positive impact on GDP, indicating this may be a low-risk, high-reward scheme.

3.1.7 Discussion

A Smart Data scheme in homebuying has the potential to transform the UK property market: reducing friction, increasing the liquidity of property as an asset, and unlocking billions in economic value. While the government must bear large upfront digitalisation costs, the long-term gains make this an attractive investment in economic growth.

[21] House of Commons Library, 2025. Gross domestic product (GDP): Economic indicators. Calculated using 2024 UK GDP data (GDP = £2,848 billion)

The economic modelling of digital information for homebuying faces several underlying uncertainties. These include variability in adoption rates across different stakeholders, challenges in predicting implementation timelines given the complex ecosystem of participants, and difficulties in quantifying benefits that depend on behavioural changes. A particular area of uncertainty is the pace of local authority digitalisation, which is essential to realise the benefits of Smart Data within the property sector.

For the adoption rate, all eligible respondents indicated that they would be interested in participating in the use-case. However, since adoption is dependent on both property service providers and consumers, we used a more prudent assumption based on Open Banking. On average, the number of participating users, as a share of home sellers, is estimated to grow from 3.66% in 2031 (the first year post implementation), to 8.55% in 2033, to 40.91% in 2038, and 75.66% in 2043.

The analysis highlights particular challenges around benefits realisation for government entities. While property service providers and consumers stand to gain from efficiency improvements and reduced transaction failures, government organisations face significant costs for developing and maintaining digitalised property records. The economic case rests heavily on achieving sufficient scale and standardisation across local authorities to justify these upfront digitalisation investments.

Crucially, simple digitalisation of records would not be sufficient to realise these projected benefits. The "Do Minimum" scenario, which envisions basic digitalisation without such requirements, would deliver only a fraction of the potential benefits – demonstrating that a full Smart Data scheme with proper legislative backing is necessary to achieve the projected economic gains, in addition to digitalising property records.

3.2 Digitising trade finance

3.2.1 Use case summary and value chain

International trade is still burdened by slow, paper-based processes that create inefficiencies, increase costs, and delay transactions. This use case envisions a Smart Data scheme that facilitates the secure sharing of electronic trade documents (e.g. bills of lading), manifest data (e.g. descriptions of goods), and payment records (e.g. settlements between trading parties) through an Authorised Third Party, when goods arrive in or leave the UK. By streamlining document processing and enhancing due diligence, this initiative aims to accelerate trade transactions, improve liquidity, and combat fraud.

Whilst a Smart Data scheme can be implemented independently by the UK, achieving its full potential requires international cooperation through digital trade agreements or alignment with the UNCITRAL Model Law on Electronic Transferable Records (MLETR). These frameworks are essential because they provide the legal foundation for electronic trade documents to be recognised across borders, enabling complete automation and digitalisation of trade finance processes. For our analysis, we assume the UK implements the Smart Data scheme for goods it receives, but due to the current lack of international agreements, similar benefits cannot yet be realised for goods received by trading partners.

Several important actors and dataflows were excluded from our analysis of this use case to maintain focus. These included the potential for Smart Data to enable detailed supply chain tracking beyond basic manifest data, which could be leveraged for improved carbon emissions data, human rights/ethics compliance and tariff compliance and reporting. Given the complexity of international trade negotiations, our analysis focuses on expected benefits from bilateral trade

between the UK and four key trading partners, identified by stakeholder interviews as the focus of the Ubiquitech pilot: the US, Australia, New Zealand, and Singapore.[22]

The table below provides a summary of the use case's data flows for key actors and their associated costs and benefits considered by our analysis. Further information can be found in the Smart Data Discovery Challenge.[23] This does not include the costs and benefits associated with actors that don't actively participate in data exchanges (scheme governance, wider economy etc.).

Within this use case, it is assumed that the ATP will charge membership fees for the service to the following actors within the use case: Exporters, Importers, Transport and Storage Companies, Banks, Financial Institutions and Insurers. Although the research makes these assumptions, the future reality could be different which would change the distribution of costs and benefits among different parties engaged with any Smart Data scheme.

Actor	Data Flows	Costs & Benefits
Standard Industrial Classification: Exporters		
Exporters	**Provides:** Manifests; customs declarations; invoices; bills of exchange (written payment orders used in international trade) to ATPs **Receives:** Electronic trade documents; faster processing	**Benefits:** • Quantified: Liquidity benefit from faster access to working capital **Costs:** • Quantified: Conversion to digital • Quantified: Platform procurement • Quantified: Service add-on • Quantified: Membership fees paid to ATPs
Standard Industrial Classification: Importers		
Importers	**Provides:** Purchase orders; import documentation **Receives:** Electronic trade documents; faster processing	**Benefits:** • Quantified: Improved productivity from faster due diligence • Quantified: Improved productivity from faster customs checks • Quantified: Liquidity benefit from faster access to working capital **Costs:** • Quantified: Conversion to digital • Quantified: Platform procurement • Quantified: Service add-on • Quantified: Membership fees paid to ATPs

[22] Department for Business & Trade, 2025. Smart Data Discovery Challenge: significant insights and outcomes.
[23] Department for Business & Trade, 2025. Smart Data Discovery Challenge: significant insights and outcomes.

Standard Industrial Classification: Transport & Storage		
Transport & Storage Companies	**Provides:** Shipping documents; warehousing records **Receives:** Electronic documentation; status updates	**Benefits:** • Quantified: Improved productivity from faster customs checks **Costs:** • Quantified: Conversion to digital • Quantified: Platform procurement • Quantified: Service add-on • Quantified: Membership fees paid to ATPs
Standard Industrial Classification: Financial services		
Banks & Financial Institutions	**Provides:** Letters of credit; bank guarantees; payment processing. **Receives:** Verified trade documentation.	**Benefits:** • Quantified: increased revenue from better risk assessment • Quantified: Improved productivity from faster due diligence • Not Quantified: Reduced fraud-related insurance claims **Costs:** • Quantified: Platform procurement • Quantified: Membership fees paid to ATPs
Insurers	**Provides:** Insurance policies; risk assessments **Receives:** Verified trade documentation	
Standard Industrial Classification: Government		
Customs Authorities	**Receives:** Digital customs declarations; automated duty calculations. **Provides:** Customs clearance; verification.	**Benefits:** • Quantified: Increased revenue from reduced fraud • Quantified: Reduced costs from more efficient processing **Costs:** • Quantified: Set-up costs • Quantified: Monitoring costs
Standard Industrial Classification: Authorised Third Parties (ATPs)		
Authorised Third Parties (ATPs)	**Receives:** All trade documentation; consent. **Provides:** Verified digital document packages; payment processing status.	**Costs:** • Quantified: Platform development • Quantified: Ongoing costs, including customer support and consent management systems **Benefits:** • Quantified: Membership fees • Not Quantified: Data analytics opportunity

Beyond the direct actors involved in data flows, this use case generates substantial broader economic value through several quantified channels. This includes increased employment in the sectors benefiting from or facilitating imports/exports and wider multiplier effects from the improved productivity and increased returns enjoyed by importers and trade finance.

Additionally, there are several potential benefits that, while not quantified in our analysis, could have substantial impact. These include enhanced stability of the global trading system through reduced fraud and improved transparency (which decreases systemic risk), as well as innovation and growth in the trade finance sector as new services are enabled by standardised trade document access. The use case may also strengthen London's position as a centre for trade finance by demonstrating leadership in digital trade infrastructure.

3.2.2 What is the net value to UK society of implementing each of the use cases over fifteen years from implementation?

This use case is projected to deliver **£3.6 billion of Net Present Value to the UK over 15 years** between 2028 and 2043 – equating to an average annual benefit of £241 million. With a benefit-cost ratio of 6.50, this use case demonstrates good value for money in terms of benefits relative to costs incurred by actors.

Top three benefits (NPV impact):

1. Efficiency gains for transport and storage companies through faster document processing, reducing reliance on paper-based systems.
2. Productivity improvements in financial services from expedited due diligence when offering trade finance instruments.
3. Productivity improvements for importers, due to smoother customs processes and faster due diligence.

Top three costs (NPV impact):

1. Transition costs for exporters, importers, and logistics providers shifting from paper-based to digital systems.
2. Subscription fees for trade participants to access the digital system and enable data sharing.
3. Government implementation costs, especially in establishing customs systems and processes which automatically ingest data from other parties.

3.2.3 How is the projected net value of the use case distributed between different market actors?

The benefits of digitising trade finance are distributed unevenly across market participants. Transport and storage companies, financial services businesses, and importers all see substantial gains. However, exporters face initial challenges as they would bear the costs of digitalisation and membership fees while receiving limited benefits, since our analysis only considers efficiency gains from UK-inbound trade (as noted earlier, this reflects our assumption that benefits can only be realised for goods received by the UK). This leads to a projected net loss for exporters of £437 million.

If the UK successfully establishes digital trade agreements or achieves MLETR alignment with its trading partners, enabling Smart Data systems for both inbound and outbound trade, exporters will realise comparable efficiency benefits to importers through streamlined customs processes abroad. There will also be some costs incurred by government and any scheme governance body to establish and maintain the relevant Smart Data scheme.

Actor	Net Present Value (2028 – 2043)
Transport & Storage	**+ £811 million** – Productivity savings from faster document processing.

Importers	**+ £432 million** – Cost reductions from improved customs clearance and due diligence.
Financial Services	**+ £686 million** – Faster risk assessment enables more efficient trade finance provision.
Exporters	**- £437 million** – Cost of bearing digitalisation and subscription fees while receiving limited benefits since the analysis only considers efficiency gains from UK-inbound trade. However, if the UK establishes digital trade agreements or achieves MLETR alignment with trading partners, exporters would receive comparable benefits to importers through improved customs processing abroad.
Government	**- £39 million** – Implementation and running costs in customs checks.
Scheme Governance	**- £8 million** – Costs related to establishing and governing the Smart Data scheme.
Authorised Third Parties	**+ £530 million** – Revenue generated from managing the digital trade platform.
Whole economy	**+ £1.63 billion** – Wider benefits from efficiency improvements and trade acceleration.
Total	**+ £3.61 billion**

3.2.4 What proportion of the use-case's projected net social value is likely to occur without a corresponding Smart Data scheme, either through ongoing market activity ('Business As Usual') or existing government commitments ('Do Minimum')?

In the "Business-as-Usual" scenario, market participants would gradually adopt electronic trade documentation following the implementation of the UK's Electronic Trade Documents Bill, introduced in 2022. This legislation puts electronic trade documents on the same legal footing as paper documents, enabling organic digitisation of trade finance processes. Under this scenario, we project limited benefits arising primarily from natural technology adoption by transport and storage companies seeking to improve document processing efficiency. This would deliver approximately £223 million in GDP contribution by 2043, or 24% of the potential GDP contribution under full scheme implementation.

Key limitations of the "Business-as-Usual" scenario include:

- No coordinated approach to digital trade documentation, leading to fragmented adoption
- Continued reliance on paper-based processes for many trade finance instruments
- Limited ability to reduce fraud or improve due diligence processes
- No improvement in customs clearance times or efficiency
- Restricted access to working capital for importers and exporters

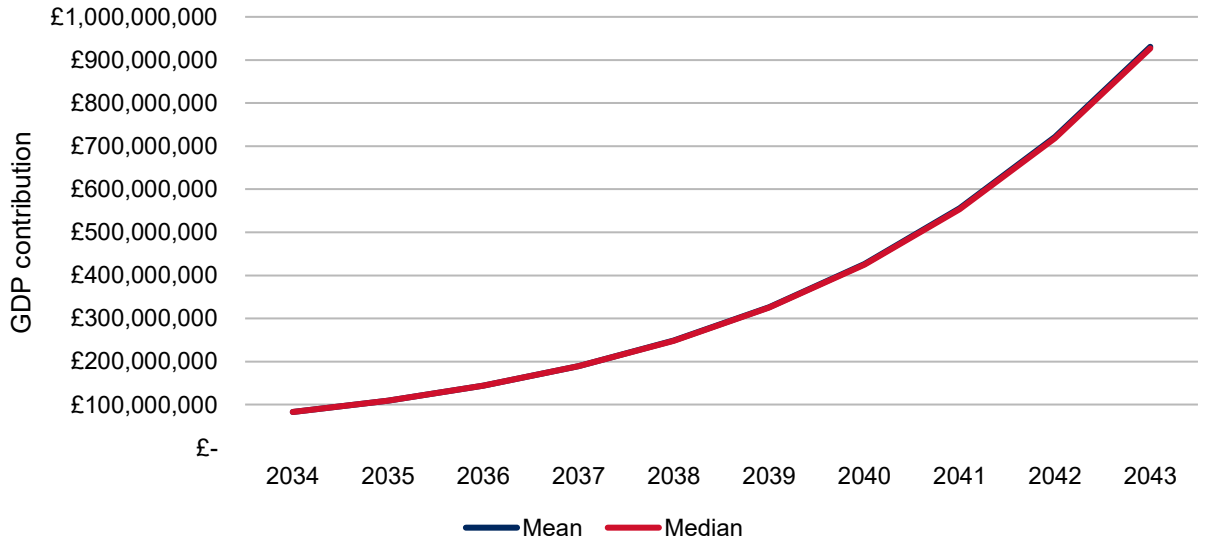
Our analysis suggests the "Business-as-Usual" scenario would deliver £656 million in Net Present Value over the 15-year period (2028-2043), primarily driven by transport and storage companies (£488 million NPV) making independent efficiency improvements. This projection aligns with the

government's impact assessment of the Electronic Trade Documents Bill[24], which estimated an NPV of £1.137 billion over 10 years (2023-2032) in 2019 prices. The difference in valuations reflects varying timeframes, price bases (our 2028 prices are approximately 33%[25] higher than 2019 prices), and scope (our analysis focuses specifically on Smart Data implementation for four trading corridors). When accounting for these differences, both analyses show broadly consistent projections.

For this use case, the "Do Minimum" scenario is assumed to be equivalent to "Business-as-Usual", as meaningful improvements to trade finance processes require coordinated action across multiple stakeholders and cannot be achieved through limited intervention alone. This demonstrates that while organic digitalisation may deliver some benefits, a comprehensive Smart Data scheme is needed to unlock the full potential of digital trade finance.

3.2.5 How does the use case contribute to the UK Government's mission to "kickstart economic growth", as measured by GDP?

This use case makes a large positive contribution to GDP, expected to reach **£931 million per year by 2043 (0.03% of 2024 GDP)[26]**. Significant GDP benefits are first expected to be seen in 2034 with a £83 million GDP contribution. GDP contribution then rises year-on-year in a gentle exponential curve to £427 million by 2040. The GDP benefits arise directly from the large productivity improvements expected across transport and storage companies, importers and financial services businesses.



3.2.6 What is the indicative projected net social value and GDP contribution of the associated Smart Data scheme?

By extrapolating from the Net Present Value of this use case, we can infer that a Smart Data scheme in international trade may offer **£8.4 billion of net social value** to the UK from 2028-2043. As with all scheme-level estimates, this figure carries a high degree of uncertainty, as it has been

[24] Department for Science, Innovation and Technology and Department for Digital, Culture, Media & Sport, 2022. Electronic Trade Documents Bill: impact assessment.
[25] 2019 values are uprated to 2028 prices by applying ONS CPIH inflation for 2019–2024 and 2% p.a. for 2024–2028, i.e. multiplying by $(1 + 0.010) \times (1 + 0.025) \times (1 + 0.079) \times (1 + 0.068) \times (1 + 0.033) \times (1.02)^4 \approx 1.33$.
[26] House of Commons Library, 2025. Gross domestic product (GDP): Economic indicators. Calculated using 2024 UK GDP data (GDP = £2,848 billion)

derived by scaling up the use case value based on estimated proportions of total scheme benefits and costs. Our analysis suggests that, in 95% of simulations, the NPV contribution of this scheme from 2028-2043 could range from £4.6 billion and £13.8 billion.

Following the same methodology, we anticipate that a Smart Data scheme in international trade could **boost the UK's GDP by £2.1 billion** by 2043 (0.07% of GDP in 2024)[27]. Our 95% confidence interval suggests a lower bound for this economic impact of £1.2 billion and an upper bound of £3.3 billion. Encouragingly, as with our estimates for a homebuying Smart Data scheme, no modelled scenarios indicated a negative GDP impact, reinforcing the scheme's strong economic case.

3.2.7 Discussion

Introducing a Smart Data scheme to digitise trade finance could offer large benefits to international trade to and from the UK, creating a more transparent, efficient, and secure trading environment. While exporters may face initial costs if trading partners do not swiftly follow suit, the overall economic impact is overwhelmingly positive. However, the benefits from this use case could be increased significantly further if the international partners were to implement the new scheme in lockstep with the UK, as similar benefits could then be enjoyed by countries receiving exports from the UK.

The model relies on assumptions about adoption rates and implementation timelines that may not fully account for the complex international nature of trade finance. Additionally, the analysis may underestimate the technical challenges of integrating legacy systems across different jurisdictions and the time required for international standardisation of digital trade documentation. The model also doesn't fully capture potential network effects that could accelerate or hinder adoption based on international participation rates.

The decision to limit the analysis to only four trade corridors (US, Australia, New Zealand and Singapore) represents a conservative approach. This focus aligns with the initial Ubiquitech pilot currently being developed, as described by the stakeholders interviewed for this report. However, if the scheme were extended to include major trading partners like the EU, Japan, and emerging economies, the potential benefits could be substantially larger. Our extrapolated scheme values do not consider the potential extension of the scheme to other countries. Were this to occur, the value of the scheme could be substantially higher, as the countries included represent less than 20% of the UK's total trade[28].

The adoption rate was based on Open Banking for banks, importers, exporters and transport and logistics services facilitating trade along the four trade corridors. On average, the number of participants, as a share of businesses importing or exporting goods to the US, Australia, New Zealand and Singapore, is estimated to grow from 0.88% in 2034 (the first-year post implementation), to 2.64% in 2038, and 9.86% in 2043.

The stakeholders interviewed as part of this research indicated that early pilots, relying on screen scraping to achieve similar benefits to a Smart Data scheme, demonstrated that some benefits of the use case could be realised through initial implementations. However, these small-scale demonstrations capture only a fraction of the potential value, as they require broader adoption and integration with official trade documentation systems to achieve full benefits.

Regardless, a critical dependency for realising the benefits is the broader digitalisation of trade documentation, including bills of lading, letters of credit and customs declarations. The UK

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[27] House of Commons Library, 2025. Gross domestic product (GDP): Economic indicators. Calculated using 2024 UK GDP data (GDP = £2,848 billion)
[28] Office for National Statistics, 2024. Balance of Payments.

government is leading this through the Electronic Trade Documents Bill, introduced in 2022[29], which puts electronic trade documents on the same legal footing as paper documents. While market forces alone may drive some progress through platforms like Bolero, comprehensive legislation covering both Smart Data and digital trade documentation would help unlock the full economic potential identified in this analysis.

3.3 Consumer experience of online groceries

3.3.1 Use case summary and value chain

The UK grocery sector is highly competitive, yet consumers often struggle to access comprehensive product information, optimise their spending, and make healthier choices. This use case explores how a Smart Data scheme could enable real-time data sharing between online grocery retailers, consumers, and third parties through an Authorised Third Party (ATP). By providing personalised insights on pricing, nutrition, and sustainability, the use case aims to drive cost savings, improve health outcomes, and reduce food waste.

The scope of our analysis focussed on data flows associated with online business-to-consumer purchasing, excluding in-store activity (e.g. loyalty scheme information) and business-to-business activity (e.g. detailed supply chain tracking and optimisation) to maintain a focused assessment. Additionally, benefits associated with customer incentives and personalisation offers were excluded, as an estimate of increased incentives and personalisation benefits, in addition to those currently offered by individual retailers, could not reliably be obtained.

The table below provides a summary of the use case's data flows for key actors and their associated costs and benefits considered by our analysis. This does not include the costs and benefits associated with actors that don't actively participate in data exchanges (scheme governance, wider economy etc.).

This use case does not charge the consumer for access to the service; however, the analysis assumes that products bought from Online Grocery Retailers would be subject to a commission fee from the ATP. Although the research makes these assumptions, the future reality could be different which would change the distribution of costs and benefits among different parties engaged with any Smart Data scheme.

Actor	Data flows	Costs & Benefits
Standard Industrial Classification: Consumers		
Consumers	**Provides:** Personal preferences; Consent for data sharing; Online grocery account details. **Receives:** Personalised product recommendations; Nutritional insights; Cost-saving opportunities.	**Benefits:** • Quantified: Cost savings from informed choices • Quantified: Time savings from automated shopping • Quantified: Health improvements from better diet • Quantified: Personalisation and consumer preference for low-emissions groceries

[29] Department for Science, Innovation and Technology and Department for Digital, Culture, Media & Sport, 2022. Electronic Trade Documents Bill: impact assessment.

Standard Industrial Classification: Retailers		
Online Grocery Retailers	**Provides:** Stock Keeping Unit (SKU) level data (nutrition, allergens, date labelling, provenance, packaging, emissions); Purchase history data to ATPs. **Receives**: Consumer basket information.	**Costs:** • Quantified: Set-up costs including staff training, process redesign and platform integration / API Development • Quantified: Ongoing running and maintenance costs • Quantified: Commission / fees paid to Authorised Third Parties on products bought through the platform • Quantified: Lost revenue from consumer cost saving **Benefits:** • Quantified: Improved productivity from reduced waste and better demand prediction • Not quantified: Increase in market share for online retail vs offline retail
Standard Industrial Classification: Authorised Third Parties (ATPs)		
Authorised Third Parties (ATPs)	**Receives:** Product data; Purchase history; Personal preferences; Consent; Online grocery account details. **Provides:** Consumer basket information; Personalised recommendations; Nutritional analysis; Cost optimisation insights.	**Costs:** • Quantified: Platform development • Quantified: Ongoing costs, including customer support and consent management systems **Benefits:** • Quantified: Commission / fees paid from Retailers • Not Quantified: Data analytics opportunity

Beyond the direct actors involved in data flows, this use case is expected to generate significant broader economic value through several channels. Our analysis has quantified multiple economic consequences, including job creation and loss throughout the retail value chain, from changes in consumption patterns, an increase in labour supply from consumer time savings, an increase in capital stock resulting from greater consumer savings. We have also quantified the impact of reduced carbon dioxide emissions from reduced food waste and more sustainable purchasing decisions, and reduced government expenditure on health, from improved consumer diets.

Several potential costs and benefits were not quantified but could have an impact. These include potential benefits from increased innovation in retail technology as standardised data access enables new services for health tracking and sustainability monitoring, and improved market data analytics and insights for retailers to optimise pricing, inventory and customer offers. These also include potential costs for non-online retailers associated with the increase in online grocery

shopping, which is typically less profitable than in-store sales due to delivery costs and other operational expenses.

3.3.2 What is the net value to UK society of implementing each of the use cases over fifteen years from implementation?

Our analysis estimates that this use case could generate **£7.2 billion in Net Present Value (NPV) to the UK** between 2028 and 2043, delivering an average annual benefit of £479 million. With a benefit-cost ratio of 5.21, this use case also represents good value for money. However, the benefit-cost ratio is relatively low given the use-case's high net present value – this is likely due to the substantial costs expected to be incurred by retailers.

Top three benefits (NPV impact):

1. Time savings for consumers in meal planning and grocery shopping, freeing up leisure and productive time.
2. Cost savings on grocery spending due to enhanced product information, price comparisons, and better purchasing decisions.
3. Health improvements through increased adoption of healthier diets, measured in Quality Adjusted Life Years (QALYs).

Top three costs (NPV impact):

1. Revenue reductions for grocery retailers, as consumers shift toward lower-cost or alternative products.
2. Commission payments to Authorised Third Parties, paid by retailers to sell and advertise products via the ATP platform.
3. Ongoing scheme administration costs, required to maintain data-sharing infrastructure and compliance.

3.3.3 How is the projected net value of the use case distributed between different market actors?

The majority of benefits from this use case accrue to consumers, with additional gains for the UK government as health improvements for consumers are converted into cost savings for the National Health Service. The wider economy also benefits from spillover effects and reduced carbon emissions (~3 million tCO2e in 2043) However, retailers face revenue losses due to reductions in spending by consumers, implementation costs, and potential commission paid to Authorised Third Parties, which would have knock-on effects throughout the supply-chain. These significant losses for retailers could be mitigated through alternative models for funding schemes and/or alternative commercial models which do not see retailers paying commission to Authorised Third Parties.

Actor	Net Present Value (2028 – 2043)
Consumers	**+ £4.98 billion** – Cost savings, time efficiencies, and improved health outcomes.
Retailers	**- £406 million** – Lower consumer spending, implementation costs and commission costs.
Government	**+ £379 million** - NHS savings from reduced diet-related health issues.
Scheme governance	**- £117 million** – Costs related to establishing and governing the Smart Data scheme.
Authorised Third Parties	**+ £361 million** – Revenue from retailer commissions.

Whole economy	**+ £1.99 billion** – Reductions in carbon emissions and increased spending elsewhere in the economy as consumers reallocate cost savings.
Total	**+ £7.19 billion**

3.3.4 What proportion of the use-case's projected net social value is likely to occur without a corresponding Smart Data scheme, either through ongoing market activity ('Business As Usual') or existing government commitments ('Do Minimum')?

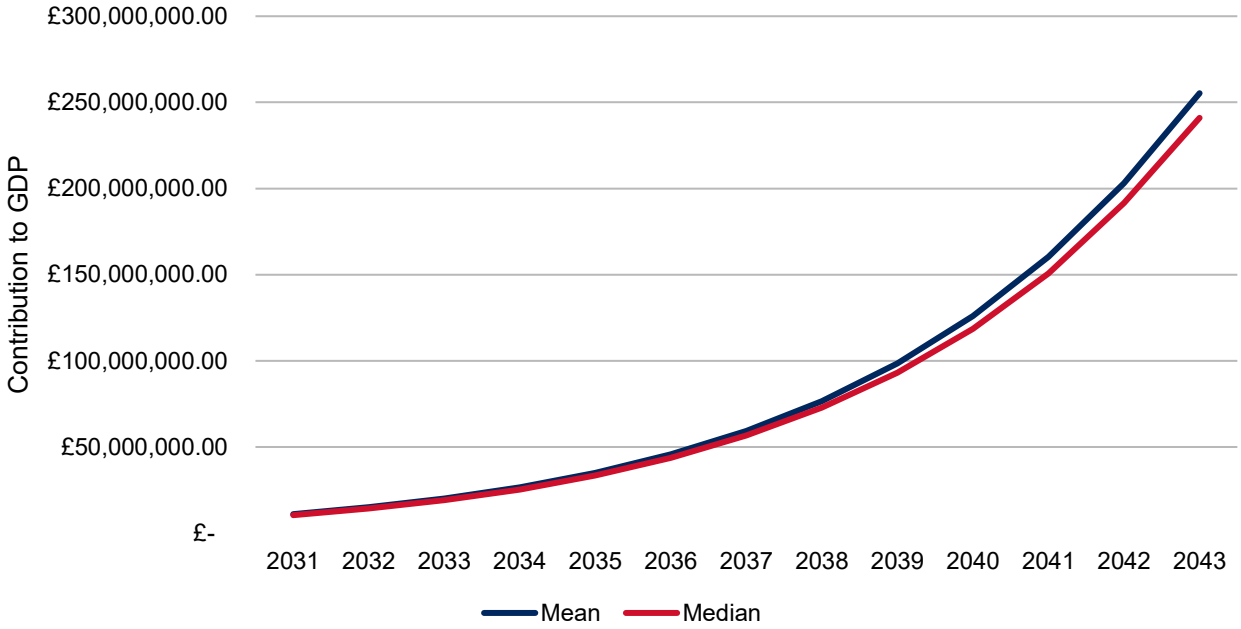
For this use case, the "Business-as-Usual" and "Do Minimum" scenarios are identical, as both would result in no implementation of retail data sharing. Without legislative intervention to mandate data sharing between retailers and third parties, retailers would continue to maintain exclusive control over their customer data, with no obligations to share this information through standardised APIs. Given the competitive nature of the retail sector and the commercial sensitivity of customer data, retailers would be unlikely to voluntarily participate in data sharing arrangements through non-legislative measures alone.

Therefore, both scenarios would result in zero Net Present Value and zero GDP contribution over the 2028-2043 period, as the transformative benefits of retail Smart Data would remain unrealised without legislative intervention to mandate participation. The anticipated benefits from improved consumer choice, time savings, and health outcomes would not materialise in either case.

3.3.5 How does the use case contribute to the UK Government's mission to "kickstart economic growth", as measured by GDP?

This use case makes a moderate positive contribution to GDP, expected to reach **£255 million per year by 2043 (0.01% of GDP in 2024)**[30]. GDP benefits are first expected to be seen in 2031 with a £11 million GDP contribution. GDP contribution then rises year-on-year in a gentle exponential curve, to £35 million by 2035 and £126 million by 2040.

[30] House of Commons Library, 2025. Gross domestic product (GDP): Economic indicators. Calculated using 2024 UK GDP data (GDP = £2,848 billion)



However, it is important to note that 9% of the simulations run in our analysis resulted in a negative GDP contribution from this use case. This is because a reduction in direct consumer spending on groceries, and therefore revenue for retailers, results in a reduction in economic activity – without considering the ripple effects of demand multipliers – which is not always offset by other economic gains. Still, in the majority of scenarios, we anticipate this being offset by:

- Consumers spending a portion of their savings elsewhere
- Improved productivity in the retail sector, from reduced waste and improved demand prediction
- The capital increase made available from the increase in consumer savings
- Consumer time savings being partially used for productive activities

3.3.6 What is the indicative projected net social value and GDP contribution of the associated Smart Data scheme?

If the benefits observed in this use case extend across a broader Smart Data scheme in retail, the UK could see up to **£24.6 billion in net social value** generated over the 2028-2043 period.[31] However, once again, it is important to note that this scheme-level estimate has been extrapolated from one use case estimate and carries a high degree of uncertainty. While the expected net social value benefits are promising, actual outcomes may vary substantially depending on how far the specific use case is representative of the scheme as a whole. In 95% of our simulations, our analysis predicts the NPV contribution of a Smart Data scheme in retail from 2028-2043 could fall anywhere within the range of £17.2 billion to £35.5 billion.

[31] Please note that the health benefits engendered by the specific use case have not been scaled up to scheme level NPV estimates. This is in recognition of the fact that not all use cases brought about by a retail Smart Data scheme will have health benefits, and some may in fact have negative health impacts. However, the health benefits from the specific modelled use case are still included in the scheme-level estimates in raw form (i.e. before scaling).

We estimate the GDP contribution of a Smart Data scheme in retail will be approximately **£1.1 billion** by 2043 (0.04% of GDP in 2024).[32] In this instance, at a 95% confidence level, our analysis suggests the GDP impact of a Smart Data scheme in retail in 2043 will fall between a £370 million reduction in GDP and a £3.1 billion increase in GDP. The risk of a Smart Data scheme in retail generating a negative impact on GDP should therefore be factored into any decisions taken on which sectors to prioritise for Smart Data schemes and how those schemes are designed.

3.3.7 Discussion

A Smart Data scheme in retail – with a focus on online groceries – could offer significant net social value by empowering consumers to save money, driving healthier and more sustainable eating habits, and improving price transparency. However, expected contribution to GDP remains smaller than in other sectors. This is because many of the benefits (e.g. reduced emissions, and improved health outcomes) do not directly contribute to GDP and those that do (e.g. consumer cost savings), while beneficial for households, result in reduced retail sector revenues that partially offset other increases in economic activity. Additionally, the potential impact of Smart Data on traditional retail business models poses challenges that need careful consideration. Policymakers and industry leaders may need to explore alternative funding models to ensure the viability of Smart Data schemes for retailers, and mitigate against the small risk of a Smart Data scheme in retail having a negative impact on GDP.

Several limitations should be noted regarding this use case analysis. The analysis excludes potential competitive responses from traditional retailers that could affect the projected benefits. Additionally, while we quantified direct cost savings and revenue impacts, indirect effects on retail supply chains and employment patterns may not be fully captured. There is also inherent uncertainty in how consumers reallocate their cost savings in a rapidly evolving retail landscape and economic environment.

The adoption rate was based on Open Banking and our consumer survey, which indicated 61.4% of consumers would consider adopting this use-case. On average, the number of use-case users, as a share of consumers purchasing their groceries online, is estimated to grow from 0.85% in 2031 (the first year post implementation), to 1.38% in 2033, to 4.57% in 2038, and 14.06% in 2043.

3.4 Supporting green home upgrades

3.4.1 Use case summary and value chain

Green home upgrades offer significant benefits for homeowners, financial institutions, and the UK's net zero agenda, yet adoption remains low. This Smart Data use case would enable secure sharing of finance data, energy data and data from Internet of Things devices to provide tailored insights and advice on green home upgrades. These insights would empower homeowners to make informed investment decisions, while also helping financial institutions assess and promote green home upgrade loans.

Several data flows and associated costs and benefits were excluded from the scope of our analysis to maintain a focused assessment. While the use case could incorporate Internet of Things (IoT) data to provide richer insights into home energy efficiency, we excluded IoT providers as mandatory data sharers to avoid creating additional barriers to adoption for households without smart devices. Any behavioural effects from improved energy usage analytics were also excluded from our analysis, as the marginal benefit of these insights would be difficult to isolate from the energy usage data already available to consumers through their energy suppliers. Quantifying this additional behavioural impact would require extensive primary research to establish both baseline

[32] House of Commons Library, 2025. Gross domestic product (GDP): Economic indicators. Calculated using 2024 UK GDP data (GDP = £2,848 billion)

behaviours and the incremental changes attributable specifically to the enhanced analytics provided by this use case.

The table below provides a summary of the use case's data flows for key actors and their associated costs and benefits considered by our analysis. This does not include the costs and benefits associated with actors that don't actively participate in data exchanges (scheme governance, wider economy etc.).

This use case does not charge the consumer for access to the service; however, the analysis assumes that Construction Services are charged a commission fee from the ATP for any business it they receive due to the use case. Although the research makes these assumptions, the future reality could be different which would change the distribution of costs and benefits among different parties engaged with any Smart Data scheme.

Actors	Data flows	Costs & Benefits
Standard Industrial Classification: Consumers		
Homeowners	**Provides:** User behaviour / internet-of-things data; consent. **Receives:** Home scores; efficiency scores; upgrade advice.	**Benefits:** • Quantified: Lower energy costs from easier access home upgrade • Quantified: Better lending rates for home upgrades • Quantified: Time saved making home upgrade decisions • Not Quantified: Improved home purchase decisions from access to home scores.
House hunters	**Receives:** Home scores.	
Standard Industrial Classification: Energy services		
Smart meter data holders (Data Communications Company and data aggregators)	**Provides:** Smart meter data; energy usage data. **Receives:** Aggregated usage insights.	**Costs:** • Quantified: Set-up costs including staff training, process redesign and platform integration / API Development • Quantified: Ongoing running and maintenance costs • Quantified: Lost revenue from consumer energy savings **Benefits:** • Quantified: Improved productivity from reduced peak energy demand and improved data for planning[33]
Standard Industrial Classification: Financial services		

[33] The extent of which will vary depending on the installations with some (e.g. heat pumps) increasing peak demand.

Banks & Insurers	**Provides:** Green finance products, tailored mortgages, tailored insurance offers; financial history and insurance details. **Receives:** Home and efficiency scores; energy usage data; financial history and insurance details.	**Costs:** • Quantified: System updates for mortgage processing and API integration **Benefits:** • Quantified: Better risk assessment • Quantified: Increased green lending • Quantified: Improved productivity from faster review of green finance applications
Standard Industrial Classification: Construction services		
Construction Services	**Receives:** Home upgrade recommendations; customer leads. **Provides:** Upgrade completion data.	**Costs:** • Quantified: Commission / fees paid to Authorised Third Parties **Benefits:** • Quantified: Quicker deployment of home-upgrades
Standard Industrial Classification: Authorised Third Parties (ATPs)		
Authorised Third Parties (ATPs)	**Receives:** All data sources; consent. **Provides:** Home and efficiency scores; analytics; recommendations.	**Costs:** • Quantified: Platform development • Quantified: Ongoing costs, including customer support and consent management systems **Benefits:** • Quantified: Commission / fees – assumed to be paid by construction services • Not Quantified: Data analytics opportunity

Beyond direct participants, this use case generates broader economic value through several quantified channels. These include economic growth multiplier effects from increased construction activity, expanded labour supply from consumer time savings on home improvement projects, increased capital stock from energy cost savings being reinvested, and productivity gains across the housing finance sector. Environmental benefits like reduced carbon emissions also represent significant positive externalities felt by the entire UK.

Additionally, there are several potential benefits that, while not quantified in our analysis, could have substantial impact. These include enhanced stability of the housing finance market through improved transparency of home energy efficiency (which decreases lending risk), innovation and growth in green finance as new products are enabled by standardised energy performance data, and accelerated progress towards net zero targets through faster adoption of home energy improvements. Changes in household ability to provide flexible electricity demand have not been included in the assessment. The use case may also strengthen the UK's position as a leader in green finance by demonstrating innovative ways to unlock capital for residential decarbonisation,

which could increase exports of financial services, attract international investment, and help establish the UK as a key player in setting global standards for sustainable finance.

3.4.2 What is the net value to UK society of implementing each of the use cases over fifteen years from implementation?

This use case is projected to deliver **£745 million of Net Present Value to the UK over 15 years** between 2028 and 2043, thereby delivering £50 million of value each year on average. With a benefit-cost ratio of 5.26, this use case has a middling benefit-cost ratio, representing positive value for money.

Top three benefits (NPV impact):

1. Increased revenue for financial institutions from a rise in green home upgrade loans, which generate interest income.
2. Productivity gains for financial services businesses through streamlined loan assessments enabled by better data.
3. Revenue growth in the construction sector as more homeowners invest in home upgrades.

Top three costs (NPV impact):

1. Revenue losses for energy services – specifically energy suppliers – as improved energy efficiency leads to lower energy consumption and spend.
2. Implementation and running costs for energy services – specifically smart meter networks – to enable secure access to required smart meter data via API.
3. Implementation costs for financial services businesses to receive relevant data via API to support green home finance decisions.

3.4.3 How is the projected net value of the use case distributed between different market actors?

Financial services and construction services businesses stand to gain the most from this initiative. Homeowners benefit from reduced energy bills, while energy services are expected to face some revenue losses as a direct result of the energy cost savings made by consumers. The wider economy will benefit from economic spillovers and reduced emissions (28 thousand tCO2e in 2043).

Actor	Net Present Value (2028 – 2043)
Financial Services	**+ £267 million** – Higher lending volumes and reduced processing costs.
Construction Services	**+ £130 million** – Increased demand for green home upgrades.
Consumers (Homeowners)	**+ £78 million** – Energy savings and improved home values.
Energy Services	**- £55 million** – Revenue losses due to reduced household energy consumption.
Scheme Governance	**- £39 million** – Administrative costs for maintaining the scheme.
Authorised Third Parties	**+ £12 million** – Service fees for managing data flows.

Whole Economy Impact	**+ £353 million** – Broader economic benefits from increased investment in home upgrades.
Total	**+ £745 million**

3.4.4 What proportion of the use-case's projected net social value is likely to occur without a corresponding Smart Data scheme, either through ongoing market activity ('Business As Usual') or existing government commitments ('Do Minimum')?

The Do Minimum scenario assumes Ofgem will implement its consumer consent initiative[34]: a standardised solution for consumers to control permissions for sharing their energy data. This would give consumers better control over their data while enabling innovative services to reduce bills and support the transition to net zero. The Energy Digitalisation Taskforce recommended this initiative to address the current fragmented approach to obtaining and managing consent across the energy sector.

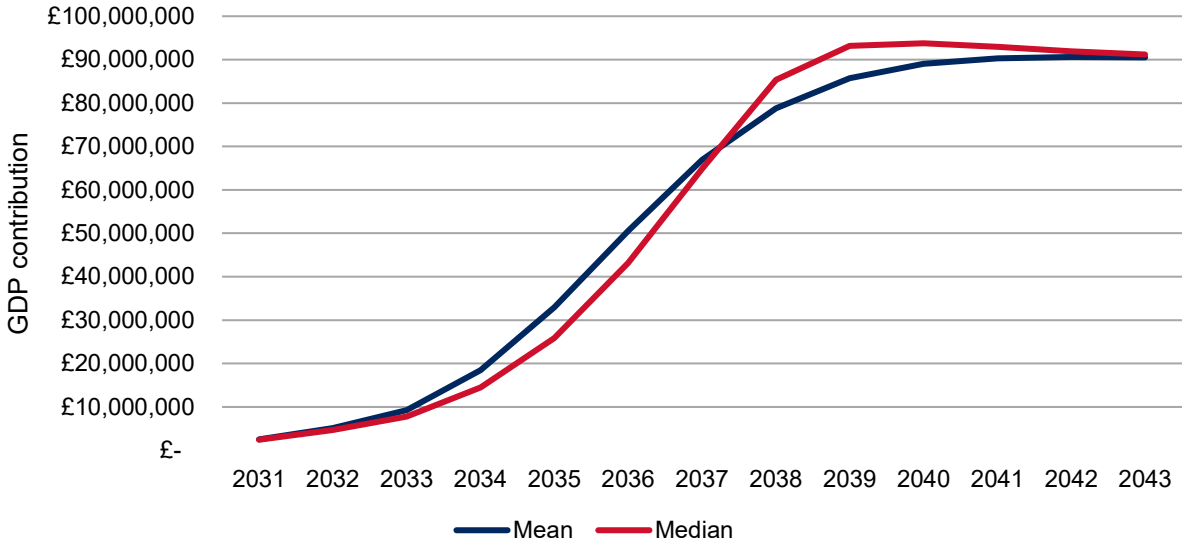
In this scenario, Ofgem would proceed with the consumer consent work without broader government Smart Data legislation, preventing the use case from accessing other data necessary for developing Home Scores (e.g. property records or internet-of-things data). We estimate this would deliver approximately £436 million in Net Present Value between 2028-2043, representing about 59% of the value achieved in the Do Maximum scenario. The estimate assumes lower consumer adoption due to limited data sharing beyond the energy sector (based on results from our consumer survey), along with a longer 5-year implementation timeline. Whilst the solution would provide basic consent management and some market standardisation, it would lack legislative backing to drive wider adoption.

In the Business-as-Usual scenario, neither government nor Ofgem would intervene regarding consumer consent. This lack of standardised consent mechanisms across the sector would make this use case impossible.

3.4.5 How does the use case contribute to the UK Government's mission to "kickstart economic growth", as measured by GDP?

This use case makes a moderate positive contribution to GDP, expected to reach **£91 million per year by 2043 (0.003% of 2024 GDP)**. GDP benefits are first expected to be seen in 2031 with a £3 million GDP contribution. GDP contribution then rise year-on-year in a sharp S-shaped curve with increases in GDP contribution starting to plateau from 2038 onwards. This plateau is a result of use case adoption beginning to reach saturation, with an increasing number of homeowners who would take advantage of this use case to make home upgrades having already done so.

[34] Ofgem, 2024. Consumer Consent Solution consultation.



3.4.6 What is the indicative projected net social value and GDP contribution of the associated Smart Data scheme?

See Section 3.5.6 for estimates of the net social value and GDP contribution of a Smart Data scheme in energy, combining insights from both the energy use cases analysed through this work.

3.4.7 Discussion

See Section 3.5.7 on conclusions on the costs and benefits of a Smart Data scheme in energy.

3.5 Verified electricity emissions reporting for SMEs

3.5.1 Use case summary and value chain

Small and medium-sized enterprises (SMEs) face increasing pressure to demonstrate their sustainability credentials to secure green finance. However, current emissions reporting processes are often costly, time-consuming, and low quality. In this use case, an Authorised Third Party would facilitate automated sharing of the following data from SMEs: (a) electricity tariff emissions intensity data and (b) smart meter electricity consumption data. This data would be used to efficiently generate verifiable emissions reports for SMEs, which could be automatically shared with auditors and banks to provide increased assurance in investment decision-making and improve access to green finance for SMEs.

Several data flows and associated costs and benefits were excluded from the scope of our analysis to maintain a focused assessment. While the use case could include a wider range of energy types beyond electricity (such as gas and other fuels), we focused solely on electricity consumption to maintain alignment with existing smart meter data standards and avoid complexities around different fuel types and their associated emissions calculations. Additionally, we excluded potential benefits from government use of the collated data, such as targeted incentive programmes and regional emissions tracking, from our current analysis. However, the standardised data infrastructure established through this Smart Data scheme could provide a foundation for future policy initiatives in these areas.

The table below provides a summary of the use case's data flows for key actors and their associated costs and benefits considered by our analysis. This does not include the costs and benefits associated with actors that don't actively participate in data exchanges (scheme governance, wider economy etc.).

Within this use case, the analysis assumes that both SMEs and Banks and Financial Services will pay membership fees to the ATP to access the service. Although the research makes these assumptions, the future reality could be different which would change the distribution of costs and benefits among different parties engaged with any Smart Data scheme.

Actors	Data flows	Costs & Benefits
Standard Industrial Classification: SMEs		
Small and Medium Enterprises (SMEs)	**Provides:** Consent for data sharing **Receives:** Verified emissions reports; energy usage insights	**Costs:** • Quantified: Authorised Third Party membership fees **Benefits:** • Quantified: Improved productivity from reduced reporting time • Quantified: Increased access to green finance • Not Quantified: Lower interest rates due to greater confidence in reporting • Not Quantified: Increased revenue from enhanced environmental reputation
Standard Industrial Classification: Energy services		
Smart meter data holders	**Provides:** Smart meter data; electricity usage data; tariff emissions intensity **Receives:** Usage pattern analytics	**Costs:** • Quantified: Set-up costs including staff training, process redesign and platform integration / API Development • Quantified: Ongoing running and maintenance costs **Benefits:** • Not Quantified: Better capital planning • Not Quantified: Enhanced usage insights
Standard Industrial Classification: Financial services		
Banks & Financial Services	**Provides:** Green finance products **Receives:** Verified emissions reports	**Costs:** • Quantified: Authorised Third Party membership fees **Benefits:** • Quantified: Productivity improvement from reduced time for green finance evaluation • Quantified: Increased returns from increased use of green finance

		• Not Quantified: New product opportunities
Standard Industrial Classification: Professional services		
Auditors & Accountants	**Receives:** Verified emissions data for compliance reporting	**Benefits:** • Quantified: Productivity improvement from faster verification and more efficient reporting
Standard Industrial Classification: Authorised Third Parties (ATPs)		
Authorised Third Parties (ATPs)	**Receives:** Energy data, consent; usage data. **Provides:** Verified emissions reporting; analytics.	**Costs:** • Quantified: Platform development • Quantified: Ongoing costs, including customer support and consent management systems **Benefits:** • Quantified: Membership fees from financial services and SMEs • Not Quantified: Data analytics opportunity

Beyond direct participants, this use case generates broader economic value, primarily through economic multiplier effects and reduced carbon emissions. The main quantified benefits derive from job creation in sustainable sectors, and the value of reduced carbon emissions from the increased use of green finance.

Several additional benefits, while not quantified in our analysis, could have meaningful impact. These include potential benefits from increased standardisation of emissions reporting leading to better cross-sector comparability and decision-making, enhanced market confidence in green investments due to improved verification, and accelerated innovation in sustainability-focused financial products. The use case may also strengthen the UK's position in green finance by demonstrating effective ways to scale verified emissions reporting to SMEs. However, it will be important to ensure proper verification mechanisms are in place to maintain data quality and consistency with grid carbon intensity methodology as adoption increases.

3.5.2 What is the net value to UK society of implementing each of the use cases over fifteen years from implementation?

Our analysis estimates that this use case could deliver **£685 million in Net Present Value (NPV) to the UK** between 2028 and 2043, equating to an average annual benefit of £46 million. The use case shows a benefit-cost ratio of 4.84: the lowest benefit-cost ratio of the five considered use cases.

Top three benefits (NPV impact):	**Top three costs (NPV impact):**
1. Lower greenhouse gas emissions from the increase in green investment by SMEs. 2. Productivity gains for financial services businesses, as automated reporting	1. Implementation and running costs for energy services – specifically smart meter networks – to enable secure access to required smart meter data via API.

reduces manual due diligence in assessing SME green finance applications. 3. Productivity improvements for legal and accounting services in assuring SME green finance applications and reported emissions.	2. Government costs to implement and maintain a Smart Data scheme in energy. 3. Membership fees paid by financial services businesses to access ATP-generated emissions reports.

3.5.3 How is the projected net value of the use case distributed between different market actors?

The most significant beneficiary of this increased value is the wider economy which gains £568 million over the 15 years from SMEs having increased access to green finance. The majority of this benefit comes from the reduced emissions resulting from the funded investments (235 million tCO2e in 2043 and £444 million of net present value between 2028-2043), with the remaining attributable to wider economic spillovers. The other primary beneficiaries are financial services businesses, legal and accounting businesses and SMEs. ATP costs are assumed to be covered by the SME and financial services users, in a manner similar to the current operational pilot,[35] resulting in the ATP having £0 net value in the table below. Energy services are expected to lose out somewhat due to the moderate implementation costs, as well as whichever actor ends up responsible for funding the scheme governance.

Actor	Net Present Value (2028 – 2043)
Financial Services	**+ £159 million** – Faster, lower-cost green finance assessments.
Legal & Accounting	**+ £26 million** – Reduced compliance and verification costs.
SMEs	**+ £54 million** – Easier access to green funding and improved sustainability credentials.
Energy Services	**- £79 million** – Revenue losses from reduced energy consumption.
Scheme Governance	**- £43 million** – Costs of maintaining regulatory compliance.
Authorised Third Parties	**£0** – Costs fully offset by membership fees.
Whole Economy Impact	**+ £568 million** – Macroeconomic benefits from green investment.
Total	**+ £685 million**

[35] Icebreaker One, 2024. Perseus – 2024 plan.

3.5.4 What proportion of the use-case's projected net social value is likely to occur without a corresponding Smart Data scheme, either through ongoing market activity ('Business As Usual') or existing government commitments ('Do Minimum')?

In the Business-as-Usual scenario, the initiative would continue through the existing voluntary programme, but at a slower pace (assumed to be half the pace). The voluntary programme referenced here is Project Perseus from IceBreaker One, which is piloting automated emissions reporting for UK SMEs to help them access green finance. The pilot focuses on automating access to assurable SME electricity consumption data and its carbon intensity to enable verified emissions reporting that can be shared with banks and lenders. This slower adoption rate is due to the voluntary nature of participation and lack of standardised integration requirements. Based on modelling data, this would deliver approximately £87 million in Net Present Value between 2028-2043, representing about 13% of the value achieved in the Do Maximum scenario. The estimate assumes:

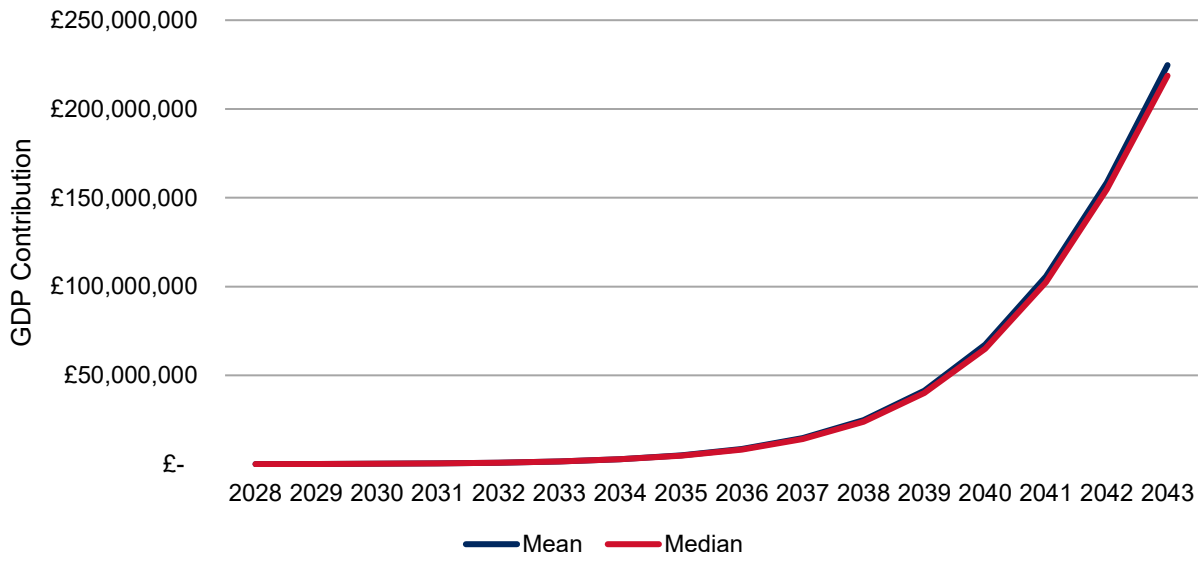
- Slower adoption rates due to the voluntary nature of the use case
- Limited integration between systems and stakeholders, resulting in lower efficiency gains
- Reduced environmental benefits due to slower uptake of green finance initiatives

The Do Minimum scenario assumes Ofgem will implement its consumer consent initiative, which while not directly SME-facing, would develop capabilities that support verified electricity emissions reporting. We estimate this would deliver approximately £441 million in Net Present Value between 2028-2043, representing about 64% of the value achieved in the Do Maximum scenario. This estimate reflects:

- Longer implementation timeline
- Partial system integration leading to moderate efficiency improvements
- Moderate environmental benefits from increased but not optimised green finance access

3.5.5 How does the use case contribute to the UK Government's mission to "kickstart economic growth", as measured by GDP?

This use case makes a moderate positive contribution to GDP, expected to reach **£225 million per year by 2043 (0.01% of GDP in 2024)**. GDP benefits are first expected to be seen in 2028 with a £0.11 million GDP contribution. GDP contribution will then initially rise exponentially year-on-year before eventually plateauing, due to the assumed S-shaped adoption curve. While increases in GDP contribution do not start to plateau by 2043, we would expect the GDP contributions to stop increasing by 2063, as use case adoption begins to reach saturation – when all SMEs reporting on carbon emissions have adopted the use-case.



3.5.6 What is the indicative projected net social value and GDP contribution of the associated Smart Data scheme?

For the first 3 use cases discussed in this paper, we have scaled up the expected net social value and GDP contribution of the use case to a scheme level: as previously outlined, there is a high level of uncertainty with these figures which rely on an estimated 'share of scheme' assumption for each use case (see Section 2.1.2 for more detail on this methodology). When considering the net social value and GDP contribution of a Smart Data scheme in energy, we have the benefit of being able to draw on analysis of two use cases to reach scheme-level estimates.

By applying the insights from both these use cases on a larger scale, we project that a Smart Data scheme in energy could contribute **£9.5 billion in net social value** to the UK over the 2028-2043 timeframe. However, with all scheme estimates, there's a high degree of uncertainty: 95% of our simulations suggest that this figure could fall anywhere between £5.2 billion and £13.3 billion – all simulations were positive.

Applying the same methodology, we project that a Smart Data scheme in energy could generate around **£2.1 billion** in GDP contributions by 2043 (0.07% of 2024 GDP)[36]. At a 95% confidence level, our analysis indicates that the impact could range from a £1.1 billion to £3.5 billion boost to the economy.

3.5.7 Discussion

A Smart Data scheme for energy has the potential to drive significant economic and environmental benefits, including by supporting green home upgrades and SME emissions reporting. While the expected NPV and GDP contributions of a Smart Data scheme in energy are more modest than in some other sectors, it should not be overlooked how a scheme could contribute to a wider set of policy goals including reaching net zero and boosting energy security.

A key limitation of the green home upgrades use case modelling is our decision to focus on accelerating investments that would have occurred anyway, rather than modelling the creation of entirely new investments. Whilst this approach provides a more conservative and defensible

[36] House of Commons Library, 2025. Gross domestic product (GDP): Economic indicators. Calculated using 2024 UK GDP data (GDP = £2,848 billion)

estimate, it may understate the true potential value of the use case. The model also does not account for potential wider behavioural changes that could be enabled by improved data access and visualisation – for instance, households might develop better energy consumption habits, provide electricity use flexibility to support the management of the grid or become more receptive to future green initiatives after experiencing the benefits of their initial upgrades.

For the verified electricity emissions reporting use case, key limitations include uncertainty around the future regulatory landscape for SME emissions reporting and the evolving nature of green finance criteria. The model's assumptions about efficiency gains and cost savings may not fully account for variations in SME size, sector, and technological readiness. Furthermore, the analysis may underestimate the complexity of integrating different data systems and standardising emissions reporting methodologies across diverse business contexts.

Comparing the two use cases reveals different patterns of costs, benefits, and implementation timelines that provide insight into the wider energy Smart Data scheme. The green home upgrades use case shows higher potential value but requires more substantial upfront costs, particularly for energy suppliers. Whilst it would take longer to implement initially, once launched it would realise benefits quickly before plateauing as the pool of potential adopters becomes saturated. In contrast, the verified emissions reporting use case demonstrates lower implementation costs and could begin delivering value sooner, but would take longer to reach its full potential as SME adoption gradually increases over time.

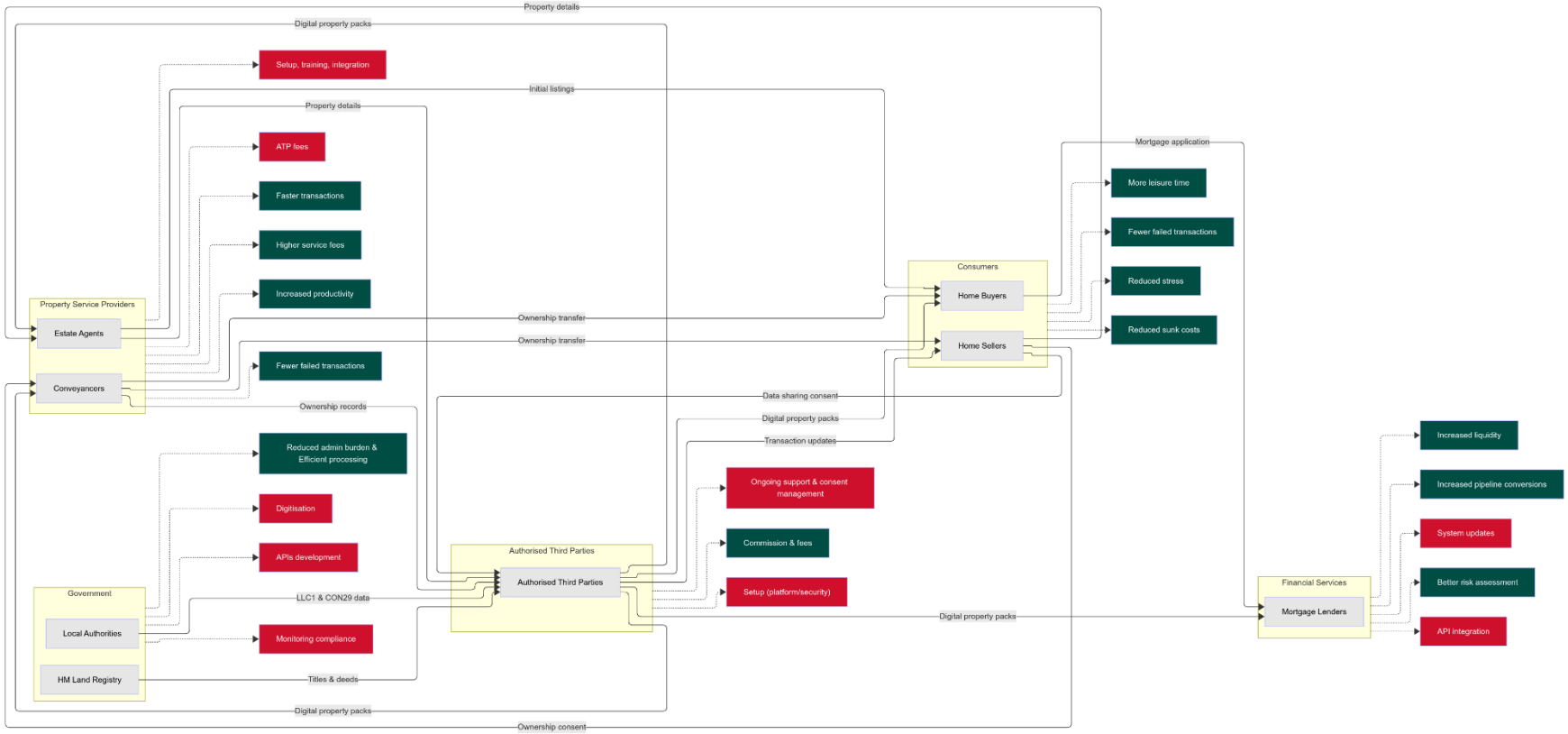
The estimated costs and benefits of both use-cases is heavily dependent on the adoption rate. For the verified electricity emissions reporting use case, the adoption rate is based on the estimate average year-on-year increase in Open Banking and the historic adoption of Project Perseus.[37] On average, the number of SMEs participating in the use-case, as a share of SMEs reporting carbon emissions, is estimated to grow from 0.07% in 2028, to 0.71% by 2033, to 8.06% by 2038, and 51.62% by 2043. For the green home upgrades use case, the adoption rate is based on the results of our consumer survey, indicating that 69% of homeowners were interested in becoming users. On average, the number of participating users, as a share of homeowners making green home upgrades, is estimated to grow from 1.34% in 2031 (the first year post implementation), to 5.66% in 2033, to 58.53% in 2038, and 92.18% in 2043. Faster adoption rates increase the estimated net present values, while slower adoption reduces them.

Both use cases suggest that energy Smart Data schemes may often involve revenue losses for energy suppliers while generating significant wider economic and environmental benefits. This pattern implies that careful consideration needs to be given to how implementation costs are distributed across stakeholders to ensure sustainable adoption of Smart Data initiatives in the energy sector.

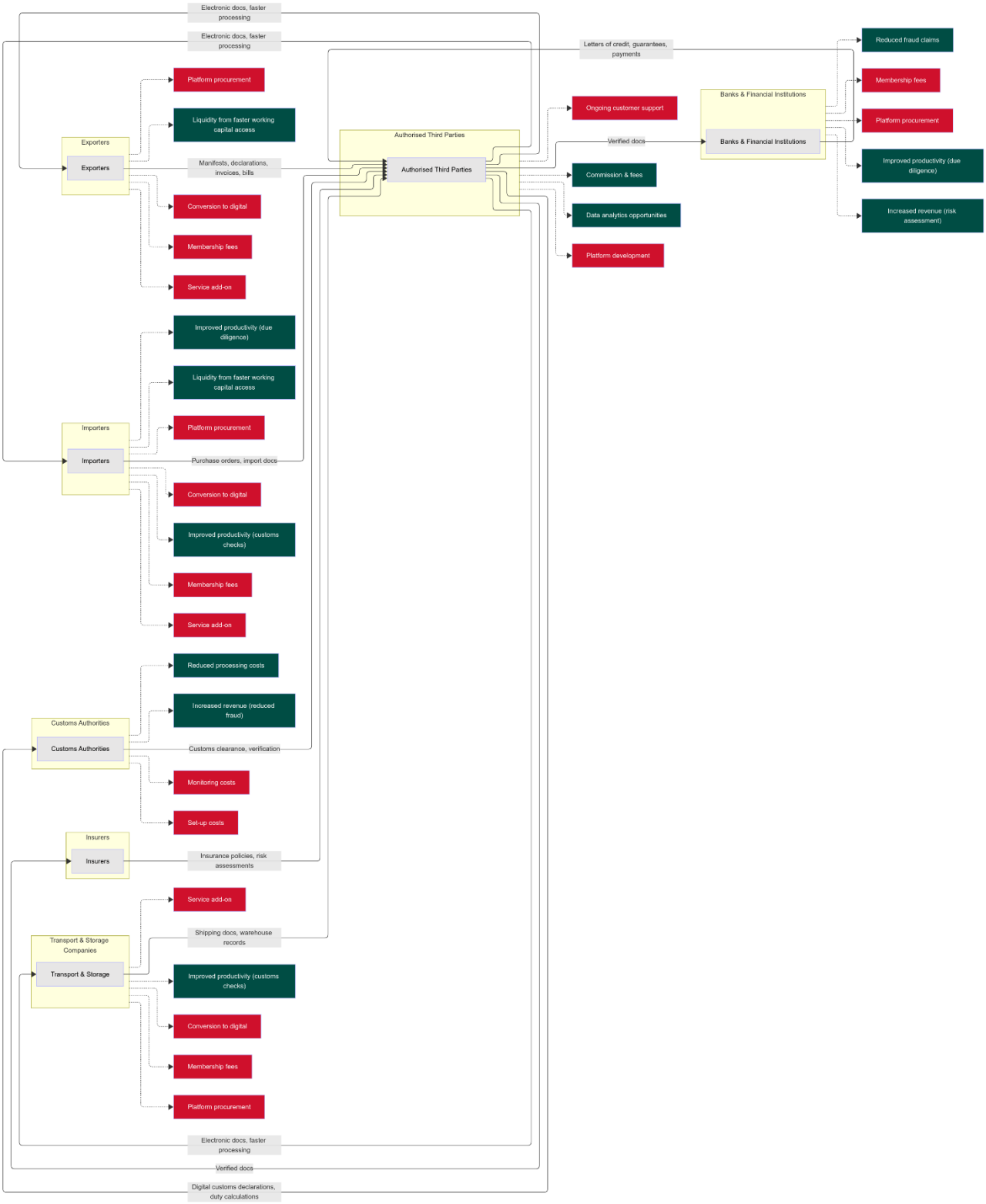
[37] Icebreaker One, 2024. Perseus – 2024 plan.

Technical Annex A: Value Chains

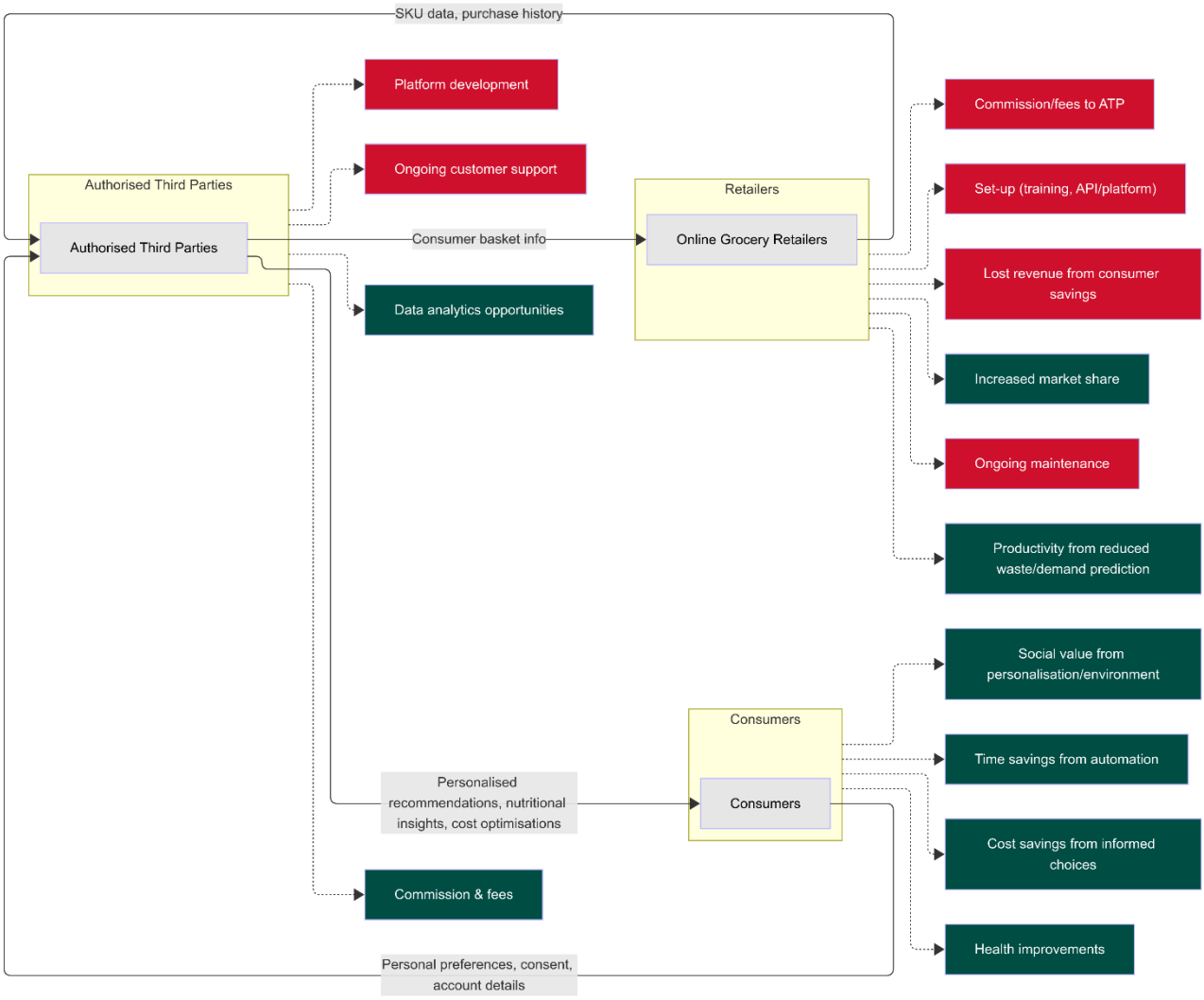
A.1 Digital information for homebuying



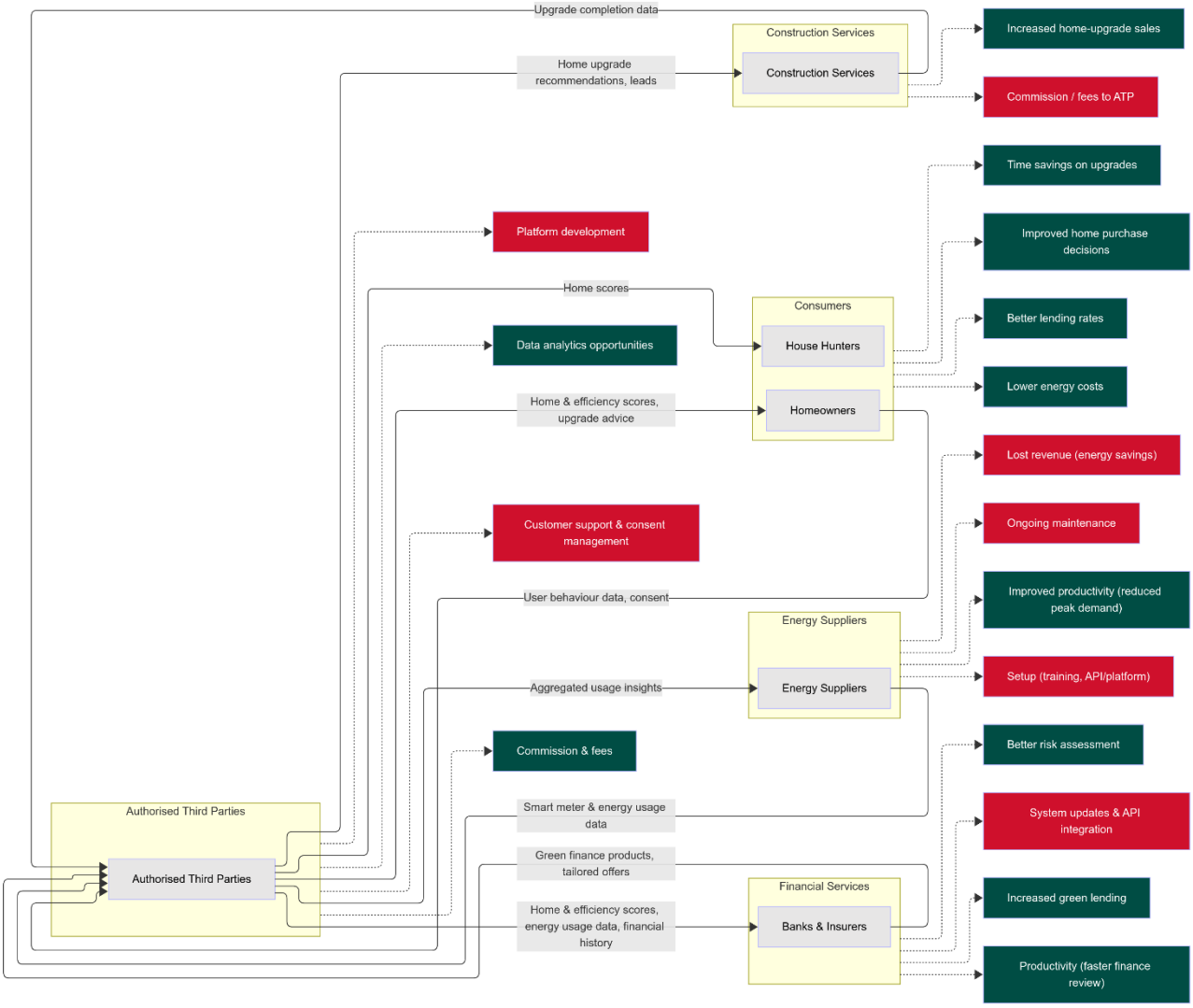
A.2 Digitising trade finance



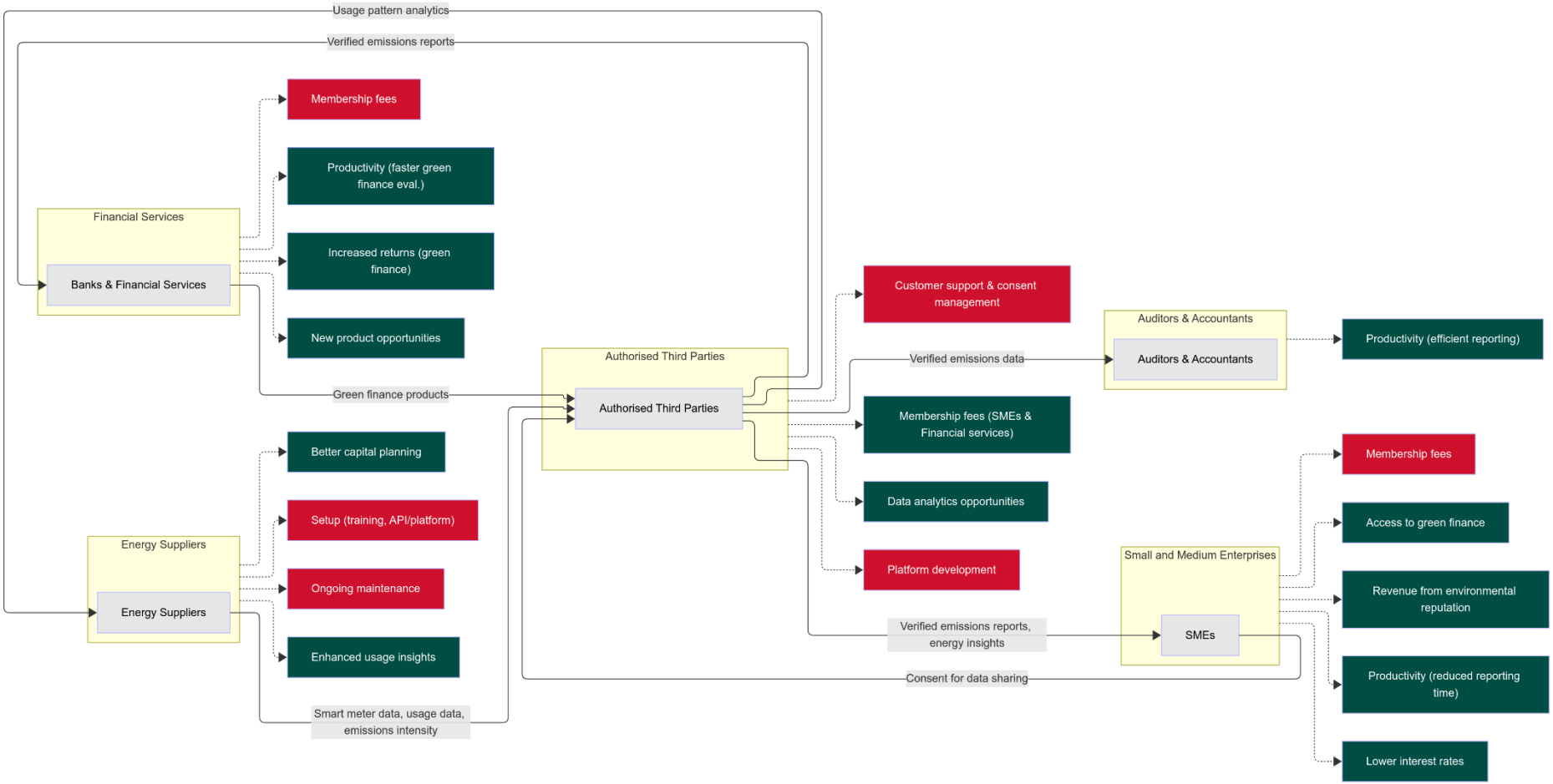
A.3 Consumer experience of online groceries



A.4 Supporting green home upgrades



A.5 Verified electricity emissions reporting for SMEs



Technical Annex B: Inputs and assumptions for each use case

This Technical Annex lists the two types of assumptions used to model economic impacts: fixed assumptions and Monte Carlo assumptions. Fixed assumptions are single-point estimates that remain constant throughout our analysis. These are used where we have high confidence in a specific value, often derived from authoritative sources or widely accepted industry standards.

Monte Carlo assumptions, by contrast, are used where there is greater uncertainty around the true value. Rather than using a single estimate, these assumptions are modelled as probability distributions, allowing us to account for uncertainty and variability in our projections. The Monte Carlo simulation runs multiple iterations using random samples from these distributions to generate a range of possible outcomes.

For Monte Carlo assumptions, we employ our Confidence Grade approach to determine the appropriate probability distribution and parameters:

- Grade A (±2% SD, 0% mean adjustment)
- Grade B (±5% SD, -5% mean adjustment)
- Grade C (±10% SD, -10% mean adjustment)
- Grade D (±20% SD, -25% mean adjustment)
- Grade E (±25% SD, -40% mean adjustment)

All URLs shared in the table below were accessed between February and March 2025. Some figures on these pages may have been updated since the time of access.

B.1 Digital information for homebuying

The table below provides a list of all the assumptions which informed the estimates of the value of the Digital information for homebuying use case (see section 3.1).

B.1.1 Fixed assumptions

Assumption	Value	Rationale	Source
Number of property transactions a year currently	1,189,402	Average number of property transactions over £40,000 over five years from 2019-2024	HM Revenue & Customs, 2025 (https://www.gov.uk/government/statistics/monthly-property-transactiOffice for National Statistics-completed-in-the-uk-with-value-40000-or-above); Confirmed by interviewee.
Revealed preference for more insightful services	£299	Developed using a willingness-to-pay survey methodology with 100 consumers	Consumer survey carried out by The PSC (03/03/2025)
Estimated time saving per transaction (hours)	7.1	Average time spent on paperwork and administrative tasks multiplied by average % reduction in time on paperwork and administrative tasks	Combined from number of property transactions a year currently and revealed preferences for more insightful services

Average time spent on paperwork and administrative tasks (hours)	10.2	Mean of responses to the following question in a consumer survey: "Thinking of the process when you last bought or sold a residential property, from applying for a mortgage to closing the deal, roughly how much time did you spend on paperwork and administrative tasks?"	Consumer survey carried out by The PSC (03/03/2025)
Average % reduction in time on paperwork and administrative tasks	70%	Assumption made based on a range of qualitative comments by interviewees	Triangulated from 4 interviewees.
Percentage of transactions which fail	34%	Taken from previous work completed by TRX Impact on behalf of MHCLG	TRX Impact, 2023 (on behalf of MHCLG)
Percentage of transactions which are fraudulent	0.006%	HMLR report approximately 86 instances of property fraud a year, equating to 0.006% of all transactions.	HM Land Registry, 2024/25 (https://hmlandregistry.blog.gov.uk/2025/09/17/the-true-picture-of-property-fraud-in-england-and-wales/)
Estimated average sunk cost per failed transaction for buyer	£460	Taken from previous work completed by TRX Impact on behalf of MHCLG	TRX Impact, 2023 (on behalf of MHCLG)
Estimated average sunk cost per failed transaction for seller	£316	Taken from previous work completed by TRX Impact on behalf of MHCLG	TRX Impact, 2023 (on behalf of MHCLG)
Estimated average sunk cost per failed transaction for all consumers	£776	Sum of estimated average sunk cost per failed transaction for buyer and seller	Combined from previous assumptions; Aligns with comments from interviewee.
Estimated cost per instance of fraud	£107,699	Average cost of a property scam per homeowner	Home Owners Alliance, 2019 (https://hoa.org.uk/advice/guides-for-homeowners/for-owners/protect-property-fraud/)
Average weekly household expenditure on food & Non-alcoholic drinks	£63.50	Used to calculate consumer multiplier effect (see section 1b)	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)
Average weekly household expenditure on Alcoholic drink, tobacco & narcotics	£10.80	Used to calculate consumer multiplier effect (see section 1b)	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)
Average weekly household expenditure on Clothing & footwear	£16.80	Used to calculate consumer multiplier effect (see section 1b)	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)
Average weekly household expenditure on Housing(net)[1], fuel & power	£105.70	Used to calculate consumer multiplier effect (see section 1b)	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)
Average weekly household expenditure on Household goods & services	£35.50	Used to calculate consumer multiplier effect (see section 1b)	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)
Average weekly household expenditure on Health	£8.90	Used to calculate consumer multiplier effect (see section 1b)	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)

Average weekly household expenditure on Transport	£79.20	Used to calculate consumer multiplier effect (see section 1b)	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)
Average weekly household expenditure on Communication	£20.30	Used to calculate consumer multiplier effect (see section 1b)	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)
Average weekly household expenditure on Recreation & culture	£65.40	Used to calculate consumer multiplier effect (see section 1b)	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)
Average weekly household expenditure on Education	£5.10	Used to calculate consumer multiplier effect (see section 1b)	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)
Average weekly household expenditure on Restaurants & hotels	£40.50	Used to calculate consumer multiplier effect (see section 1b)	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)
Average weekly household expenditure on Miscellaneous goods and services	£40.30	Used to calculate consumer multiplier effect (see section 1b)	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)
Time savings reinvested into work	40%	Time reinvestment is similar to time reinvested from reduction commuting times due to remote working	Aksoy et al., 2023 (https://www.ebrd.com/publications/working-papers/time-savings-when-working-from-home)
Estimated time saving for employees per transaction (days)	0.25	Our source suggests mortgage underwriting typically takes 'from a few hours to a few days'. We have taken a mid-point of 1 working day (8 hours) from this range, and assumed this use case will reduce time taken by 25%.	Online Mortgage Advisor, 2025 (https://www.onlinemortgageadvisor.co.uk/mortgage-application/mortgage-underwriting/#how-long-does-underwriting-take)
Average residential transaction value	£268,087	Figure provided by HMLR	HM Land Registry December 2024 (https://www.gov.uk/government/statistics/uk-house-price-index-for-december-2024/uk-house-price-index-summary-december-2024)
Average mortgage value	£200,442	Estimate triangulated from several online sources.	Finder Mortgage Statistics, 2024 (https://www.finder.com/uk/mortgages/mortgage-statistics); KIS Finance, 2024 (https://www.kisbridgingloans.co.uk/finance-news/a-comprehensive-overview-of-the-UK-mortgage-and-lending-landscape-in-2024/)
Total mortgage lending value per year	£238,406,115,684	Annual number of transactions x average mortgage value	Combined from other assumptions.
Annualised cost of capital for financial services	11.2%	Assumes WACC in UK financial services is the same as in US financial services.	Kroll, 2025 (https://www.kroll.com/en/cost-of-capital/us-cost-of-capital)
Estimated time elapsed for each failed transaction (for liquidity implications) (days)	49	Industry estimates from interviews and online sources suggest the average homebuying process is 12-16 weeks. We have taken a mid-point of 14 weeks, and then reduced this by 50%, assuming that on average fall throughs will occur approximately half way through the homebuying process.	UK Property Market News, 2024 (https://www.ukpropertymarketnews.co.uk/how-long-does-it-take-to-buy-a-house-from-offer-to-completion-uk/); Confirmed by Adam Cook (05/02)
Average annual salary for a mortgage underwriter	£36,000	Estimate triangulated from several online sources.	Reed.co.uk, 2025 (https://www.reed.co.uk/average-salary/average-mortgage-underwriter-salary); Glassdoor, 2025 (https://www.glassdoor.co.uk/Salaries/mortgage-underwriter-salary-

			SRCH_KO0%2C20.htm); Indeed, 2025 (https://uk.indeed.com/career/mortgage-underwriter/salaries); Totaljobs, 2025 (https://www.totaljobs.com/salary-checker/average-mortgage-underwriter-salary).
Average annual salary for data engineers responsible for implementation	£70,000	Estimate triangulated from several online sources.	Indeed, 2025 (https://uk.indeed.com/career/data-engineer/salaries); Morgan McKinley, 2025 (https://www.morganmckinley.com/uk/salary-guide/data/data-engineer/london).
Working days in a year	225	260 week days, less 25 statutory holidays, less 10 bank holidays	N/A
Estimated cost per failed transaction	£410	Summing direct costs from property valuation and employee time spent	Combined from other assumptions.
Estimated direct cost from property valuation per failed transaction	£250	Estimate triangulated from several online sources.	Yopa, 2025 (https://www.yopa.co.uk/homeowners-hub/how-much-does-a-house-valuation-cost/); Greater London Properties, 2022 (https://www.greaterlondonproperties.co.uk/faq/how-much-does-a-house-valuation-cost-uk/)
Estimated cost from employee time spent	£160	Our source suggests mortgage underwriting typically takes 'from a few hours to a few days'. We have taken a mid-point of 1 working day from this range and calculated the cost of the day by combining assumptions 2a.7 and 2a.9.	Online Mortgage Advisor, 2025 (https://www.onlinemortgageadvisor.co.uk/mortgage-application/mortgage-underwriting/#how-long-does-underwriting-take)
Estimated cost per instance of fraud	£1,714	£1290 in 2015/16, inflated to 2024/25	Home Office, 2018 (https://assets.publishing.service.gov.uk/media/60094b86d3bf7f2ab1a1af96/the-economic-and-social-costs-of-crime-horr99.pdf)
Average annual mortgage yield for mortgage providers	4.1%	The OBR predicts average interest rates on the stock of mortgages to rise from around 3.7% in 2024 to a peak of 4.5% in 2027. We have taken the mid-point between these figures.	Financial Reporter, 2024 (https://www.financialreporter.co.uk/budget-2024-obr-reveals-forecasts-for-house-prices-mortgages-and-interest-rates.html)
Probability of mortgage default	0.6%	280,775 mortgages were taken out in Q1 2024, suggesting 1,123,100 mortgages taken out in a year. There were 6,440 mortgage defaults in 2024, suggesting a 0.57% default rate.	Finder Mortgage Statistics, 2024 (https://www.finder.com/uk/mortgages/mortgage-statistics); UK Finance 2024 (https://www.ukfinance.org.uk/data-and-research/data/arrears-and-possessiOffice for National Statistics)
Financial Services cost base (Opex)	£133,248,000,000	Taken the total GVA of the sector, minus profits, to reach cost base	Combined from other assumptions.
GVA contribution for Financial Services Industry	£208,200,000,000	Inflation-adjusted from 2023 to 2025	House of Commons Library report on Financial services in the UK (https://researchbriefings.files.parliament.uk/documents/SN06193/SN06193.pdf)
Operating Margin for financial services	36%	N/A	FCA, 2020 (https://www.fca.org.uk/data/investment-management-data-annual-report-2019-20)
% contribution of MFP to GVA for Financial Services industry	0.42%	For 1987 (first year from "Big Bang") until 2022 (latest)	Office for National Statistics, 2024 (https://www.ons.gov.uk/economy/grossvalueaddedgva/datasets/nominalandrealregionalgrossvalueaddedbalancedbyindustry)
Average annual salary for PSP employee	£33,261	Average between conveyancer and estate agent salaries.	Combined from other assumptions.
Average annual salary for conveyancers	£38,097	Estimate reached by taking estimate of cost per day from previous work completed by TRX Impact on behalf of MHCLG, and scaling it according to 255 working days in a year	TRX Impact, 2023 (on behalf of MHCLG)
Average annual salary for estate agents	£28,425	Estimate reached by taking estimate of cost per day from previous work completed by	TRX Impact, 2023 (on behalf of MHCLG)

		TRX Impact on behalf of MHCLG, and scaling it according to 255 working days in a year	
Total size of PSP workforce	402,140	Sum of estate agency and conveyancing workforce size	Combined from other assumptions.
Estate agency workforce size	391,000	N/A	Statista, 2024 (https://www.statista.com/statistics/1386103/uk-real-estate-workforce/)
Conveyancing workforce size	11,140	N/A	Todays Conveyancer, 2025 (https://todaysconveyancer.co.uk/15-fall-in-conveyancer-numbers-since-pandemic/)
Estimated cost to establish APIs	£587,895,000	Total number of estate agency and conveyancing business in the UK multiplied by average cost of API integrations per firm, and then adjusted to account for economies of scale	Combined from other assumptions.
Number of estate agency businesses in the UK	24,965	N/A	Office for National Statistics, 2024 (https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/datasets/ukbusinessactivitysizeandlocation)
Number of conveyancing firms in the UK	3,539	N/A	Research and Markets, 2025 (https://www.researchandmarkets.com/report/united-kingdom-conveyancing-market)
Average cost of API integrations per firm	£27,500	Mid-point of a range provided by an interviewee; sense checked against online sources.	RichestSoft, 2025 (https://richestsoft.com/blog/how-much-does-it-cost-to-develop-an-api/); Netguru, 2025 (https://www.netguru.com/blog/api-integration-cost); Confirmed by interviewee.
Adjustment to account for economies of scale	75%	Assuming a 25% reduction in total required API integration for National Statistics due to shared systems	N/A
Average annual salary for software developers	£48,493	N/A	Indeed, 2025 (https://uk.indeed.com/career/software-engineer/salaries)
Share of additional revenue passed on to ATPs	25%	By providing a more effective service, PSPs may be able to charge increased fees for their work. However, we estimate approximately 25% of this value will be passed onto ATPs.	N/A
Estimated time saving for PSP employees per transaction (days)	3.8	Sum of time savings for conveyancers and estate agents.	Combined from other assumptions.
Estimated time saving for conveyancer (seller) per transaction (hours)	10	Estimate provided by an interviewee, and aligns with estimated % time reduction provided by other interviewees.	Triangulated from 2 interviewees.
Estimated time saving for conveyancer (buyer) per transaction (hours)	12	Estimate provided by an interviewee, and aligns with estimated % time reduction provided by other interviewees.	Triangulated from 2 interviewees.
Estimated time saving for estate agent per transaction (hours)	8	Average of estimates provided by interviewees.	Triangulated from 2 interviewees.
Estimated average sunk costs per failed	£352	Taken from previous work completed by TRX Impact on behalf of MHCLG	TRX Impact, 2023 (on behalf of MHCLG)

transaction for conveyancers (buyer)			
Estimated average sunk costs per failed transaction for conveyancers (seller)	£426	Taken from previous work completed by TRX Impact on behalf of MHCLG	TRX Impact, 2023 (on behalf of MHCLG)
Estimated average sunk costs per failed transaction for estate agents	£1,091	Taken from previous work completed by TRX Impact on behalf of MHCLG	TRX Impact, 2023 (on behalf of MHCLG)
Estimated average sunk costs per failed transaction for all PSPs	£1,869	Sum of average sunk costs per failed transaction for conveyancers (buyers and sellers) and estate agents	Combined from other assumptions.
Estimated FTE time per failed transaction for conveyancers (buyer) (days)	2.85	Taken from previous work completed by TRX Impact on behalf of MHCLG	TRX Impact, 2023 (on behalf of MHCLG)
Estimated FTE time per failed transaction for conveyancers (seller) (days)	2.35	Taken from previous work completed by TRX Impact on behalf of MHCLG	TRX Impact, 2023 (on behalf of MHCLG)
Estimated FTE time per failed transaction for estate agents (days)	2.60	Taken from previous work completed by TRX Impact on behalf of MHCLG	TRX Impact, 2023 (on behalf of MHCLG)
Estimated FTE time per failed transaction for all PSPs (days)	7.8	Sum of FTE time per failed transaction for conveyancers (buyers and sellers) and estate agents	Combined from other assumptions.
Property service providers cost base (Opex)	£63,903,690,000	GVA contribution for Property Service Providers Industry with profit margin removed	Combined from other assumptions.
Operating margin for Estate Agency	20%	Estimated from several online sources.	Estate Agent Today, 2025 (https://www.estateagenttoday.co.uk/breaking-news/2025/01/lsls-franchised-agents-boosted-by-material-increase-in-profit/); Letting Agent Today, 2021 (https://www.lettingagenttoday.co.uk/breaking-news/2021/09/agents-should-aim-for-50-profit-margins-says-ex-arla-chief/)
Operating margin for Conveyancing	21%	N/A	Law Society, 2024 (https://www.lawsociety.org.uk/topics/research/financial-benchmarking-survey-2024)
GVA contribution for Property Service Providers Industry	£80,382,000,000	N/A	Office for National Statistics, 2024 (https://www.ons.gov.uk/economy/grossvalueaddedgva/datasets/nominalandrealregionalgrossvalueaddedbalancedbyindustry)
% contribution of MFP to GVA for Property Services industry	0.35%	For 2012 until 2022 (latest)	Office for National Statistics, 2024 (https://www.ons.gov.uk/economy/grossvalueaddedgva/datasets/nominalandrealregionalgrossvalueaddedbalancedbyindustry)
Estimated cost to establish APIs	£31,515,000	Estimated costs per Local Authority multiplied by number of Local Authorities	Combined from other assumptions.
Number of Local Authorities in the UK	382	Combined number of Local Authorities across all 4 UK nation	LGiU, 2025 (https://lgiu.org/resources/local-government-facts-and-figures/); Law Wales, 2025 (https://law.gov.wales/local-government-bodies)

Number of API integrations required per Local Authority	4	4 API integrations assumed to be required to share: UPRN, LLC1 data, CON29 data and AML checks.	Triangulated from 2 interviewees.
Average cost of API integrations per API	£27,500	Mid-point of a range provided by an interviewee; sense checked against online sources.	RichestSoft, 2025 (https://richestsoft.com/blog/how-much-does-it-cost-to-develop-an-api/); Netguru, 2025 (https://www.netguru.com/blog/api-integration-cost); Confirmed by an interviewee.
Adjustment to account for economies of scale	0.75	Assuming a 25% reduction in total required API integrations due to shared systems.	N/A
Estimated cost to digitise and standardise data	£1,500,000,000	Sum of estimated cost to digitise LLC1 and CON29 data	Combined from other assumptions.
Estimated cost to digitise and standardise LLC1 data	£750,000,000	According to interviewees, £500m has been invested in digitalisation of LLC1 data to date, but this has only covered half of Local Authorities. The other 50% of Local Authorities are anticipated to do this 40% more efficiently due to learnings from the work so far.	Triangulated from 4 interviewees.
Estimated cost to digitise and standardise CON29 data	£750,000,000	According to interviewees, digitising the CON29 dataset is estimated to be twice as complex as LLC1, but cost a similar amount due to learnings from previous digitalisation efforts.	Triangulated from 4 interviewees.
Estimated FTE required for process / organisational redesign programme across all Local Authorities	955	FTE required per Local Authority, multiplied by number of Local Authorities.	Combined from other assumptions.
Estimated FTE required for process / organisational redesign programme per Local Authority	3	Estimates from qualitative descriptions provided by interviewees.	Triangulated from 4 interviewees.
Average annual salary for project manager implementing process / organisational redesign programme	£46,750	this figure was derived by averaging the project, programme, delivery, and change roles that would realistically appear in a local government transformation team, removing senior roles.	Association for Project Management, 2023 (https://www.apm.org.uk/project-management-salary-survey/); UK Talent, 2025 (https://uk.talent.com/salary?job=local+authority)
Estimated FTE required for database maintenance and storage across all Local Authorities	764	FTE required per Local Authority, multiplied by number of Local Authorities.	Combined from other assumptions.
Estimated FTE required for database maintenance and storage per Local Authority	2	Estimates from qualitative descriptions provided by interviewees.	Triangulated from 4 interviewees.

Average annual salary for database administrator	£44,000	N/A	Indeed, 2025 (https://uk.indeed.com/career-advice/pay-salary/average-it-salaries)
Estimated time saving for Local Authority staff per transaction (days)	0.25	Estimates from qualitative descriptions provided by interviewees.	Triangulated from 4 interviewees.
Financial Services I-O multiplier	1.529	Assumes consumer spends excess money in finance sector	Office for National Statistics, 2025 (https://www.ons.gov.uk/economy/nationalaccounts/supplyandusetables/datasets/ukinputoutputanalyticaltablesindustrybyindustry)
Property Services I-O multiplier	1.578	Assumes consumer spends excess money in property sector	Office for National Statistics, 2025 (https://www.ons.gov.uk/economy/nationalaccounts/supplyandusetables/datasets/ukinputoutputanalyticaltablesindustrybyindustry)
Information and Communication Services I-O multiplier	1.598	Assumes ATP spend multiplier is similar to wider information sector	Office for National Statistics, 2025 (https://www.ons.gov.uk/economy/nationalaccounts/supplyandusetables/datasets/ukinputoutputanalyticaltablesindustrybyindustry)
Estimated growth rate of property transactions	0.7%	Assumed the same as population growth, presupposing the average household size and rate of home ownership will remain steady over time.	Office for National Statistics (https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojectiOffice for National Statistics/bulletins/nationalpopulationprojections/2022based)
Inflation rate (2022-25)	6.0%	Mean of inflation rates provided by Office for National Statistics over 3 years	Office for National Statistics, 2025 (https://www.ons.gov.uk/economy/inflationandpriceindices/timeseries/l55o/mm23)
Inflation rate (2025 onwards)	2.0%	Assumes inflation remains in line with Bank of England target from 2025 onwards	Bank of England, 2025 (https://www.bankofengland.co.uk/monetary-policy/inflation)
Value of one hour of leisure time (inflated to use case start date)	£8.36	Using figure from the Department for Transport's 'Transport Analysis Guidance' (TAG)	Batley, R. & Dekker, T., 2023 (https://www.fca.org.uk/publication/external-research/valuing-consumers-time-cost-benefit-analysis.pdf)
Consumer multiplier	1.49	Assumes consumer spends excess money on retail sector	Office for National Statistics, 2023 (https://www.ons.gov.uk/economy/economicoutputandproductivity/productivitymeasures/bulletins/growthaccountingmultifactorproductivityestimatesuk/2023)
Number of ATPs in year 1	1	Assumes Open Property Data Association is only ATP in first year of use case	N/A
Total GVA (whole economy)	£356,045,596,037	Assumes total GVA benefits from increased savings	Office for National Statistics, 2024 (https://www.ons.gov.uk/economy/grossvalueaddedgva/datasets/nominalandrealregionalgrossvalueaddedbalancedbyindustry)
Capital weights	37.2%	Average of historic capital weights	Office for National Statistics, 2023 (https://www.ons.gov.uk/economy/economicoutputandproductivity/productivitymeasures/bulletins/growthaccountingmultifactorproductivityestimatesuk/2023)
Whole Economy Multiplier	1.43	Assumes multiplier is the same as gross fixed capital formation multiplier across total economy	Office for National Statistics, 2023 (https://www.ons.gov.uk/economy/economicoutputandproductivity/productivitymeasures/bulletins/growthaccountingmultifactorproductivityestimatesuk/2023)
Labour weights	63%	Average of historic labour weights	Office for National Statistics, 2023 (https://www.ons.gov.uk/economy/economicoutputandproductivity/productivitymeasures/bulletins/growthaccountingmultifactorproductivityestimatesuk/2023)

B.1.2 Monte Carlo assumptions

Assumption	Value	Confidence grade / Use case size	Rationale	Source
Initial condition for adoption curve	46%	D	Assumes rate of increase in penetration is double that of Open Banking, due to increased stress associated with current state.	Forrester, 2022 (https://www.forrester.com/report/european-open-banking-forecast-2022-to-2027/RES178412)

			Log distribution used to account for "black swan" scenario where use case takes off rapidly	
ATP set-up costs	£32,961	A	Assumes cost to set-up ATP is similar to PSDII	Implementation of the revised EU PSDII (https://www.gov.uk/government/consultations/implementation-of-the-revised-eu-payment-services-directive-psdii)
Proportion of failed transactions avoided	26%	C	A triangulated estimate based on inputs from several interviewees and a previous study which found upfront information at the point of listing a property prevents approximately 13% of fall throughs.	Today's conveyancer, 2023; TRX Impact, 2023 (on behalf of MHCLG); Confirmed by an interviewee.
Proportion of fraudulent transactions avoided	25%	D	Assumed digitalisation will reduce fraud within property to a similar extent to within financial services.	Datavisor, 2021 (https://cdn.featuredcustomers.com/CustomerCaseStudy.document/DataVisor_Top_Credit_Card_Issuer_Application_Fraud_Case_Study.pdf)
ATP annual compliance costs	£18,736	A	Assumes cost to set-up ATP is similar to PSDII	Implementation of the revised EU PSDII (https://www.gov.uk/government/consultations/implementation-of-the-revised-eu-payment-services-directive-psdii)
Scheme implementation cost for financial services (FS)	£31,261,758	A	Taking estimates provided by two large banks, scaling it according to those bank's share of the mortgage market, before taking a mean.	Mortgage Introducer, 2024 (https://www.mpamag.com/uk/mortgage-industry/market-trends/santander-mortgage-market-share-gutted-as-battle-for-customers-heats-up/502665); NatWest Group (https://www.natwestgroup.com/sustainability/society/mortgage-lending.html); Confirmed by 2 interviewees.
Estimated reduction in probability of default	6%	E	Assumed that use case will only have an impact on mortgage defaults not brought about by negative life events	Ganong, P. & Noel, P., 2023 (https://academic.oup.com/qje/article-abstract/138/2/1001/6760170).
ATP Year 1 Growth Rate	263%	C	Assumes ATP growth rate similar to "improved financial decision making" use case in Open Banking	Open Banking Limited, 2023 (https://openbanking.foleon.com/live-publications/the-open-banking-impact-report-october-2023/)
ATP Year 2 Growth Rate	55%	C	Assumes ATP growth rate similar to "improved financial decision making" use case in Open Banking	Open Banking Limited, 2023 (https://openbanking.foleon.com/live-publications/the-open-banking-impact-report-october-2023/)
ATP Year 3+ Growth Rate	13%	C	Assumes ATP growth rate similar to "improved financial decision making" use case in Open Banking	Open Banking Limited, 2023 (https://openbanking.foleon.com/live-publications/the-open-banking-impact-report-october-2023/)
% of salary costs for additional resources and indirect staff costs (all sectors)	33%	A	Assumes cost per employee is a standard % increase on top of salary across all sectors	TimeCamp, 2024 (https://www.timecamp.com/blog/understanding-the-exact-cost-of-an-employee/)
Estimated hours spent per FTE on implementing new processes and training (PSP)	0.50	A	Assumption developed from qualitative comments from interviewees	Triangulated from 2 interviewees.
Scheme governance body set-up costs	£50,083,825	A	Assumes governance body costs are similar to Open Banking	Companies House, 2025 (https://find-and-update. company-information.service.gov.uk/company/10440081/filing-history?page=1)
Scheme governance body ongoing costs	£39,511,239	A	Assumes governance body costs are similar to Open Banking	Companies House, 2025 (https://find-and-update. company-information.service.gov.uk/company/10440081/filing-history?page=1)

Marginal Propensity to consume	11%	A	Consumers will only spend a proportion of their cost savings	Bank of England, 2022 (https://www.bankofengland.co.uk/-/media/boe/files/working-paper/2022/financial-concerns-and-the-marginal-propensity-to-cOffice for National Statisticsume-in-covid-times.pdf)
Use case share of scheme	50%	L	Assumed to be a 'Large' use case in T-shirt sizing approach, accounting for 40-60% of scheme costs and benefits.	API calls from Open Banking; Qualitative assessment (x3); Share of use case longlist

B.2 Digitising trade finance

The table below provides a list of all the assumptions which informed the estimates of the value of the Digitising trade finance use case (see section 3.2).

B.2.1 Fixed assumptions

Assumption	Value	Rationale	Source
Cost of transportation as proportion of total product cost	2%	Noted as rule of thumb by Maersk	Maersk, date unknown (https://www.shippingdaily.co.kr/newsfile/2011/09/14/SDD00082242.pdf)
Total UK GDP	£2,848,000,000,000	GDP in 2024 in cash terms	House of Commons Library, 2025 (https://commonslibrary.parliament.uk/research-briefings/sn02783/)
Value of goods imports into the UK	£560,600,000,000	Total imports in goods in current prices, 2024, excluding precious metals	Office for National Statistics, 2024 (https://www.ons.gov.uk/economy/nationalaccounts/balanceofpayments/bulletins/uktrade/december2024)
Imports into the UK as a percentage of total GDP	20%	Total imports as a percentage of GDP	Combined from other assumptions.
Value of goods exports from the UK	£359,100,000,000	Total exports in goods in current prices, 2024, excluding precious metals	Office for National Statistics, 2024 (https://www.ons.gov.uk/economy/nationalaccounts/balanceofpayments/bulletins/uktrade/december2024)
Minimum number of importers from the US, AU, NZ, SG	45,032	As the list of importers above may include duplicates across categories (i.e some companies will import from more than one country), we know the largest value from the list is the minimum number of total importers.	HM Revenue & Customs, 2025 (https://www.uktradeinfo.com/trade-data/ots-custom-table/); HM Revenue & Customs, 2024 (https://www.gov.uk/government/statistical-data-sets/uk-regional-trade-in-goods-statistics-second-quarter-april-to-june-2024-business-counts-data)
Maximum number of importers from the US, AU, NZ, SG	55,914	The sum of all the values in the list above is the maximum number of importers from the 4 included countries, assuming there are no companies which import from more than one of those countries.	HM Revenue & Customs, 2025 (https://www.uktradeinfo.com/trade-data/ots-custom-table/); HM Revenue & Customs, 2024 (https://www.gov.uk/government/statistical-data-sets/uk-regional-trade-in-goods-statistics-second-quarter-april-to-june-2024-business-counts-data)
Mean number of importers from the US, AU, NZ, SG	50,473	Mid-point of the upper and lower bound	Combined from minimum and maximum number of importers from the US, AU, NZ and SG
Total importers from all origin countries	251,200	Gathered from HMRC data sources	HM Revenue & Customs, 2025 (https://www.uktradeinfo.com/trade-data/ots-custom-table/); HM Revenue & Customs, 2024 (https://www.gov.uk/government/statistical-data-sets/uk-regional-trade-in-goods-statistics-second-quarter-april-to-june-2024-business-counts-data)

Proportion of importers that import from the US, AU, NZ, SG	20%	Gathered from HMRC data sources	HM Revenue & Customs, 2025 (https://www.uktradeinfo.com/trade-data/ots-custom-table/); HM Revenue & Customs, 2024 (https://www.gov.uk/government/statistical-data-sets/uk-regional-trade-in-goods-statistics-second-quarter-april-to-june-2024-business-counts-data)
Minimum number of exporters to the US, AU, NZ, SG	40,104	As the list of exporters above may include duplicates across categories (i.e some companies will export to more than one country), we know the largest value from the list is the minimum number of total exporters.	HM Revenue & Customs, 2025 (https://www.uktradeinfo.com/trade-data/ots-custom-table/); HM Revenue & Customs, 2024 (https://www.gov.uk/government/statistical-data-sets/uk-regional-trade-in-goods-statistics-second-quarter-april-to-june-2024-business-counts-data)
Maximum number of exporters to the US, AU, NZ, SG	71,961	The sum of all the values in the list above is the maximum number of exporters from the 4 included countries, assuming there are no companies which export to more than one of those countries.	HM Revenue & Customs, 2025 (https://www.uktradeinfo.com/trade-data/ots-custom-table/); HM Revenue & Customs, 2024 (https://www.gov.uk/government/statistical-data-sets/uk-regional-trade-in-goods-statistics-second-quarter-april-to-june-2024-business-counts-data)
Mean number of exporters to the US, AU, NZ, SG	56,033	Mid-point of the upper and lower bound	Combined from other assumptions.
Total exporters to all destination countries	125,547	Gathered from HMRC data sources	HM Revenue & Customs, 2025 (https://www.uktradeinfo.com/trade-data/ots-custom-table/); HM Revenue & Customs, 2024 (https://www.gov.uk/government/statistical-data-sets/uk-regional-trade-in-goods-statistics-second-quarter-april-to-june-2024-business-counts-data)
Proportion of exporters that export to the US, AU, NZ, SG	45%	Gathered from HMRC data sources	HM Revenue & Customs, 2025 (https://www.uktradeinfo.com/trade-data/ots-custom-table/); HM Revenue & Customs, 2024 (https://www.gov.uk/government/statistical-data-sets/uk-regional-trade-in-goods-statistics-second-quarter-april-to-june-2024-business-counts-data)
Average days travel by ship from United States	24	Based on average of North America East Coast - North Europe and North America West Coast - North Europe freight times	WTA, 2024 (https://www.wtagroup.com/resources-and-insights/blogs/how-long-does-sea-freight-take)
Average days travel by ship from Australia	39.5	Based on average of transit times between four major routes	Doc Shipper, 2025 (https://docshipper.co.uk/en/freight-shipping-between-the-uk-and-australia-rates-transit-time-duties-taxes/)
Average days travel by ship from New Zealand	42	Value taken directly from Fluent Cargo	Fluent Cargo, 2025 (https://www.fluentcargo.com/routes/new-zealand/united-kingdom)
Average days travel by ship from Singapore	29	Value taken directly from Fluent Cargo	Fluent Cargo, 2025 (https://www.fluentcargo.com/routes/singapore/united-kingdom)
Weighted average across countries	24.6	Average days travel by ship from US, AU, NZ, SG, weighted according to total value of trade from that country	Combined from other assumptions.
Number of transport and storage companies (Lower bound)	154,665	Lower bound taken from Statista	Statista, 2023 (https://www.statista.com/statistics/1314276/number-of-local-business-units-used-for-transport-and-storage-uk/)
Number of transport and storage companies (Upper bound)	214,160	Upper bound taken from Logistics UK	Logistics UK, 2024 (https://logistics.org.uk/CMSPages/GetFile.aspx?guid=a6fc6902-4a7a-4276-8c4c-bbe641af74b7&lang=en-GB)
Number of transport and storage companies (Mid-point)	184,413	Mid-point of the upper and lower bound	Combined from other assumptions.
Proportion of trading businesses that import from the US, AU, NZ, SG	20%	Assumed the proportion of work of transport and storage companies which handles goods from US, AU, NZ, and SG will be the same as	Taken from previous input.

		the proportion of all importers who import from those countries	
Number of transport and storage companies working with trade with the US, AU, NZ, SG	37,054	Number of transport and storage companies multiplied by proportion of trading businesses that import from the US, AU, NZ, SG	Combined from other assumptions.
Wholesale trade, except of motor vehicles and motorcycles	41,100	N/A	Office for National Statistics, 2024 (https://www.ons.gov.uk/businessindustryandtrade/business/businessservices/datasets/annualbusinesssurveyimportersandexportersindustrybreakdown)
Retail trade, except of motor vehicles and motorcycles	49,000	N/A	Office for National Statistics, 2024 (https://www.ons.gov.uk/businessindustryandtrade/business/businessservices/datasets/annualbusinesssurveyimportersandexportersindustrybreakdown)
% of all wholesale enterprises which import	40%	N/A	Office for National Statistics, 2024 (https://www.ons.gov.uk/businessindustryandtrade/business/businessservices/datasets/annualbusinesssurveyimportersandexportersindustrybreakdown)
% of all retail enterprises which import	23%	N/A	Office for National Statistics, 2024 (https://www.ons.gov.uk/businessindustryandtrade/business/businessservices/datasets/annualbusinesssurveyimportersandexportersindustrybreakdown)
% of all importers which are wholesale enterprises	23%	N/A	Office for National Statistics, 2024 (https://www.ons.gov.uk/businessindustryandtrade/business/businessservices/datasets/annualbusinesssurveyimportersandexportersindustrybreakdown)
% of all importers which are retail enterprises	27%	N/A	Office for National Statistics, 2024 (https://www.ons.gov.uk/businessindustryandtrade/business/businessservices/datasets/annualbusinesssurveyimportersandexportersindustrybreakdown)
% of all importers which are retail or wholesale enterprises	50%	Sum of % of all importers which are wholesale enterprises and % which are retail enterprises	Combined from other assumptions.
Value of trade finance as proportion of total trade value	80%	N/A	International Chamber of Commerce, 2021 (https://www.wto.org/english/tratop_e/msmes_e/iccuk_240621.pdf)
Value of UK trade finance	£735,760,000,000	Assumes UK trade finance market is at least as big in proportion to value of UK trade as global proportion (likely underestimate given size of exports of UK financial services)	Combined from other assumptions.
Value of UK financial services industry	£1,600,000,000,000	Total assets managed by UK-resident investment funds in 2023	Office for National Statistics, 2024 (https://www.ons.gov.uk/economy/nationalaccounts/uksectoraccounts/articles/ukfinancialaccountsupdate/2024-12-04)
Proportion of UK financial services industry from trade finance	46%	N/A	Combined from other assumptions.
Total global trade finance gap	£1,500,000,000,000	The trade finance gap represents global unmet demand: the difference between requests and approvals for financing to support imports and exports.	International Chamber of Commerce, 2021 (https://www.dsi.iccwbo.org/files/ugd/0b6be59a983b7c954d49389dd25a54033bcf78.pdf?index=true)
Total value of global goods exports (2023)	$30,800,000,000,000	N/A	World Trade Organisation, 2023 (https://www.wto.org/english/res_e/statis_e/statistics2023_e.htm)
UK goods exports to US, AU, NZ, SG as percentage of total global goods exports	0.08%	N/A	Combined from other assumptions.

Value of trade finance gap relating to UK goods exports to US, AU, NZ, SG	£532,780,374	Total trade finance gap relating to exports, multiplied by percentage relating to trade from UK with US, AU, NZ, SG	Combined from other assumptions.
Total trade finance for UK goods exports to US, AU, NZ, SG	£15,217,107,629	Total value of trade to these countries versus proportion of that value subject to trade finance	Combined from other assumptions.
Trade finance gap as percentage of value of export goods trade from UK to US, AU, NZ, SG	3.50%	N/A	Combined from other assumptions.
Estimated growth rate in UK companies importing goods from US, AU, NZ, SG	4%	Average annual growth rate in UK imports from 2000 to 2023	UN Trade & Development, 2024 (https://unctadstat.unctad.org/datacentre/dataviewer/US.TradeMerchGR)
Estimated growth rate in UK transport and storage companies	3%	Predicted CAGR for UK freight and logistics market to 2030	Mordor Intelligence, 2024 (https://www.mordorintelligence.com/industry-reports/united-kingdom-freight-logistics-market-study)
Transport & storage GVA	£3,704,684,585	Proportion of transportation and storage GVA relating to imports (assuming same proportion for industry as for whole economy) from US, AU, NZ, SG	Combined from a range of other inputs.
Importer GVA	£1,399,792,639	Proportion of retail and wholesale industry GVA relating to wholesale and retail enterprises which are importing from US, AU, NZ, SG, doubled as wholesale and retail account for c.50% of importers	Combined from a range of other inputs.
Estimated average time to process UK customs for goods traded internationally (days)	1.11	Median average time in port in UK for all ships, in 2023	UN Trade & Development, 2024 (https://unctadstat.unctad.org/datacentre/dataviewer/US.PortCalls)
Weighted Average Cost of Capital (WACC) for importers	9.3%	Average from 4 of the largest UK retailers	As of 3/3/25, WACC was 7.7% for Kingfisher PLC (https://valueinvesting.io/KGF.L/valuation/wacc), 10.11% for Marks & Spencer Group (https://www.gurufocus.com/term/wacc/LSE:MKS), 11.48% for Next (https://www.gurufocus.com/term/wacc/NXGPY), and 7.91% for Sainsbury's (https://www.gurufocus.com/term/wacc/JSAIY)
Weighted Average Cost of Capital (WACC) for exporters	9.3%	Assumed to be the same as for importers.	As of 3/3/25, WACC was 7.7% for Kingfisher PLC (https://valueinvesting.io/KGF.L/valuation/wacc), 10.11% for Marks & Spencer Group (https://www.gurufocus.com/term/wacc/LSE:MKS), 11.48% for Next (https://www.gurufocus.com/term/wacc/NXGPY), and 7.91% for Sainsbury's (https://www.gurufocus.com/term/wacc/JSAIY)
Estimated cost to digitise and standardise data and system for Transport & storage companies, exporters and importers	-£40,319	Assuming costs for SMEs, as 90% of importers and exporters are SMEs; based on 5% of average annual turnover.	Office for National Statistics, 2024 (https://www.ons.gov.uk/businessindustryandtrade/internationaltrade/datasets/uktradeingoodsbybusinesscharacteristics); Merchantsavvy, 2024 (https://www.merchantsavvy.co.uk/uk-sme-data-stats-charts/)
Estimated cost to re-platform for Transport & storage companies, exporters and importers	-£27,167	Assuming costs for SMEs, as 90% of importers and exporters are SMEs; converted from USD to GBP on 10/3/25 at rate of 1:0.78	Office for National Statistics, 2024 (https://www.ons.gov.uk/businessindustryandtrade/internationaltrade/datasets/uktradeingoodsbybusinesscharacteristics); LK Tech, date unknown (https://lktechnologies.com/costs-of-cloud-migration-a-guide-for-smes/)

Estimated cost of service add-on for Transport & storage companies, exporters and importers	-£6,000	Assuming costs for SMEs, as 90% of importers and exporters are SMEs; based on case study of SME costs of £500 per month for electronic bills of lading software	Office for National Statistics, 2024 (https://www.ons.gov.uk/businessindustryandtrade/internationaltrade/datasets/uktradeingoodsbybusinesscharacteristics); International Chamber of Commerce, 2024 (https://iccwbo.uk/wp-content/uploads/2024/04/Seizing_the_moment_Unleashing_the_power_of_trade_digitalisation_report.pdf)
Estimated ATP annual membership fee for Transport & storage companies	£7,200	As we have no data on likely ATP membership fees, assume ATP membership fees are the same as those for small organisations in Project Perseus, but apply a 40% reduction to account for optimism bias, as is standard for assumptions at confidence grade E (see 'Lookups' tab).	Icebreaker One, 2024 (https://ib1.org/perseus/2024-plan/)
Estimated ATP annual membership fee for Importers and Exporters	£7,200	As we have no data on likely ATP membership fees, assume ATP membership fees are the same as those for small organisations in Project Perseus (£12,000), but apply a 40% reduction to account for optimism bias, as is standard for assumptions at confidence grade E (see 'Lookups' tab).	Icebreaker One, 2024 (https://ib1.org/perseus/2024-plan/)
Estimated ATP annual membership fee for Financial services	£24,000	As we have no data on likely ATP membership fees, assume ATP membership fees are the same as those for medium organisations (£40,000) in Project Perseus, but apply a 40% reduction to account for optimism bias, as is standard for assumptions at confidence grade E (see 'Lookups' tab).	Icebreaker One, 2024 (https://ib1.org/perseus/2024-plan/)
Estimated value of duties lost due to customs fraud	£177,311,209	Based on 2.5% tax gap from excise duty estimated by HMRC for 2022/23, with total revenue estimated from proportion of £4.8bn total customs duty receipts plus assumed 29% VAT rate	HMRC, 2024 (https://assets.publishing.service.gov.uk/media/66a8ebc349b9c0597fdb0784/HMRC_annual_report_and_accounts_2023_to_2024.pdf); Statista, 2024 (https:// www.statista.com/statistics/284363/customs-duty-united-kingdom-hmrc-tax-receipts/)
Total FTE in ports trading with US, AU, NZ, SG which are employed as customs officials	6,524	Proportion of total port employees working in specialist services (including customs and security), assuming linear proportion of FTEs by proportion of importers/exporters	Maritime UK, 2022 (https://www.maritimeuk.org/documents/1138/2022_CEBR_Report_Ports_industry.pdf); Department for Transport, 2010 (https://assets.publishing.service.gov.uk/media/5b5ae40940f0b6338e417923/port-employment-and-accident-rates-statistical_release-2009-10.pdf)
Cost per FTE	£42,053	Employer total cost including NI and pension, from gross pay of £36,432 p.a. (average salary for customs office in UK, n=27)	Indeed, 2025 (https://uk.indeed.com/career/customs-officer/salaries)
Number of UK banks	328	N/A	Statista, 2024 (https://www.statista.com/statistics/870166/number-of-banks-operating-in-the-uk-by-country-of-residence)
Estimated growth rate in UK banks	2.1%	Assumes the number of banks grows in line with anticipated CAGR of the banking sector from 2024-2032	imarc, 2024 (https://www.imarcgroup.com/uk-retail-banking-market)
Trade finance GVA	£2,456,675,856	Proportion of financial services sector GVA relating to trade finance with US, AU, NZ, SG	Combined from a range of other inputs.
Estimated growth rate in UK companies exporting goods to US, AU, NZ, SG	3%	Average annual growth rate in UK exports from 2000 to 2023	UN Trade & Development, 2024 (https://unctadstat.unctad.org/datacentre/dataviewer/US.TradeMerchGR)

Number of ATPs in Year 1	6	Number of pilot companies involved in 2025	Agreed with owner of the relevant submission to the Smart Data Discovery Challenge
Assumed scheme costs relative to Open Banking	4%	Assumed to be the combination of the GVA ratio of trade finance GVA from US, AU, NZ, SG to financial services, and the number of large firms in trade finance (13 - see source) vs Open Banking (9)	Combined from a range of other inputs; International Chamber of Commerce, 2020 (https://iccwbo.org/wp-content/uploads/sites/3/2020/07/2020-ICC-Global-Trade-Survey-vWeb.pdf)
Transport & storage multiplier	1.84	Average across all transport and storage sub-sectors	Office for National Statistics, 2024 (https://www.ons.gov.uk/economy/nationalaccounts/supplyandusetables/datasets/ukinputoutputanalyticaltablesindustrybyindustry)
Importer multiplier	1.53	Using wholesale and retail as proxies for importer average (collectively correspond to 50% of importers - see inputs)	Office for National Statistics, 2024 (https://www.ons.gov.uk/economy/nationalaccounts/supplyandusetables/datasets/ukinputoutputanalyticaltablesindustrybyindustry)
Exporter multiplier	1.53	Assumed to be the same as for importers.	Taken from previous assumption.
Financial services multiplier	1.53	Financial services spend multiplier	Office for National Statistics, 2024 (https://www.ons.gov.uk/economy/nationalaccounts/supplyandusetables/datasets/ukinputoutputanalyticaltablesindustrybyindustry)
Reduction in time required for customs processing due to data sharing	80%	Assumption from the International Chamber of Commerce	International Chamber of Commerce, 2024 (https://iccwbo.uk/wp-content/uploads/2024/09/Achieving-Growth-Through-Trade-Digitalisation.pdf); International Chamber of Commerce, 2024 (https://iccwbo.uk/wp-content/uploads/2024/04/Seizing_the_moment_Unleashing_the_power_of_trade_digitalisation_report.pdf)
Value of UK international trade finance market between UK and US, AU, NZ, SG	£34,221,380,971	Assuming 100% of UK exports and imports backed by UK financial service organisations	Combined from a range of other inputs.
Estimated cost to re-platform for Financial services	-£10,000,000	80% of banks spent <£10m on developing/acquiring digital solutions for trade finance, including future spends 3-5 years ahead	International Chamber of Commerce, 2020 (https://iccwbo.org/wp-content/uploads/sites/3/2020/07/2020-ICC-Global-Trade-Survey-vWeb.pdf)

B.2.2 Monte Carlo assumptions

Assumption	Value	Confidence grade / Use case size	Rationale	Source
Initial condition for adoption curve - transport & storage and importers	25%	A	Assuming same adoption rates used for EDTA impact assessment	Department for Science, Innovation & Technology, 2022 (https://www.gov.uk/government/publications/electronic-trade-documents-bill-impact-assessment/impact-assessment-of-the-electronic-trade-documents-bill)
Reduction in transport & storage company total time required from faster document processing	4%	C	75% reduction in processing times from digitalisation of transferrable documents; 5% of total trade transaction values associated with paper document processes	Department for Science, Innovation & Technology, 2022 (https://www.gov.uk/government/publications/electronic-trade-documents-bill-impact-assessment/impact-assessment-of-the-electronic-trade-documents-bill); London School of Economics, 2023 (https://www.lse.ac.uk/business/consulting/assets/documents/Benefits-of-the-digitalisation-of-trade-processes-and-cross-border-barriers-to-their-adoption.pdf)
Increase in value of goods for importer	0%	B	Assuming increase in output is equal to reduction in total travel time due to customs time reduction (estimated based on	International Chamber of Commerce, 2024 (https://iccwbo.uk/wp-content/uploads/2024/09/Achieving-Growth-Through-Trade-Digitalisation.pdf); International Chamber of Commerce,

due to faster customs processing			triangulation from various sources), multiplied by proportion of product costs relating to transportation	2024 (https://iccwbo.uk/wp-content/uploads/2024/04/ Seizing_the_moment_Unleashing_the_power_of_trade_digitalisation_report.pdf)
Proportion of transport & storage companies and importers which need to convert from paper to digital	17%	B	45% of companies say they're ready to use digital documents of title in Santander Barometer survey (n=1004); of proportion not ready, assuming 35% will need software add-on, 35% will need to re-platform, and 30% will need to digitise	International Chamber of Commerce, 2024 (https://iccwbo.uk/wp-content/uploads/2024/04/ Seizing_the_moment_Unleashing_the_power_of_trade_digitalisation_report.pdf)
Proportion of transport & storage companies and importers which need to re-platform	19%	B	45% of companies say they're ready to use digital documents of title in Santander Barometer survey (n=1004); of proportion not ready, assuming 35% will need software add-on, 35% will need to re-platform, and 30% will need to digitise	International Chamber of Commerce, 2024 (https://iccwbo.uk/wp-content/uploads/2024/04/ Seizing_the_moment_Unleashing_the_power_of_trade_digitalisation_report.pdf)
Proportion of transport & storage companies and importers which need to procure service add-on	19%	B	45% of companies say they're ready to use digital documents of title in Santander Barometer survey (n=1004); of proportion not ready, assuming 35% will need software add-on, 35% will need to re-platform, and 30% will need to digitise	International Chamber of Commerce, 2024 (https://iccwbo.uk/wp-content/uploads/2024/04/ Seizing_the_moment_Unleashing_the_power_of_trade_digitalisation_report.pdf)
Reduction in importer total time required from faster due diligence processes	3%	D	Assumed equal to cost savings of implementation of Legal Entity Identifiers, as a key component of KYC due diligence checks	International Chamber of Commerce, 2024 (https://www.gleif.org/lei-solutions/featuring-the-lei/global-value-chains/scaling-the-use-of-digital-identities-in-trade.pdf)
Regulatory monitoring costs	£200,000	B	Assumes monitoring costs similar to FCA compliance monitoring cost of Pensions Dashboards	Legislation.gov.uk, 2022 (https:// www.legislation.gov.uk/ukia/2022/81)
Percentage reduction in trade finance gap for UK exporters to US, AU, NZ, SG	50%	C	Assuming access to trade finance solutions through sufficient data will have same impact for UK export trade finance as for global average	International Chamber of Commerce, 2024 (https://iccwbo.uk/wp-content/uploads/2024/09/Achieving-Growth-Through-Trade-Digitalisation.pdf); International Chamber of Commerce, 2024 (https://iccwbo.uk/wp-content/uploads/2024/04/ Seizing_the_moment_Unleashing_the_power_of_trade_digitalisation_report.pdf)
Government set up costs, including re-platforming, standardisation, and connectivity upgrades at ports	£180,000,000	C	Assuming similar to implementation cost estimates for Single Trade Window	Cabinet Office, 2022 (https://www.gov.uk/government/publications/uk-single-trade-window-discussion-paper/uk-single-trade-window-policy-discussion-paper)
Proportion of time savings in customs translated into reduced headcount	100%	E	Given the push towards reducing the size and cost of government agencies, it is assumed that all of the time savings in customs processes would be converted into headcount reductions within government.	BBC News, 2025 (https://www.bbc.co.uk/news/articles/cy5nzy403l0o)
Proportion of customs fraud avoided through increased transparency	10%	C	Digitalisation of trade processes has enabled customs authorities to improve anomaly detection by 10%.	London School of Economics, 2023 (https://assets.publishing.service. gov.uk/media/ 669fcf5b49b9c0597fdb0349/benefits-of-the-digitalisation-of-trade-processes-and-cross-border-barriers-to-their-adoption-report.pdf)

Initial condition for adoption curve - financial services	23%	B	Assumes rate of increase in penetration is similar to open banking. Log distribution used to account for "black swan" scenario where use case takes off rapidly	Forrester, 2022 (https://www.forrester.com/report/european-open-banking-forecast-2022-to-2027/RES178412)
Reduction in financial services total time required from faster due diligence processes	10%	D	Assumed equal to cost savings of implementation of Legal Entity Identifiers, as a key component of KYC due diligence checks	McKinsey & Company, 2017 (https://www.mckinsey.com/industries/financial-services/our-insights/the-legal-entity-identifier-the-value-of-the-unique-counterparty-id)
% increase in capital provided through trade finance (CAGR)	4%	B	CAGR without use case estimated at 3.01%; additional CAGR from use case is estimated to be 0.95% based on LSE assessment of impact of trade finance digitalisation on agriculture and manufacturing imports and exports.	Business Wire, 2022 (https://www.businesswire.com/news/home/20220720005761/en/UK-Letter-Of-Credit-Confirmation-Market-Report-2022-2027-Increased-Risk-of-Non-Payment-Increasing-Digitization-of-Financial-Services-Fueling-3-Growth---ResearchAndMarkets.com); London School of Economics, 2023 (https://assets.publishing.service.gov.uk/media/669fcf5b49b9c0597fdb0349/benefits-of-the-digitalisation-of-trade-processes-and-cross-border-barriers-to-their-adoption-report.pdf)
Proportion of banks which need to re-platform	5%	E	Assuming low for UK financial services as assuming majority aligned with Open Banking, and assuming interoperability of trade finance solution with Open Banking scheme	Forrester, 2022 (https://www.forrester.com/report/european-open-banking-forecast-2022-to-2027/RES178412)
Proportion of banks which need to procure service add-on	40%	D	Based on proportion of banks who use physical paper for settlement and document verification, assuming all would require service add-on	International Chamber of Commerce, 2020 (https://iccwbo.org/wp-content/uploads/sites/3/2020/07/2020-ICC-Global-Trade-Survey-vWeb.pdf)
Scheme governance body ongoing costs	£1,516,602	A	Assumes governance body costs are similar to Open Banking, adjusted for relative size	Companies House, 2025 (https://find-and-update.company-information.service.gov.uk/company/10440081/filing-history?page=1)
Use case share of the scheme	50%	L	Developed by researchers through triangulation of three separate approaches	N/A
ATP set-up costs	£33,620	C	Assumes cost to set-up ATP is similar to the EU's PSDII	HM Treasury, 2017 (https://www.gov.uk/government/consultations/implementation-of-the-revised-eu-payment-services-directive-psdii)
ATP annual compliance and running costs	£19,110	C	Assumes cost to set-up ATP is similar to the EU's PSDII	HM Treasury, 2017 (https://www.gov.uk/government/consultations/implementation-of-the-revised-eu-payment-services-directive-psdii)
ATP Year 1 growth rate	263%	C	Assumes ATP growth rate similar to "improved financial decision-making" use case in Open Banking	Open Banking Limited, 2023 (https://openbanking.foleon.com/live-publications/the-open-banking-impact-report-october-2023/)
ATP Year 2 growth rate	55%	C	Assumes ATP growth rate similar to "improved financial decision-making" use case in Open Banking	Open Banking Limited, 2023 (https://openbanking.foleon.com/live-publications/the-open-banking-impact-report-october-2023/)
ATP Year 3+ growth rate	13%	C	Assumes ATP growth rate similar to "improved financial decision-making" use case in Open Banking	Open Banking Limited, 2023 (https://openbanking.foleon.com/live-publications/the-open-banking-impact-report-october-2023/)
Scheme governance body set up costs	£1,153,453	A	Assumes governance body costs are similar to Open Banking, adjusted for relative size	Companies House, 2025 (https://find-and-update.company-information.service.gov.uk/company/10440081/filing-history? page=1)

B.3 Consumer experience of online groceries

The table below provides a list of all the assumptions which informed the estimates of the value of the Consumer experience of online groceries use case (see section 3.3).

B.3.1 Fixed assumptions

Assumption	Value	Rationale	Source
Adjusted QALY coefficient of mMDS score 3-5 (relative to 0-2)	0.11	Assumes healthier diet equivalent to higher modified Mediterranean Diet Score	Fransen et al., 2014 (https://pmc.ncbi.nlm.nih.gov/articles/PMC4219750/)
Adjusted QALY coefficient of mMDS score 6-8 (relative to 0-2)	0.12	Assumes healthier diet equivalent to higher modified Mediterranean Diet Score	Fransen et al., 2014 (https://pmc.ncbi.nlm.nih.gov/articles/PMC4219750/)
Retail Commission Rates	3.5%	Assumes commission rates for this use case are similar to current commission rates	Remuner, 2024 (https://www.remuner.com/blog/sales-commission/)
Retail Commission Rates	6.5%	Assumes commission rates for this use case are similar to current commission rates	SmartReach.io, 2024 (https://smartreach.io/blog/sales-commission-rates-by-industry/)
Average weekly household expenditure on food & Non-alcoholic drinks	£63.50	Consumers will primarily purchase food & non-alcoholic drinks through this use case	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)
Average weekly household expenditure on Alcoholic drink, tobacco & narcotics	£10.80	N/A	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)
Average weekly household expenditure on Clothing & footwear	£16.80	N/A	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)
Average weekly household expenditure on Housing(net), fuel & power	£105.70	N/A	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)
Average weekly household expenditure on Household goods & services	£35.50	N/A	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)
Average weekly household expenditure on Health	£8.90	N/A	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)
Average weekly household expenditure on Transport	£79.20	N/A	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)
Average weekly household expenditure on Communication	£20.30	N/A	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)
Average weekly household expenditure on Recreation & culture	£65.40	N/A	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)

Average weekly household expenditure on Education	£5.10	N/A	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)
Average weekly household expenditure on Restaurants & hotels	£40.50	N/A	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)
Time savings reinvested into work	40%	Time reinvestment is similar to commuting times saved by remote working	Aksoy et al., 2023 (https://www.ebrd.com/publications/working-papers/time-savings-when-working-from-home)
Average time spent on grocery shopping per week (hours)	2.3	N/A	Consumer survey carried out by The PSC (03/03/2025)
Estimate of time savings per month from use case (hours)	8	Time saving estimate taken from submission to the Department for Business & Trade's Smart Data Discovery Challenge	Smart Data Discovery Challenge Submission, 2024 (unpublished)
Estimated 6-month adoption rate of use case	61%	N/A	Consumer survey carried out by The PSC (03/03/2025)
Willingness to pay for use case service per year	£148.00	Result of a willingness-to-pay survey question	Consumer survey carried out by The PSC (03/03/2025)
Revealed preferences for Meal Boxes (per meal)	£1.24	Premium paid for Hello Fresh and other "meal boxes" is equivalent to the net social value users get (would include the time savings). Premiums paid in source comparison include: £1.31, £1.60, £1.75, £0.30, £1.17 and £1.30. We take the average.	Be Clever With Your Cash, 2024 (https://becleverwithyourcash.com/is-hellofresh-value-for-money/)
Supermarket share of Retail GVA	39%	Productivity Multipliers assumed to only apply to Grocery Retail Share	House of Commons Library, 2025 (https://researchbriefings. files.parliament.uk/documents/SN06186/SN06186.pdf)
Percentage of inputs required post-use case implementation	14.8%	Assumes productivity benefit is a feature of a reduction in food waste (similar to results of AI solutions, Shelf Engine and Afresh - 14.8%) and efficiency of consumer benefits and competition	Pacific Coast Collaborative , 2022 (https://pacificcoastcollaborative.org/wp-content/uploads/2022/12/PCFWC-Case-Study_AI_Final.pdf)
CO_2 Emissions per kg of food	Mixed	Emissions for different food types used to calculated the emissions impact of reductions in food waste through the use case	Poore, J. and Nemecek, T., 2018 (https://ourworldindata.org/grapher/food-emissions-supply-chain)
Annual population growth	0.7%	Assumes average annual growth between mid-2022 and mid-2032. No ranges used, as ONS does not publish confidence intervals for its population projections	Office for National Statistics, 2022 (https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/bulletins/nationalpopulationprojections/2022based)
Number of UK households (2023)	28,400,000	UK households based on ONS projections. No ranges used, as ONS does not publish confidence intervals for its population projections	Office for National Statistics, 2023 (https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/families/bulletins/familiesandhouseholds/2023)
Value of one hour of leisure time (2022/23)	£6.60	Using figure from the Department for Transport's 'Transport Analysis Guidance' (TAG)	Batley, R. & Dekker, T., 2023 (https://www.fca.org.uk/publication/external-research/valuing-consumers-time-cost-benefit-analysis.pdf)
Average household size	2.00	Assumes number of users per household is same as number of residents	Office for National Statistics, 2023 (https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/families/bulletins/familiesandhouseholds/2023)
Value of one QALY (2020/21)	£70,000	Use value of QALY from Green Book	HM Treasury, 2022 (https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government/the-green-book-2020)

ATP commission rates	5%	Assumes Mealia commission rates are similar to current commission rates	SmartReach.io, 2024 (https://smartreach.io/blog/sales-commission-rates-by-industry/); Remuner, 2024 (https://www.remuner.com/blog/sales-commission/)
Number of ATPs in year 1	1	Assumes there is only one ATP in first year of use case	N/A
Assumed scheme costs relative to Open Banking	36%	Assumed to be the combination of the GVA ratio of retail grocery trade to financial services, and the number of large firms (7 in online groceries vs 9 in Open Banking)	N/A
Grocery GVA	£52,761,476,983	Assumed to be groceries' share of retail GVA, uplifted by inflation	Office for National Statistics, 2024 (https://www.ons.gov.uk/economy/grossvalueaddedgva/datasets/nominalandrealregionalgrossvalueaddedbalancedbyindustry)
Opportunity cost of one QALY	£18,949	Opportunity Cost of additional QALYs	Department of Health and Social Care, 2023 (https://www.gov.uk/government/consultations/proposed-update-to-the-2023-statutory-scheme-to-control-the-costs-of-branded-health-service-medicines/outcome/proposed-changes-to-the-statutory-scheme-to-control-the-costs-of-branded-health-service-medicines-consultation-response)
Years for health benefits of dietary changes to manifest	30	It takes approximately 30 years for the full effect of health benefits from changes in diets to take effect	Herman et al., 2021 (https://pmc.ncbi.nlm.nih.gov/articles/PMC8275689/#s2)
Consumer multiplier	2.54	Assumes consumer spends excess money on retail sector	Office for National Statistics, 2025 (https://www.ons.gov.uk/economy/nationalaccounts/supplyandusetables/datasets/ukinputoutputanalyticaltablesindustrybyindustry)
Grocery multiplier	1.08	Assumes grocery spend multiplier is similar to wider retail sector	Office for National Statistics, 2025 (https://www.ons.gov.uk/economy/nationalaccounts/supplyandusetables/datasets/ukinputoutputanalyticaltablesindustrybyindustry)
Total GVA (whole economy)	£2,682,199,647,971	Assumes total GVA benefits from increased savings	Office for National Statistics, 2024 (https://www.ons.gov.uk/economy/grossvalueaddedgva/datasets/nominalandrealregionalgrossvalueaddedbalancedbyindustry)
Capital weights	37.2%	Average of historic capital weights	Office for National Statistics, 2023 (https://www.ons.gov.uk/economy/economicoutputandproductivity/productivitymeasures/bulletins/growthaccountingmultifactorproductivityestimatesuk/2023)
Whole Economy Multiplier	1.43	Assumes multiplier is the same as gross fixed capital formation multiplier across total economy	Office for National Statistics, 2025 (https://www.ons.gov.uk/economy/nationalaccounts/supplyandusetables/datasets/ukinputoutputanalyticaltablesindustrybyindustry)
Labour weights	63%	Average of historic labour weights	Office for National Statistics, 2023 (https://www.ons.gov.uk/economy/economicoutputandproductivity/productivitymeasures/bulletins/growthaccountingmultifactorproductivityestimatesuk/2023)
Reduction in time spent on grocery shopping (percentage)	90%	Assumes that users still have to spend some time on grocery shopping (e.g. selecting their desired meals)	N/A

B.3.2 Monte Carlo assumptions

Assumption	Value	Confidence grade / Use case size	Rationale	Source
Estimated time saving per account per week (hours)	2.02	C	Users could save 8 hours per month typically spent on meal planning and grocery shopping	Smart Data Discovery Challenge Submission, 2024 (unpublished)
Average weekly expenditure (2022/23) on food & non-alcoholic drinks	£71	A	Consumers will primarily purchase food & non-alcoholic drinks through the use case	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)

Adoption rate of online grocery shopping	3%	B	Assumes users of the use case will primarily order their shopping online	Statista, 2023 (https://www.statista.com/statistics/1319926/online-grocery-market-penetration-rate-uk/)
Maximum adoption rate	61%	C	Assumes penetration of use case is similar in its first year to Open Banking	Open Banking Limited, 2023 (https://openbanking.foleon.com/live-publications/the-open-banking-impact-report-october-2023/)
Increase in use case adoption rate	23%	B	Assumes rate of increase in penetration is similar to open banking. Log distribution used to account for "black swan" scenario where Mealia use case takes off rapidly	Forrester, 2022 (https://www.forrester.com/report/european-open-banking-forecast-2022-to-2027/RES178412)
Cost saving from use case	20%	E	Estimate comes from small scale pilot, but from source with a vested interest so downgraded from confidence level C to confidence level D. The use case optimises consumers' grocery list based on budget-friendly meal plans, helping reduce food waste and avoid unnecessary purchases.	Qualitative research interview
Net social value benefit of use case	£0.16	B	Premium paid for Hello Fresh and other "meal boxes" is equivalent to the net social value users get (would include the time savings)	Be Clever With Your Cash, 2024 (https://becleverwithyourcash.com/is-hellofresh-value-for-money/)
Health benefits of use case (QALY)	0.04	D	Assumes health benefit equivalent to moving up a group in mMDS (i.e. bottom third from low > moderate, middle third from moderate > high, and high with no movement)	Fransen et al., 2014 (https://pmc.ncbi.nlm.nih.gov/articles/PMC4219750/)
ATP Set-up costs	£32,961	C	Assumes cost to set-up ATP is similar to PSDII	HM Treasury, 2017 (https://www.gov.uk/government/consultations/implementation-of-the-revised-eu-payment-services-directive-psdii)
ATP annual compliance costs	£18,736	C	Assumes cost to set-up ATP is similar to PSDII	HM Treasury, 2017 (https://www.gov.uk/government/consultations/implementation-of-the-revised-eu-payment-services-directive-psdii)
ATP Year 1 growth rate	1500%	C	Assumes ATP growth rate similar to "expanded payments choice" use case in Open Banking	Open Banking Limited, 2023 (https://openbanking.foleon.com/live-publications/the-open-banking-impact-report-october-2023/)
ATP Year 2 growth rate	125%	C	Assumes ATP growth rate similar to "expanded payments choice" use case in Open Banking	Open Banking Limited, 2023 (https://openbanking.foleon.com/live-publications/the-open-banking-impact-report-october-2023/)
ATP Year 3+ growth rate	1%	C	Assumes ATP growth rate similar to "expanded payments choice" use case in Open Banking	Open Banking Limited, 2023 (https://openbanking.foleon.com/live-publications/the-open-banking-impact-report-october-2023/)
Scheme implementation costs	£187,894,470	A	Assumes Scheme Cost is similar to Open Banking	Department for Business & Trade, 2024 (https://bills.parliament.uk/publications/56550/documents/5223)
Scheme ongoing costs	£49,307,506	A	Assumes Scheme Cost is similar to Open Banking	Department for Business & Trade, 2024 (https://bills.parliament.uk/publications/56550/documents/5223)
Use case share of scheme	23%	M	Assumed to be a 'Medium' use case in T-shirt sizing approach, accounting for 20-25% of scheme costs and benefits	API calls from Open Banking; Qualitative assessment (x3); Share of use case longlist
Scheme governance body set-up costs	£50,083,825	A	Assumes governance body costs are similar to Open Banking	Companies House, 2025 (https://find-and-update.company-information.service.gov.uk/company/10440081/filing-history?page=1)
Scheme governance body ongoing costs	£39,511,239	A	Assumes governance body costs are similar to Open Banking	Companies House, 2025 (https://find-and-update.company-information.service.gov.uk/company/10440081/filing-history?page=1)

Percentage of inputs required post-use case implementation	85%	C	Assumes productivity benefit is a feature of a reduction in food waste (similar to results of AI solutions, Shelf Engine and Afresh - 14.8%) and efficiency of consumer benefits and competition	Pacific Coast Collaborative, 2022 (https://pacificcoastcollaborative.org/wp-content/uploads/2022/12/PCFWC-Case-Study_AI_Final.pdf)
Regulatory monitoring costs	£200,000	B	Assumes monitoring costs similar to FCA compliance monitoring cost of Pensions Dashboards	Legislation.gov.uk, 2022 (https:// www.legislation.gov.uk/ukia/2022/81)
Reduction in carbon emissions from use case	30%	E	The use case reduces carbon emissions by encouraging more sustainable choices	Qualitative research interview
Marginal propensity to consume	11%	A	Consumers will only spend a proportion of their cost savings	Bank of England, 2022 (https://www.bankofengland.co.uk/-/media/boe/files/working-paper/2022/financial-concerns-and-the-marginal-propensity-to-consume-in-covid-times.pdf)

B.4 Supporting green home upgrades

The table below provides a list of all the assumptions which informed the estimates of the value of the Supporting green home upgrades use case (see section 3.4).

B.4.1 Fixed assumptions

Assumption	Value	Rationale	Source
Reduction in loan approval time from combining financial and energy data	70%	There are two case studies related to lending summarised in the CFIT report: (1) the iwoca Analysis of the Benefits of Streamlining SME VAT Data suggests a time reduction of 'more than half'; (2) the Credit Canary and NEFirst Collaboration for At-Risk Borrowers indicates a time reduction of 89%. We have taken the mid-point between 50% and 89%, and rounded to the nearest whole percentage.	CFIT, 2024 (https://cfit.org.uk/wp-content/uploads/2024/02/CFIT-Open-Finance-Blueprint.pdf)
Energy supply GVA	£25,964,009,100	GVA for the energy supply industry, inflated to 2025 value	Office for National Statistics, 2024 (https://www.ons.gov.uk/economy/grossvalueaddedgva/datasets/nominalandrealregionalgrossvalueaddedbalancedbyindustry)
% contribution of MFP to GVA for Energy supply	0.3%	N/A	Office for National Statistics, 2023 (https://www.ons.gov.uk/economy/economicoutputandproductivity/productivitymeasures/bulletins/growthaccountingmultifactorproductivityestimatesuk/2023)
Peak demand for electricity (GW)	61.1	N/A	National Grid, date unknown (https://www.nationalgrid.com/electricity-transmission/document/82686/download)
Savings from 1% reduction of Mean Absolute Percentage Error (MAPE) for a utility with peak demand of 1GW (2015)	£196,258	Assumes similar savings in the UK to the US (adjusted to GBP using ONS exchange rate in 2015)	Energy Biz Magazine, 2015 (https://web.archive.org/web/20150910030519/http://www.energybiz.com/magazine/article/404587/crystal-ball-lessons-predictive-analytics)
Reduction in MAPE from improved forecasting techniques	2.1%	Assumes improvement in MAPE from Smart Data enables better forecasting techniques	Khafaf et al., 2019 (https://arxiv.org/abs/1903.11941)

Wholesale cost as share of household bills	29.3%	N/A	Ofgem, 2022 (https://www.ofgem.gov.uk/all-available-charts?sort=created&page=3)
Average household bill (2025)	£1,849	N/A	Ofgem, 2025 (https://www.standard.co.uk/news/uk/ofgem-price-cap-energy-bills-rise-b1018072.html)
Number of UK households (2023)	28,400,000	UK households based on ONS projections. No ranges used, as ONS does not publish confidence intervals for its population projections	Office for National Statistics, 2023 (https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/families/bulletins/familiesandhouseholds/2023)
Reduction in wholesale costs from a 10% reduction in peak demand	5%	N/A	Mihalache, A. et al., 2024 (https://link.springer.com/article/10.1007/s12053-024-10268-z)
Wholesale energy price (Feb 2025)	£143.37	Assumes cost saving from MAPE has risen in-line with wholesale energy prices	Statista, 2025 (https://www.statista.com/statistics/589765/average-electricity-prices-uk/)
Wholesale energy price (Feb 2015)	£42.86	Assumes cost saving from MAPE has risen in-line with wholesale energy prices	Statista, 2025 (https://www.statista.com/statistics/589765/average-electricity-prices-uk/)
Replace oil boiler with heat pump	4,523	CO_2 savings based on home efficiency upgrades	nu-Heat, 2025 (https://www.nu-heat.co.uk/home-carbon-calculator/)
Replace gas boiler with heat pump	2,330	CO_2 savings based on home efficiency upgrades	nu-Heat, 2025 (https://www.nu-heat.co.uk/home-carbon-calculator/)
Added or improved cavity wall insulation for mid-floor flat	325	CO_2 savings based on home efficiency upgrades	nu-Heat, 2025 (https://www.nu-heat.co.uk/home-carbon-calculator/)
Added or improved cavity wall insulation for mid-terrace house	415	CO_2 savings based on home efficiency upgrades	nu-Heat, 2025 (https://www.nu-heat.co.uk/home-carbon-calculator/)
Added or improved cavity wall insulation for semi-detached house	660	CO_2 savings based on home efficiency upgrades	nu-Heat, 2025 (https://www.nu-heat.co.uk/home-carbon-calculator/)
Added or improved cavity wall insulation for detached house	1100	CO_2 savings based on home efficiency upgrades	nu-Heat, 2025 (https://www.nu-heat.co.uk/home-carbon-calculator/)
Added or improved wall insulation for mid-floor flat	440	CO_2 savings based on home efficiency upgrades	nu-Heat, 2025 (https://www.nu-heat.co.uk/home-carbon-calculator/)
Added or improved wall insulation for mid-terrace house	560	CO_2 savings based on home efficiency upgrades	nu-Heat, 2025 (https://www.nu-heat.co.uk/home-carbon-calculator/)
Added or improved wall insulation for semi-detached house	600	CO_2 savings based on home efficiency upgrades	nu-Heat, 2025 (https://www.nu-heat.co.uk/home-carbon-calculator/)
Added or improved wall insulation for detached house	1490	CO_2 savings based on home efficiency upgrades	nu-Heat, 2025 (https://www.nu-heat.co.uk/home-carbon-calculator/)
Added or improved loft insulation for mid-terraced house	530	CO_2 savings based on home efficiency upgrades	nu-Heat, 2025 (https://www.nu-heat.co.uk/home-carbon-calculator/)
Added or improved loft insulation for semi-detached	580	CO_2 savings based on home efficiency upgrades	nu-Heat, 2025 (https://www.nu-heat.co.uk/home-carbon-calculator/)

Added or improved loft insulation for detached house	830	CO_2 savings based on home efficiency upgrades	nu-Heat, 2025 (https://www.nu-heat.co.uk/home-carbon-calculator/)
Added or improved floor insulation for semi-detached house	120	CO_2 savings based on home efficiency upgrades	nu-Heat, 2025 (https://www.nu-heat.co.uk/home-carbon-calculator/)
Added or improved floor insulation for detached house	270	CO_2 savings based on home efficiency upgrades	nu-Heat, 2025 (https://www.nu-heat.co.uk/home-carbon-calculator/)
Installed solar panels	1000	CO_2 savings based on home efficiency upgrades	nu-Heat, 2025 (https://www.nu-heat.co.uk/home-carbon-calculator/)
Average weekly household expenditure on food & Non-alcoholic drinks	£63.50	N/A	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)
Average weekly household expenditure on Alcoholic drink, tobacco & narcotics	£10.80	N/A	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)
Average weekly household expenditure on Clothing & footwear	£16.80	N/A	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)
Average weekly household expenditure on Housing(net), fuel & power	£105.70	N/A	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)
Average weekly household expenditure on Household goods & services	£35.50	N/A	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)
Average weekly household expenditure on Health	£8.90	N/A	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)
Average weekly household expenditure on Transport	£79.20	N/A	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)
Average weekly household expenditure on Communication	£20.30	N/A	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)
Average weekly household expenditure on Recreation & culture	£65.40	N/A	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)
Average weekly household expenditure on Education	£5.10	N/A	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)
Average weekly household expenditure on Restaurants & hotels	£40.50	N/A	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)

Average weekly household expenditure on Miscellaneous goods and services	£40.30	N/A	Office for National Statistics, 2024 (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/familyspendingworkbook1detailedexpenditureandtrends)
Time savings reinvested into work	40%	Time reinvestment is similar to commuting times saved by remote working	Aksoy et al., 2023 (https://www.ebrd.com/publications/working-papers/time-savings-when-working-from-home)
Average time spent researching options on home upgrades (hours)	4.15	N/A	Consumer survey carried out by The PSC (03/03/2025)
Estimated 12-month interest for use case	69%	N/A	Consumer survey carried out by The PSC (03/03/2025)
Annual population growth	0.7%	Assumes average annual growth between mid-2022 and mid-2032. No ranges used, as ONS does not publish confidence intervals for its population projections	Office for National Statistics, 2022 (https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/bulletins/nationalpopulationprojections/2022based)
Number of UK households (2023)	28,400,000	UK households based on ONS projections. No ranges used, as ONS does not publish confidence intervals for its population projections	Office for National Statistics, 2023 (https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/families/bulletins/familiesandhouseholds/2023)
Percentage of households that are owner occupied	65%	Only owner-occupied houses would be users of the use case	Ministry of Housing, Communities and Local Government, 2024 (https://www.gov.uk/government/statistics/chapters-for-english-housing-survey-2023-to-2024-headline-findings-on-demographics-and-household-resilience/chapter-1-profile-of-households-and-dwellings)
Percentage of owner-occupied households that purchase home energy upgrades	59%	Only owner-occupied houses engaging in home upgrades would be users of the use case	Consumer survey carried out by The PSC (03/03/2025)
Value of one hour of leisure time (inflated to use case start date)	£7.88	Using figure from the Department for Transport's 'Transport Analysis Guidance' (TAG)	Batley, R. & Dekker, T., 2023 (https://www.fca.org.uk/publication/external-research/valuing-consumers-time-cost-benefit-analysis.pdf)
Number of ATPs in year 1	1	Assumes there is only ATP in first year of use case	N/A
Estimated proportion of households who make energy saving home upgrades in a year	1.92%	Sum of number of households who have made different forms of home upgrades, divided by total number of households	Combined from assumptions 1a.7.1-4
Estimated number of households who upgraded insulation or other heating in 2023	181,602	57 per cent of the 318,600 measures in 2023 were for insulation	Department for Energy Security and Net Zero, 2024 (https://assets.publishing.service.gov.uk/media/66043d95e8c442001a2203bb/HEE_Statistics_Detailed_Release_March_2024.pdf)
Estimated number of households who added or improved boiler in 2023	136,998	43 per cent of the 318,600 measures in 2023 were for heating	Department for Energy Security and Net Zero, 2024 (https://assets.publishing.service.gov.uk/media/66043d95e8c442001a2203bb/HEE_Statistics_Detailed_Release_March_2024.pdf)
Estimated number of households who installed solar panels in 2024	191,000	N/A	Department for Energy Security and Net Zero, 2025 (https://www.gov.uk/government/statistics/solar-photovoltaics-deployment)
Estimated number of households who installed a heat pump in 2024	34,771	N/A	Department for Energy Security and Net Zero, 2024 (https://www.gov.uk/government/statistics/heat-pump-deployment-statistics-june-2024)

Average annual energy cost savings per home upgrade	£358	Average cost saving from home upgrades of different types	Combined from other assumptions.
Average annual energy cost savings per upgraded boiler or other heating	£320	N/A	Centre for Sustainable Energy, 2024 (https://www.cse.org.uk/advice/upgrading-and-replacing-your-boiler/)
Average annual energy cost savings per added or improved insulation	£385	The report suggests an average cost saving of £260 for solid wall insulation, £500 for cavity wall insulation, and £395 for loft insulation. We have taken the mean average of these three figures.	Smart Energy Homes, 2024 (https://smartenergyhomes.co.uk/news/stay-warm-this-winter-how-free-energy-upgrades-can-cut-your-bills/)
Average annual energy cost savings per installed solar panels	£400	N/A	Smart Energy Homes, 2024 (https://smartenergyhomes.co.uk/news/stay-warm-this-winter-how-free-energy-upgrades-can-cut-your-bills/)
Average annual energy cost savings per installed a heat pump	£213	N/A	Smart Energy Homes, 2024 (https://smartenergyhomes.co.uk/news/stay-warm-this-winter-how-free-energy-upgrades-can-cut-your-bills/)
Average upfront cost per home upgrade	£6,880	Average upfront cost from home upgrades of different types	Combined from other assumptions.
Average upfront cost per upgraded boiler or other heating	£3,500	N/A	Checkatrade, 2025 (https://www.checkatrade.com/blog/cost-guides/new-boiler-cost/)
Average upfront cost per added or improved insulation	£13,000	N/A	MyBuilder, 2025 (https://www.mybuilder.com/insulation/price-guides/cost-of-external-wall-insulation)
Average upfront cost per installed solar panels	£5,500	N/A	GreenMatch, 2025 (https://www.greenmatch.co.uk/blog/2014/08/what-is-the-installation-cost-for-solar-panels)
Average upfront cost per installed a heat pump	£8,000	N/A	British Gas, 2025 (https://www.britishgas.co.uk/heating/guides/air-source-heat-pump-cost.html)
Average lifetime of home upgrade in years	21.55	Average lifetime of home upgrades of different types	Combined from other assumptions.
Average lifetime of upgraded boiler or other heating	12.5	N/A	Checkatrade, 2025 (https://www.checkatrade.com/blog/cost-guides/new-boiler-cost/)
Average lifetime of added or improved insulation	25	N/A	Angi, 2024 (https://www.angi.com/articles/when-should-i-replace-my-insulation.htm)
Average lifetime of installed solar panels	28	N/A	GreenMatch, 2025 (https://www.greenmatch.co.uk/blog/2014/08/what-is-the-installation-cost-for-solar-panels)
Average lifetime of installed a heat pump	23	N/A	Evergreen Energy, 2025 (https://www.evergreenenergy.co.uk/heat-pump-guides/how-long-do-heat-pumps-last/)
Average interest rates for green home upgrades (APR) without use case	6.60%	Average interest rate taken from 3 major UK banks	Combined from other assumptions.
Natwest interest rate for home improvement loans	6.60%	N/A	Natwest, 2025 (https://www.natwest.com/loans/home-improvement-loans.html)

Halifax interest rate for home improvement loans	6.70%	N/A	Halifax, 2025 (https://www.halifax.co.uk/loans/what-you-can-borrow-for/home-improvement-loan.html)
Barclays interest rate for home improvement loans	6.50%	N/A	Barclays, 2025 (https://www.barclays.co.uk/loans/home-improvement-loan/)
Average interest rates for green home upgrades (APR) with use case	6.30%	Average interest rates for green home upgrades (APR) without use case, minus estimated percentage point reduction in home upgrade interest rates due to use case	Combined from other assumptions.
Average months to pay back home upgrade loans	24	As home-upgrade costs in our model range from £3,500 to £13,000, we assume contractual loan terms broadly in the 3 to 5 year range (see Moneysupermarket source). However, the contractual term is not the same as the repayment period (the time until the balance is repaid). Borrowers can repay unsecured personal loans early or in part, and there is a clear incentive to do so because the longer the loan remains outstanding, the more interest is paid. In addition, early repayment charges for personal loans are typically capped, meaning the financial barrier to early settlement will be limited in most cases of home upgrades relevant to this use case. We therefore assume an average repayment period of 24 months. This is a modelling simplification intended to reflect that many borrowers will repay faster than the contractual term where they can reduce interest costs.	Moneysupermarket, 2025 (https://www.moneysupermarket.com/loans/loans-statistics)
Average energy cost saving to consumer over home upgrade product lifetime	£7,705	Average annual energy cost savings per home upgrade, multiplied by average lifetime of home upgrade in years	Combined from other assumptions.
Average monthly instalment of loan repayment with use case	£306	Calculated from average upfront cost per home upgrade, average interest rates for green home upgrades (APR) with use case, and average months to pay back home upgrade loans	Combined from other assumptions.
Total cost of home upgrade (including loan interest) with use case	£7,341	Average months to pay back home upgrade loans multiplied by average monthly instalment of loan repayment with use case	Combined from other assumptions.
Average monthly instalment of loan repayment without use case	£307	Calculated from average upfront cost per home upgrade, average interest rates for green home upgrades (APR) with use case, and average months to pay back home upgrade loans	Combined from other assumptions.

Total cost of home upgrade (including loan interest) without use case	£7,363	Average months to pay back home upgrade loans multiplied by average monthly instalment of loan repayment without use case	Combined from other assumptions.
Cost saving in loan repayments attributable to use case	£22	Total cost of home upgrade (including loan interest) without use case, minus total cost of home upgrade (including loan interest) with use case	Combined from other assumptions.
Average interest repayments on home upgrade loans with use case	£461	Total cost of home upgrade (including loan interest) with use case minus average upfront cost per home upgrade	Combined from other assumptions.
Estimated percentage point reduction in home upgrade interest rates due to use case	0.30%	Some market leaders (e.g. Alpine Bank) offering 0.5% reduction on interest rates for energy-reduction of home improvements. This is therefore likely to be upper end of the range of interest rate reductions lenders might offer on energy efficiency loans.	Alpine Bank, 2025 (https://www.alpinebank.com/personal/personal-lending/green-lending.html)
Average annual household energy cost	£2,579	The 2024 report notes annual household energy costs vary by region between £2,466 and £2,691. We have taken the mid-point of these two figures.	House of Commons Library, 2024 (https://commonslibrary.parliament.uk/research-briefings/cbp-9491/)
Estimated GVA of home energy efficiency upgrades loans	£247,186,434	Number of UK households (2023), multiplied by estimated proportion of households who make energy saving home upgrades in a year, multiplied by average upfront cost per home upgrade, multiplied by average interest rates for green home upgrades (APR) without use case	Combined from other assumptions.
Share of personal loan applications from applicants that aren't existing customers	25%	Assumes Smart Data only speeds up application time for applicants that aren't existing customers of the lender (assumed to be approx 25% of applicants)	N/A
ATP Commission	9%	Assumes commissions similar to current commission rates	Ideal Rev, 2024 (https://idealrev.co/blog/guide-to-construction-sales-commission-success/)
Consumer multiplier	2.54	N/A	Office for National Statistics, 2025 (https://www.ons.gov.uk /economy/nationalaccounts/supplyandusetables/datasets/ukinputoutputanalyticaltablesdetailed)
Energy Services multiplier	3.43	N/A	Office for National Statistics, 2025 (https://www.ons.gov.uk /economy/nationalaccounts/supplyandusetables/datasets/ukinputoutputanalyticaltablesdetailed)
Construction Services multiplier	1.45	N/A	Office for National Statistics, 2025 (https://www.ons.gov.uk /economy/nationalaccounts/supplyandusetables/datasets/ukinputoutputanalyticaltablesdetailed)
Financial Services Multiplier	1.68	N/A	Office for National Statistics, 2025 (https://www.ons.gov.uk /economy/nationalaccounts/supplyandusetables/datasets/ukinputoutputanalyticaltablesdetailed)
Number of years use case brings forward the average home upgrade	2.00	Assumes that use case does not prompt home upgrades which would never have happened otherwise, but rather brings forward home upgrades by 2 years on average	Agreed as reasonable assumption with Department for Energy Security & Net Zero
Total GVA (whole economy)	£2,682,199,647,971	Assumes total GVA benefits from increased savings	Office for National Statistics, 2024 (https://www.ons.gov.uk/economy/grossvalueaddedgva/datasets /nominalandrealregionalgrossvalueaddedbalancedbyindustry)

Capital weights	37.2%	Average of historic capital weights	Office for National Statistics, 2023 (https://www.ons.gov.uk/economy/economicoutputandproductivity/productivitymeasures/bulletins/growthaccountingmultifactorproductivityestimatesuk/2023)
Whole Economy Multiplier	1.43	Assumes multiplier is the same as gross fixed capital formation multiplier across total economy	Office for National Statistics, 2025 (https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/timeseries/ybus/lms)
Labour weights	63%	Average of historic labour weights	Office for National Statistics, 2023 (https://www.ons.gov.uk/economy/economicoutputandproductivity/productivitymeasures/bulletins/growthaccountingmultifactorproductivityestimatesuk/2023)
Offset for lost revenue for energy services	15%	Assumes that reduced demand for energy reduces peak demand, resulting in a portion of the lost revenue being offset by reduced wholesale costs	Combined from inputs 2a.6 and 2a.9
Estimated time saving for consumer per home upgrade decision (hours)	3.1	Assumes that the use case reduces time spent researching home upgrade options, including assessing value for money by 75%.	Consumer survey carried out by The PSC (03/03/2025)
Estimated efficiency for financial institution per home upgrade loan	18%	Estimated reduction in loan approval time from combining financial data, multiplied by share of personal loan applications from applicants that aren't existing customers	Combined from other assumptions.
Financial services set-up costs	£37,313,433	A major UK lender provider an estimated cost for them to re-platform and establish APIs, which we have scaled according to percentage market share.	Estimate triangulated from qualitative research interviews.
ATP Set-up costs	£32,961	Assumes cost to set-up ATP is similar to PSDII	HM Treasury, 2017 (https://www.gov.uk/government/consultations/implementation-of-the-revised-eu-payment-services-directive-psdii)
ATP Annual Compliance Costs	£18,736	Assumes cost to set-up ATP is similar to PSDII	HM Treasury, 2017 (https://www.gov.uk/government/consultations/implementation-of-the-revised-eu-payment-services-directive-psdii)
ATP Year 1 Growth Rate	100.0%	Assumes ATP growth rate similar to "improved advice and guidance" use case in Open Banking	Open Banking Limited, 2023 (https://openbanking.foleon.com/live-publications/the-open-banking-impact-report-october-2023/)
ATP Year 2 Growth Rate	100.0%	Assumes ATP growth rate similar to "improved advice and guidance" use case in Open Banking	Open Banking Limited, 2023 (https://openbanking.foleon.com/live-publications/the-open-banking-impact-report-october-2023/)
ATP Year 3+ Growth Rate	0.1%	Assumes ATP growth rate similar to "improved advice and guidance" use case in Open Banking	Open Banking Limited, 2023 (https://openbanking.foleon.com/live-publications/the-open-banking-impact-report-october-2023/)
Use-Case Share of Scheme	7.5%	Assumed to be a 'Small' use case in T-shirt sizing approach, accounting for 5-10% of scheme costs and benefits	API calls from Open Banking; Qualitative assessment (x3); Share of use case longlist
Net value to households per home upgrade with use case	£365	Assumes Standard Deviation is based on standard error of available assumptions	N/A
Cost saving in loan repayments attributable to use case	£22	Assumes loan repayment costs reduce for whole market	Taken from previous assumption.
CO2 Emissions savings per upgrade	985.8	Average emissions reduction per year (kg/CO2) across a range of green home upgrade types	nu-Heat, 2025 (https://www.nu-heat.co.uk/home-carbon-calculator/)

Marginal Propensity to consume	11%	Consumers will only spend a proportion of their cost savings	Bank of England, 2022 (https://www.bankofengland.co.uk/-/media/boe/files/working-paper/2022/financial-concerns-and-the-marginal-propensity-to-consume-in-covid-times.pdf)
Average energy cost saving to consumer over home upgrade product lifetime	£358	N/A	Taken from previous assumption.
Average annual return on investment for loans through use case	£230	Average monthly repayment on loan, minus average upfront cost per home upgrade divided by average months to pay back home upgrade loans	Combined from other assumptions.
Est. reduction wholesale power costs due to better visibility of usage and reduced peak demand	0.2%	N/A	Combined from other assumptions.

B.4.2 Monte Carlo assumptions

Assumption	Value	Confidence grade / Use case size	Rationale	Source
Initial condition for adoption curve	69%	D	Assumes adoption rate is similar to percentage of homeowners that indicated that they would be interested in the use case in consumer survey	Consumer survey carried out by The PSC (03/03/2025)
Estimated proportion of users who make home upgrades due to the use case in a year	9%	D	The difference between consumer survey respondents who said they would make a home upgrade in the next 12 months if they had access to this use case and those who have completed a home upgrade in the last 12 months anyway.	Consumer survey carried out by The PSC (03/03/2025)
Estimated time saving for consumer per home upgrade decision (hours)	3.1	D	Assumes that the use case reduces time spent researching home upgrade options, including assessing value for money by 75%.	Consumer survey carried out by The PSC (03/03/2025)
Estimated efficiency for financial institution per home upgrade loan	18%	E	Estimated reduction in loan approval time from combining financial data, multiplied by share of personal loan applications from applicants that aren't existing customers	Combined from other assumptions.
Financial services set-up costs	£37,313,433	A	A major UK lender provider an estimated cost for them to re-platform and establish APIs, which we have scaled according to percentage market share.	Estimate triangulated from qualitative research interviews.
ATP Set-up costs	£32,961	A	Assumes cost to set-up ATP is similar to PSDII	HM Treasury, 2017 (https://www.gov.uk/government/consultations/implementation-of-the-revised-eu-payment-services-directive-psdii)
ATP Annual Compliance Costs	£18,736	A	Assumes cost to set-up ATP is similar to PSDII	HM Treasury, 2017 (https://www.gov.uk/government/consultations/implementation-of-the-revised-eu-payment-services-directive-psdii)

ATP Year 1 Growth Rate	100.0%	C	Assumes ATP growth rate similar to "improved advice and guidance" use case in Open Banking	Open Banking Limited, 2023 (https://openbanking.foleon.com/live-publications/the-open-banking-impact-report-october-2023/)
ATP Year 2 Growth Rate	100.0%	C	Assumes ATP growth rate similar to "improved advice and guidance" use case in Open Banking	Open Banking Limited, 2023 (https://openbanking.foleon.com/live-publications/the-open-banking-impact-report-october-2023/)
ATP Year 3+ Growth Rate	0.1%	C	Assumes ATP growth rate similar to "improved advice and guidance" use case in Open Banking	Open Banking Limited, 2023 (https://openbanking.foleon.com/live-publications/the-open-banking-impact-report-october-2023/)
Use case share of scheme	7.5%	S	Assumed to be a 'Small' use case in T-shirt sizing approach, accounting for 5-10% of scheme costs and benefits	API calls from Open Banking; Qualitative assessment (x3); Share of use case longlist
Net value to households per home upgrade with use case	£365	B	Assumes Standard Deviation is based on standard error of available assumptions	N/A
Cost saving in loan repayments attributable to use case	£22	B	Assumes loan repayment costs reduce for whole market	Taken from previous assumption.
CO2 Emissions savings per upgrade	985.8	B	Average emissions reduction per year (kg/CO2) across a range of green home upgrade types	nu-Heat, 2025 (https://www.nu-heat.co.uk/home-carbon-calculator/)
Marginal Propensity to consume	11%	A	Consumers will only spend a proportion of their cost savings	Bank of England, 2022 (https://www.bankofengland.co.uk/-/media/boe/files/working-paper/2022/financial-concerns-and-the-marginal-propensity-to-consume-in-covid-times.pdf)
Average energy cost saving to consumer over home upgrade product lifetime	£358	B	N/A	Taken from previous assumption.
Average annual return on investment for loans through use case	£230	B	Average monthly repayment on loan, minus average upfront cost per home upgrade divided by average months to pay back home upgrade loans	Combined from other assumptions.
Est. reduction wholesale power costs due to better visibility of usage and reduced peak demand	0.2%	C	N/A	Combined from other assumptions.

B.5 Verified electricity emissions reporting for SMEs

The table below provides a list of all the assumptions which informed the estimates of the value of the Verified electricity emissions reporting for SMEs use case (see section 3.5).

B.5.1 Fixed assumptions

Assumption	Value	Rationale	Source
Number of SMEs in the UK now	5,500,000	N/A	Department for Business & Trade, 2024 (https://www.gov.uk/government/statistics/business-population-estimates-2024/business-population-estimates-for-the-uk-and-regions-2024-statistical-release)
Current adoption rate of use case among SMEs receiving green finance loans	0.070%	Estimate combined from a range of sources, taking the number of members of the Perseus scheme, and dividing by the number of SMEs in the UK who apply for a Green Finance loan each year.	Combined from other assumptions.
Estimated FTE spent on reporting p.a.	0.6%	Assumes SME spends 12 hours on carbon reporting activities	Estimate triangulated from qualitative research interviews.
Estimated total FTE per SME p.a.	3.0	Average number of employees for UK SMEs, estimated by dividing the number of SME employees (~16.6m) by the number of SME businesses (~5.5m).	Department for Business & Trade, 2024 (https://www.gov.uk/government/statistics/business-population-estimates-2024/business-population-estimates-for-the-uk-and-regions-2024-statistical-release)
Productivity saving from Perseus	0.2%	Estimated FTE spent on reporting p.a., divided by estimated total FTE per SME p.a.	Combined from other assumptions.
UK wide GVA (SMEs)	£1,289,023,283,339	50% of GVA contribution is from SMEs; 2022 numbers updated for inflation	House of Commons Library, 2024 (https://researchbriefings.files.parliament.uk/documents/SN06152/SN06152.pdf)
% contribution of MFP to GVA for UK (total)	1.0%	Taking the 1970-2022 average of % contribution of MFP to GVA for UK (total)	Office for National Statistics, 2023 (https://www.ons.gov.uk/economy/economicoutputandproductivity/productivitymeasures/bulletins/growthaccountingmultifactorproductivityestimatesuk/2023)
Total value of green finance loans made to SMEs p.a.	£37,135,193,040	Green finance loans totalled 33bn in 2022; this has been inflated to a 2025 value	The Global City, 2022 (https://www.theglobalcity.uk/PositiveWebsite/media/research-downloads/CoL_Sustainable-Finance_Final-2.pdf)
% ROI from Green Finance loans p.a.	7.29%	Assumes increase in capital equivalent to the increase from having access to smart meter data vs not having access	Chen et al., 2024 (https://www.sciencedirect.com/science/article/pii/S0140988323007491)
Average repayment period for SME Green Finance loan (years)	5.5	Repayment periods vary from 1 to 10 years on average, and so we have taken a mid-point at 5.5 years.	Small Business UK, 2025 (https://smallbusiness.co.uk/best-small-business-loans-in-the-uk-2548223/); Natwest Group, 2025 (https://www.natwestgroup.com/news-and-insights/news-room/press-releases/climate/2022/may/green-loans-and-green-asset-finance-launched-for-businesses.html)
Membership fees - Large	£150,000	Calculated by dividing the total income from large member organisations by the number of large membership organisations for Icebreaker One's Perseus scheme.	Icebreaker One, 2024 (https://ib1.org/perseus/2024-plan/)
Membership fees - Medium	£40,000	Calculated by dividing the total income from medium-sized member organisations by the number of medium-sized membership organisations for Icebreaker One's Perseus scheme.	Icebreaker One, 2024 (https://ib1.org/perseus/2024-plan/)
Membership fees - Small	£12,000	Calculated by dividing the total income from small member organisations by the number of small membership organisations for Icebreaker One's Perseus scheme.	Icebreaker One, 2024 (https://ib1.org/perseus/2024-plan/)
Membership fees - Micro/startup	£600	Calculated by dividing the total income from micro/startup member organisations by the number of micro/startup membership	Icebreaker One, 2024 (https://ib1.org/perseus/2024-plan/)

		organisations for Icebreaker One's Perseus scheme.	
Number of Members - Large	4	Assumes make-up of membership (in terms of firm size) will be similar to that of Icebreaker One's Perseus scheme.	Icebreaker One, 2024 (https://ib1.org/perseus/2024-plan/)
Number of Members - Medium	4	Assumes make-up of membership (in terms of firm size) will be similar to that of Icebreaker One's Perseus scheme.	Icebreaker One, 2024 (https://ib1.org/perseus/2024-plan/)
Number of Members - Small	8	Assumes make-up of membership (in terms of firm size) will be similar to that of Icebreaker One's Perseus scheme.	Icebreaker One, 2024 (https://ib1.org/perseus/2024-plan/)
Number of Members - Micro/startup	20	Assumes make-up of membership (in terms of firm size) will be similar to that of Icebreaker One's Perseus scheme.	Icebreaker One, 2024 (https://ib1.org/perseus/2024-plan/)
Number of SMEs that applied for Green Finance loans in past three years	2.8%	N/A	International Chamber of Commerce, 2024 (https://iccwbo.org/news-publications/policies-reports/unlocking-sustainable-finance-for-smes/)
Energy supply GVA	£24,955,794,982.34	N/A	Office for National Statistics, 2024 (https://www.ons.gov.uk/economy/grossvalueaddedgva/datasets/nominalandrealregionalgrossvalueaddedbalancedbyindustry)
Reduction in Mean Absolute Percentage Error (MAPE) from improved forecasting techniques	37%	NREL notes that industry expectations for short-term load forecasting accuracy are typically below 5% MAPE, so we use 5% as a reasonable baseline for current forecasting error. Al Khafaf et al. (2019) report MAPE can reach 3.15% for a 3-day ahead energy demand forecast when additional appropriate data is available, implying a relative reduction of 37%.	Al Khafaf et al., 2019 (https://arxiv.org/abs/1903.11941); NREL, 2023 (https://docs.nrel.gov/docs/fy23osti/85202.pdf)
Wholesale cost as share of household bills	29%	N/A	Ofgem, 2025 (https://www.ofgem.gov.uk/all-available-charts?sort=created&page=3)
Number of audit firms now	4,000	There were 4,038 accounting firms in the UK in 2023, down from 4,310 in 2022	Financial Reporting Council, 2024 (https://www.frc.org.uk/library/supervision/professional-bodies-supervision/key-facts-and-trends-in-the-accountancy-profession/)
One person's time to verify one SME'S reporting p.a.	8.7	ESG Assurance as share of business assurance multiplied by estimated total FTE per audit firm	Combined from inputs 3a.3 and 3a.8
Estimated total FTE per audit firm	893	Total number of employees working in audit, divided by the total number of audit firms	Financial Reporting Council, 2024 (https://www.frc.org.uk/library/supervision/professional-bodies-supervision/key-facts-and-trends-in-the-accountancy-profession/)
Estimated time saving per SME using use case p.a.	75%	N/A	Estimate triangulated from qualitative research interviews.
Accounting & Legal GVA	£77,079,224,563	Closest match is "Administrative and support activities"; inflated to 2025	Office for National Statistics, 2024 (https://www.ons.gov.uk/economy/grossvalueaddedgva/datasets/nominalandrealregionalgrossvalueaddedbalancedbyindustry)
Size of ESG Global assurance market (USD, 2022)	$1,540,000,000.00	N/A	Verdantix, 2023 (https://www.verdantix.com/insights/blogs/the-esg-assurance-services-market-will-reach-5.89-billion-by-2028)
Business Assurance Market (USD, 2022)	$158,500,000,000.00	N/A	Coherent Market Insights, 2025 (https://www.coherentmarketinsights.com/market-insight/business-assurance-market-2816)
ESG Assurance as share of business assurance	1.0%	N/A	Combined from other assumptions.

Additional cost of platform maintenance, FTE p.a. per provider	0.5	N/A	Financial Conduct Authority, 2018 (https://www.fca.org.uk/publication/multi-firm-reviews/strategic-review-retail-banking-business-models-progress-report.pdf)
Average annual salary for database administrator	£44,000	N/A	Indeed, 2025 (https://uk.indeed.com/career-advice/pay-salary/average-it-salaries)
Number of lending banks operating in the UK	82	This figure represents the number of lending financial institutions operating in the UK according to a government report on Green Finance in 2022.	Department for Energy Security & Net Zero, 2022 (https://assets.publishing.service.gov.uk/media/68405f50e550203c8209cd35/green-home-finance-state-of-the-market-review-report-2.pdf)
Adoption rate of use case among banks	13%	Assumed adoption rate will be the same as that experienced by Icebreaker One.	Combined from other assumptions.
Estimated FTE per bank	830	N/A	The City UK, 2023 (https://www.thecityuk.com/media/vbhjnbmx/key-facts-about-uk-based-financial-and-related-professional-services-2023.pdf)
Financial Services GVA	£108,235,516,487	Inflation-adjusted from 2022 to 2025	Office for National Statistics, 2024 (https://www.ons.gov.uk/economy/grossvalueaddedgva/datasets/nominalandrealregionalgrossvalueaddedbalancedbyindustry)
% contribution of MFP to GVA for Financial Services	0.42%	For 1987 (first year from "Big Bang" till 2022 (latest))	Office for National Statistics, 2023 (https://www.ons.gov.uk/economy/economicoutputandproductivity/productivitymeasures/bulletins/growthaccountingmultifactorproductivityestimatesuk/2023)
Current ROI on Green Finance loans	8%	Perceived weighted cost of capital for green finance initiatives	Chicago Booth Review, 2024 (https://www.chicagobooth.edu/review/golden-age-green-investment)
Green bonds' share of global bond market	5%	N/A	Climate bonds, 2023 (https://www.climatebonds.net/2023/01/2022-market-snapshot-and-5-big-directions-sustainable-finance-2023)
Platform maintenance, data processing and customer support costs	5	Assumes one FTE for platform maintenance, one FTE for data processing, two FTE for customer support, and one supervisor	N/A
Average annual salary for data engineers	£70,000	Estimate triangulated from several online sources.	Indeed, 2025 (https://uk.indeed.com/career/data-engineer/salaries); Morgan McKinley, 2025 (https://www.morganmckinley.com/uk/salary-guide/data/data-engineer/london).
ATP Running Costs (2024)	£2,040,000	Assumes is the same as for Icebreaker One	Icebreaker One, 2024 (https://ib1.org/perseus/2024-plan/)
Variable Cost Share	25%	Assumes is the same as for Icebreaker One; Assumes data services, research, engagement and admin are fixed	Icebreaker One, 2024 (https://ib1.org/perseus/2024-plan/)
SME share of membership fees	48.6%	Assumes is the same as for Icebreaker One	Icebreaker One, 2024 (https://ib1.org/perseus/2024-plan/)
Variable Cost Per Bank	£29,759	Assumes is the same as for Icebreaker One	Icebreaker One, 2024 (https://ib1.org/perseus/2024-plan/)
Variable Cost Per SME (2024)	£11,711	Assumes is the same as for Icebreaker One	Icebreaker One, 2024 (https://ib1.org/perseus/2024-plan/)
Financial Services I-O multiplier	1.529	N/A	Office for National Statistics, 2025 (https://www.ons.gov.uk/economy/nationalaccounts/supplyandusetables/datasets/ukinputoutputanalyticaltablesindustrybyindustry)
Retail Services I-O multiplier	1.490	N/A	Office for National Statistics, 2025 (https://www.ons.gov.uk/economy/nationalaccounts/supplyandusetables/datasets/ukinputoutputanalyticaltablesindustrybyindustry)
Energy Supplier I-O multiplier	4.714	N/A	Office for National Statistics, 2025 (https://www.ons.gov.uk/economy/nationalaccounts/supplyandusetables/datasets/ukinputoutputanalyticaltablesindustrybyindustry)
Legal & Accounting Services I-O multiplier	1.151	N/A	Office for National Statistics, 2025 (https://www.ons.gov.uk/economy/nationalaccounts/supplyandusetables/datasets/ukinputoutputanalyticaltablesindustrybyindustry)
Carbon values (Net Carbon Zero scenario), £/tonne	£76	N/A	Department for Energy Security & Net Zero, 2024 (https://www.gov.uk/government/publications/traded-carbon-values-used-for-modelling-purposes-2024/traded-carbon-values-used-for-modelling-purposes-2024)

Estimated growth in SMEs	1.4%	Assumed growth rate will continue in line with growth rate from 2010-2024	Department for Business & Trade, 2024 (https://www.gov.uk/government/statistics/business-population-estimates-2024/business-population-estimates-for-the-uk-and-regions-2024-statistical-release)
Estimated proportion of SMEs who report on carbon emissions	4.0%	Assumed to be the same as the share of SMEs that reported on their emissions between 2016-2021	Small Business Britain, 2022 (https://smallbusinessbritain.uk/downloads/Small-Business-Britain-Sustainability-Basics-Insight-And-Implications.pdf?v=2)
Estimated proportion of SMEs receiving Green Finance loans	11%	Assumed to be the same as reported by Lending Standards Board in 2023.	Lending Standards Board, 2023 (https://www.lendingstandardsboard.org.uk/wp-content/uploads/2023/04/Business-customers-and-green-finance-April-23.pdf)
Estimated ceiling on proportion of SMEs eligible for Green Finance loans	22%	Assumed to be the same as reported by Lending Standards Board in 2023.	Lending Standards Board, 2023 (https://www.lendingstandardsboard.org.uk/wp-content/uploads/2023/04/Business-customers-and-green-finance-April-23.pdf)
Estimated growth in banks that actively lend to SMEs	1%	The average percentage change in number of registered UK businesses per year from 2010 to 2024	Department for Business & Trade, 2024 (https://www.gov.uk/government/statistics/business-population-estimates-2024)
Emissions avoided per unit of green investment (industry standard conversion), Tonne / £	0.017	IMF recommended a maximum of $75 (~£60) per tonne of carbon reductions, for a carbon tax in high-income countries. This converts to 0.017 tonnes of carbon per £ of spend.	International Monetary Fund, 2020 (https://www.imf.org/en/Topics/climate-change/climate-mitigation)
Working days in a year	225	260 weekdays, less 25 statutory holidays, less 10 bank holidays	N/A

B.5.2 Monte Carlo assumptions

Assumption	Value	Confidence grade / Use case size	Rationale	Source
Estimated use case adoption growth rate (SMEs)	23%	D	Assumes rate of increase in penetration is similar to open banking. Log distribution used to account for "black swan" scenario where use case takes off rapidly	Forrester, 2022 (https://www.forrester.com/report/european-open-banking-forecast-2022-to-2027/RES178412)
Estimated growth in proportion of SMEs receiving Green Finance loans p.a.	12%	C	Average annual % growth from three sources: likely increase in uptake of green finance by SMEs in reported survey; increase in green finance lending to SMEs from Q2 2023 to Q2 2024; and increase in funds raised by the UK's Green Financing programme from 2023 to 2024.	British Business Bank, data unknown (https://www.british-business-bank.co.uk/business-guidance/guidance-articles/sustainability/green-loans-for-smaller-businesses); Financial reporter, 2024 (https://www.financialreporter.co.uk/sme-lending-sees-annual-growth-but-remains-below-normal-pre-pandemic-levels-uk-finance.html); HM Treasury, 2023 (https://assets.publishing.service.gov.uk/media/651446cdb1bad4000d4fd916/HMT-UK_Green_Financing_Allocation_Impact_Report_2023_Accessible.pdf)
Estimated reduction in Green Finance interest rates from use case	2%	A	Assumes interest rate reduction equivalent to the reduction in WACC between Green and Brown investments	Chicago Booth Review, 2024 (https://www.chicagobooth.edu/review/golden-age-green-investment)
Estimated reduction in wholesale power costs due to better visibility of usage and reduced peak demand	11%	C	Multiplies the estimated % reduction in wholesale costs for energy suppliers with the estimated % of household bills related to wholesale costs	Combined from other assumptions.

Estimated use case adoption growth rate (banks)	23%	A	Assumes rate of increase in penetration is similar to Open Banking. Log distribution used to account for "black swan" scenario where use case takes off rapidly	Forrester, 2022 (https://www.forrester.com/report/european-open-banking-forecast-2022-to-2027/RES178412)
ROI on Green Finance loans from use case (SME)	13%	A	Assumes business green investment ROI is equivalent to ROI of sustainable firms	Morgan Stanley, 2023 (https://www.morganstanley.com/ideas/sustainable-funds-performance-2023-full-year)
Annual ATP Fixed Cost	£2,040,000	A	Assumes costs remain consistent with Icebreaker One costs from prior years	Icebreaker One, 2024 (https://ib1.org/perseus/2024-plan/)
MFP Contribution of SMEs	1%	A	Multi-factor productivity estimates taken from the ONS	Office for National Statistics, 2023 (https://www.ons.gov.uk/economy/economicoutputandproductivity/productivitymeasures/bulletins/growthaccountingmultifactorproductivityestimatesuk/2023)
Estimated percentage point increase in SMEs reporting carbon emissions, p.a.	0.5%	C	Assumes annual increase in SMEs reporting in the UK is the same as annual increase in SME's reporting carbon emissions internationally from 2023-2024	International Chamber of Commerce, 2024 (https://iccwbo.org/news-publications/policies-reports/unlocking-sustainable-finance-for-smes/)
Annual ATP Variable Cost Per Bank	£23,221	A	Assumes costs rise with number of users	Combined from other assumptions.
Annual ATP Variable Cost Per SME	£9,138	A	Assumes costs rise with number of users	Combined from other assumptions.
MFP Contribution – Financial services	0.4%	A	Multi-factor productivity estimates taken from the ONS	Office for National Statistics, 2023 (https://www.ons.gov.uk/economy/economicoutputandproductivity/productivitymeasures/bulletins/growthaccountingmultifactorproductivityestimatesuk/2023)
Percentage of SMEs applying for loan	8.5%	E	Number of SMEs that applied for Green Finance loans in past three years, divided by estimated proportion of SMEs receiving Green Finance loans	Combined from other assumptions.
Starting share of use case	0.07%	A	N/A	Combined from other assumptions.
Share of bank staff involved in lending activities	20%	E	A review of job function data from public reports (e.g. HSBC UK, NatWest Group, Lloyds) shows lending-related functions often account for ~15–25% of staff in retail and commercial banking units.	N/A
Reduction in time required to evaluate green finance	75%	E	N/A	Estimate triangulated from qualitative research interviews.
Use case share of scheme	7.5%	S	Assumed to be a 'Small' use case in T-shirt sizing approach, accounting for 5-10% of scheme costs and benefits	API calls from Open Banking; Qualitative assessment (x3); Share of use case longlist

Technical Annex C: Approach to estimating different cost and benefit types

Our methodology for economic modelling is based on a standard framework for evaluating the costs and benefits associated with Smart Data implementations, such as the Smart Data Impact Assessment[38]. In evaluating Smart Data implementations, we consider direct financial impacts like implementation costs, broader non-financial impacts including environmental improvements, and indirect economic effects such as productivity gains. In-line with the Green Book, we have grouped these into three primary categories of impacts, each with distinct measurement approaches and considerations.

C.1 Direct and Monetisable Impacts

The first category encompasses impacts that can be directly measured and expressed in monetary terms.

C.1.1 Market Price Measurements

Market prices form the foundation for estimating direct costs and benefits, with several established methodologies available depending on data quality and project requirements. The market price estimates used in our economic modelling, generally follow one of the main approaches:

1. **Parametric (Top-Down) Costing:** Using statistical relationships and historical data to predict costs based on key parameters
2. **First Principles (Bottom-up) Estimation:** Calculates costs by breaking down work into detailed components and activities
3. **Analogy-based Estimation:** Determines costs by comparing to similar past projects or activities
4. **Expert Opinion:** Relies on experienced professionals' judgment and knowledge to estimate costs

C.1.2 Changes in capital spending

Where possible, we leverage existing investment estimations gathered through stakeholder interviews and consultations. We will rely on figures provided by government departments and agencies, as these are expected to align with Green Book methodologies, and give consideration to non-government estimates, although these may be subject to additional verification and adjusted based on our methodology to ensure consistency across the analysis.

Where additional costing of investment value is required, we follow the methodology of the Infrastructure and Projects Authority's (IPA) Cost Estimating Guidance,[39] agreeing the necessary costs within each cost type and deploying one of the four main costing approaches. These costs form the basis for more detailed cost estimations for asset prices:

1. **Escalation:** Costs relating to changes in market prices during a project lifecycle, interest rates or applicable taxes. We will not consider inflation related escalation costs, as our net present value calculations will be presented in real terms.
2. **Land and Property:** Costs relating to acquisition of land and allocation of property for the project, including costs of relocation and movement where applicable. Admin costs related

[38] Department for Business and Trade, 2024. Impact Assessment (IA).
[39] Infrastructure and Projects Authority (IPA), 2021. Cost Estimating Guidance.

to general business overheads such as owner's costs or the sunk development costs during early development stages

3. **Indirect costs:** Costs incurred that cannot be attributed to any one section of the works: they may be fixed or time related. This includes for example design costs.
4. **Direct costs:** Costs incurred on labour, material, plant and equipment, etc., i.e. costs that are directly accountable to the project including overhead and profit, temporary works. The direct costs are further broken down in discipline-specific and (preferably) industry-standard and asset-specific Cost and Work Breakdown Structures. Direct cost elements should also include embodied carbon costs.

The quality and reliability of input data directly impacts the accuracy of the final cost estimate. We therefore consider multiple source types, including:

- Historical project data and benchmarks
- Current market rates and supplier quotes
- Technical specifications and design documents
- Industry standards and published cost data

C.1.3 Changes in labour (number of hours or WTE)

To cost changes in labour requirements from Smart Data use cases, we follow a comprehensive methodology that accounts for both direct salary costs and associated overhead expenses.

1. Calculate Direct Labour Costs

The foundation of labour costing begins with calculating gross earnings, which includes:

- Base salary and net pay
- Mandatory contributions (health insurance, social security, pension plans)
- Tax obligations
- Standard allowances (meal, travel, housing)
- Additional benefits and incentive payments (overtime, bonuses, holiday pay)

2. Time Allocation Methodology

For both full-time and part-time staff, we calculate costs based on detailed time allocations:

- Direct time estimates from staff or department heads through interviews or questionnaires
- Percentage allocation of total working time dedicated to specific activities
- For shared resources, proportional allocation based on documented time spent on activities

3. Additional Resource Costs

New employment typically generates additional operational costs. Based on institutional expenditure data, we calculate these as a percentage of salary costs, typically including:

- Office supplies and materials
- Communication costs
- Utilities

- Travel expenses

4. Scaling and Adjustments

Final labour costs are adjusted to account for:

- Full-time equivalent (FTE) calculations for part-time staff
- Indirect support staff costs (management, maintenance, security)
- Regional or market-specific salary variations
- Anticipated changes in staffing levels over time

C.1.4 Changes in spending on goods and materials

For major categories of supplies and materials that can be directly attributed to specific activities or outcomes, we employ a comprehensive bottom-up approach that ensures accurate cost estimation while accounting for various market factors and operational considerations:

- Calculate quantities through detailed analysis of anticipated output levels, activity requirements, and historical usage patterns to establish baseline demand
- Source current market prices through multiple channels including recent invoices, supplier catalogues, price lists, and industry benchmarks to ensure competitive pricing
- Include comprehensive transport and delivery costs, factoring in fuel surcharges, handling fees, customs duties, and insurance where applicable
- Account for volume discounts, bulk purchasing arrangements, and potential long-term supplier agreements that may affect pricing structures

Where necessary, apply adjustments to account for factors that could impact future costs:

- Market price volatility and trends, including seasonal variations and long-term price movement patterns
- Supply chain disruptions or constraints, considering both global and local supply chain resilience factors
- Regulatory changes affecting procurement, including environmental regulations, trade policies, and industry-specific requirements
- Technology impacts on material efficiency, including improvements in manufacturing processes and new material alternatives

C.1.5 Variations in income streams and revenue generation

For revenue streams that can be directly attributed to specific activities or outcomes, we employ a comprehensive bottom-up approach that ensures accurate revenue estimation while accounting for various market factors and operational considerations:

- Calculate output quantities through analysis of market demand, production capacity, and historical sales patterns to establish baseline revenue potential
- Source current market prices through multiple channels including competitor analysis, market research, and industry benchmarks to ensure realistic pricing assumptions
- Include comprehensive revenue adjustments, factoring in seasonal patterns, market penetration rates, and customer retention rates where applicable
- Account for volume-based pricing strategies, customer segment variations, and potential long-term contract arrangements that may affect revenue structures

Where necessary, apply adjustments to account for factors that could impact future revenue:

- Market demand volatility and trends, including seasonal variations and long-term growth patterns
- Competitive pressures and market share dynamics, considering both direct and indirect competition
- Regulatory changes affecting pricing, including price controls, taxation, and industry-specific requirements
- Technology impacts on revenue potential, including digital transformation opportunities and new business models

C.1.6 Changes in access to capital

To calculate the benefits of improved liquidity and faster capital access through Smart Data initiatives, we quantify the monetary value of freed-up capital and the associated reduced risk exposure. This approach particularly applies to financial institutions, where capital efficiency directly impacts operational performance, and buyers and sellers of property, where capital availability determines their ability to fulfil other transactions.

To model the benefits from reducing the duration that capital remains tied up in transactions, we will calculate the opportunity cost of frozen capital that cannot be deployed for other profitable activities. This opportunity cost will be measured using the institution's cost of capital or potential returns from alternative deployments.

First, establish a baseline by determining how much capital is typically tied up in transactions, such as mortgage amounts, loan values, or other financial holdings. This provides the foundation for measuring potential improvements in capital efficiency.

Next, we estimate how the implementation of Smart Data solutions affects access to capital. We have identified two main ways in which our five Smart Data use cases change stakeholders' access to capital: Reducing the duration that capital remains tied up in transactions; and reducing the fall-through rates of capital transactions. We therefore quantify:

1. The number of days saved from reduced capital transaction times
2. The percentage reduction in transaction fall-throughs per year

Then, we calculate the total amount of capital that becomes available due to these efficiency improvements. This involves combining the baseline capital amounts with the time and fall-through reductions to determine how much capital can be deployed elsewhere in the system.

Finally, apply the institution's annualised cost of capital rate to quantify the monetary benefits per transaction. This translates the freed-up capital into actual financial gains, showing the real economic value of implementing Smart Data solutions.

When applying the cost of capital, the number of days saved is divided by 365 to convert the time savings into annual terms. By converting days to years, we ensure the time units align with the annual rate being applied.

C.1.7 Transfer Price Considerations

Changes in consumer time allocation for administrative tasks

To cost changes in time spent on administrative tasks by consumers from Smart Data use cases, we will follow a methodology aligned with established cost-benefit analysis principles, developed

by the Department for Transport (DfT) and the Financial Conduct Authority (FCA),[40] for modelling the effect of changes in commuting times and time spent dealing with financial products/services respectively.

1. Identify Time Changes

First, we must quantify the expected time savings or additional time requirements for consumers (deltaT). This involves analysing specific use cases (like property transactions) to estimate minutes saved through streamlined processes or automation.

2. Apply Value of Time

We will use DfT's recommended value of travel time savings (VTTS) for leisure journeys as our baseline value, currently £6.60/hr (2022 prices). This represents a conservative estimate of consumers' value of leisure time.

3. Consider Adjustments

In applying the FCA's time valuation methodology to Smart Data initiatives, we recognize that consumers respond differently to time gains versus losses. Research shows that people generally place a higher value on losing time than on gaining it. To account for this, different multipliers are applied: time gains are valued at 0.90 times the baseline value, while time losses are valued at 1.15 times the baseline. This asymmetry reflects behavioural evidence that consumers are more sensitive to losses than equivalent gains.

Additionally, when the absolute time change is less than the standard one hour assumption, further adjustments ranging from 0.58 to 1.40 can be applied to account for these size effects. These multipliers help ensure our cost-benefit analysis of Smart Data initiatives accurately reflects how consumers value different magnitudes of time changes:

- 1 minute = 0.3745
- 2 minutes = 0.44
- 3 minutes = 0.484
- 5 minutes = 0.5464
- 10 minutes = 0.6452
- 15 minutes = 0.7118
- 20 minutes = 0.7634
- 25 minutes = 0.8062
- 30 minutes = 0.843
- 35 minutes = 0.8755
- 40 minutes = 0.9048
- 45 minutes = 0.9314
- 50 minutes = 0.9559
- 55 minutes = 0.9787

[40] Batley, R. & Dekker, T., 2023. Valuing Consumers' Time in our Cost Benefit Analysis.

- 60 minutes = 1

4. Account for Population Differences

As default, we will apply a combined multiplier of 0.9895 to account for demographic differences between transport users. This assumes that the demographics of the Smart Data use case consumers are close to equivalent to those consuming financial services.

If there are grounds to believe that the demographic make-up of the consumer groups in question may be meaningfully different, based on an initial review of demographic data, then demographic multipliers can be calculated to adjust VTTS values. It's worth noting that while such multipliers provide a mechanism for demographic adjustment, and would be based on comparing the National Travel Survey (NTS) population with the consumer-survey population or other representative basis for the user group. For very specific target groups, additional analysis may be needed to develop more precise multipliers.

5. Calculate Total Value

The final calculation follows this formula:

Total Value = (Minutes saved or lost / 60) × Adjusted hourly rate (Baseline VTTs x Multipliers) × Number of affected consumers

Note: This Total Value would need uplifting to account for inflation to the start yet

C.1.8 Fluctuations in criminal activity levels and associated costs

To cost changes in criminal activity resulting from Smart Data use cases, we have aligned with the economic and social costs of crime guidance published by the Home Office (HORR99).[41] This methodology consists of three key components that work together to provide a comprehensive assessment of crime-related costs and their variations over time.

The first component focuses on baseline cost calculation, utilising HORR99's comprehensive cost categorisation framework. This includes costs in anticipation of crime (such as defensive expenditure and insurance administration), costs as a consequence of crime (including property stolen/damaged, physical and emotional harms, lost output, health services, and victim services), and costs in response to crime (covering police and criminal justice system costs). We will directly apply the unit costs established in HORR99 for each crime category, adjusting these values only for inflation to current prices to maintain methodological consistency.

The main type of crime affected by the analysed Smart Data use cases is fraud. These costs (in 2018 prices are as follows):

Cost Category	Actor	Unit Cost for Fraud
Costs in Anticipation		
Defensive expenditure	Business/Consumer	£170
Insurance administration	Business/Consumer	£50
Costs as Consequence		
Value of property stolen/damaged	Business/Consumer	£500

[41] Home Office, 2018. The economic and social costs of crime second edition.

Physical and emotional harm	Consumer	£200
Lost output	Business	£60
Health services	Government	£70
Victim services		£0
Costs in Response		
Police costs	Government	£60
Criminal justice system	Government	£170
Total Unit Cost		**£1,290**

The second component involves quantifying the number of crimes (frauds) prevented by the Smart Data use case. This is done with reference to similar Smart Data schemes, particularly Open Banking, and reporting / compliance measures. These are then multiplied by the relevant unit costs to obtain a total cost estimate.

Finally, we apply the specific multipliers provided in HORR99 to convert police-recorded crime to estimated total crimes. These established multipliers account for variations in reporting rates across different crime types and reflect the relationship between recorded and actual crime levels. These multipliers are applied to Costs in Anticipation and Costs as a Consequence values, but not the Costs in Response. The multiplier for fraud is 53.6, which means that for every fraud offense recorded by the National Fraud Intelligence Bureau (NFIB) within dissemination packages sent to police forces, there are approximately 53.6 total fraud offenses occurring (including those not reported).

C.1.9 Revealed Preference Analysis

Revealed preference techniques are used to infer economic values by examining how people behave in related markets where prices are observable. This approach is particularly relevant for quantifying two key areas in our analysis: competition effects revealed through average consumer savings from switching providers, and service personalisation value revealed through price premiums that consumers pay for more bespoke services.

For competition effects, we analyse actual switching behaviour and resulting cost savings in comparable markets where Smart Data schemes (e.g. Open Banking) or similar data initiatives (e.g. energy reporting requirements) have been implemented. This allows us to estimate the impact of improved competition and market transparency. For personalisation value, we examine price differentials between standard and personalised service offerings to determine how much consumers are willing to pay for tailored services. This allows us to estimate the implicit value consumers place on personalisation.

The revealed preference methodology is preferred over stated preference approaches where reliable market data exists, as it is based on actual consumer behaviour rather than hypothetical choices. However, we recognise that revealed preference techniques have limitations, particularly when existing markets may be distorted or when the specific Smart Data use case introduces novel features not present in current markets. We therefore complement revealed preference analysis with willingness to pay analysis and other relevant approaches.

C.1.10 Willingness to Pay Assessment

Willingness to pay (WTP) techniques involve using specially constructed questionnaires to elicit estimates of the maximum amount people are willing to pay for a particular outcome or service. This can be done through two main approaches: contingent valuation methods, which focus on

valuing a non-market good as a whole, and choice modelling methods, which focus on valuing specific attributes of a non-market good. For contingent valuation, detailed descriptions of the good, how it will be provided, and payment methods are presented to respondents, followed by questions to determine their maximum WTP.

When implementing WTP studies, several key considerations must be addressed. Research shows that people's stated values can be influenced by irrelevant cues and anchoring effects, where initial reference points significantly impact final valuations. To mitigate these effects, careful survey design is essential. Additionally, studies have found that people's WTP statements may not always align with their actual behaviour or experienced utility, suggesting the need for appropriate adjustments and sensitivity analysis in the final calculations.

For our analysis, WTP approaches were used to quantify benefits through a comprehensive consumer survey focusing on three Smart Data use cases: property transactions, meal planning/grocery shopping, and home energy improvements. For each use case, respondents were presented with detailed scenarios comparing a full Smart Data solution against both standard processes (with cash rebates) and basic Smart Data options. This revealed consumers' relative valuations of time savings, reduced stress, and improved outcomes. The survey strengthened WTP estimates by presenting concrete trade-offs and measuring both adoption likelihood and minimum compensation required to forgo Smart Data benefits.

C.2 Direct Impacts With Non-market Valuation or Unmonetisable Values

The second category acknowledges significant direct impacts that resist straightforward monetary quantification:

C.2.1 Environmental impacts, both positive and negative

To cost changes in carbon emissions resulting from Smart Data use cases, we align with the latest Department for Energy Security and Net Zero (DESNZ) guidance on official carbon values.[42] These values represent the marginal abatement cost of achieving the UK's legislated Net Zero target by 2050.

The first step in our methodology requires determining the scope of emissions that will be affected. We identify direct emissions from the intervention, such as those from energy use and transport, while also considering indirect emissions through supply chains or behavioural changes. All greenhouse gases are converted to CO2 equivalent (CO2e) using standard conversion factors.

We then calculate emission changes by establishing a baseline emissions scenario without the intervention and projecting emissions with the intervention over its full lifetime. This allows us to calculate the net change in emissions (CO2e) for each year.

For applying carbon values, we use DESNZ's latest traded carbon values (2024), which provide four scenarios: the central trajectory aligned with Net Zero Strategy projected emissions; the high trajectory assuming lower fossil fuel prices and higher economic growth; the low trajectory assuming higher fossil fuel prices and lower economic growth; and the market trajectory accounting for initial market factors in the first four years.

Based on DESNZ's 2024 carbon values, here are the key price points for carbon emissions (in £/tCO2e, real 2024 prices):

[42] Department for Energy Security and Net Zero, 2024. Traded carbon values used for modelling purposes, 2024.

Year	Market Traded Carbon Values	Low Sensitivity	Net Zero Strategy Aligned	High Sensitivity
2024	37	28	40	46
2025	44	49	63	74
2026	62	62	87	103
2027	75	66	87	104
2028	88	62	88	110
2029	80	53	80	105
2030	78	50	78	107
2031	85	54	85	114
2032	91	60	91	118
2033	97	63	97	123
2034	100	65	100	125
2035	109	72	109	134
2036	115	77	115	140
2037	122	84	122	146
2038	130	94	130	153
2039	132	96	132	153
2040	128	94	128	151
2041	125	90	125	149
2042	122	87	122	148
2043	118	85	118	145

To monetise the impact, we multiply annual emission changes by appropriate carbon values for each year. We use real 2024 prices (£/tCO2e) from the central scenario as default, while considering sensitivity analysis using high/low trajectories and accounting for future value growth in line with published trajectories.

C.2.2 Improvement or Worsening in Health Outcomes

To cost changes in health outcomes from Smart Data use cases, we will follow a methodology aligned with established cost-benefit analysis principles, developed by the Department of Health and Social Care, based on direct estimated cost to the NHS and the effects in Quality Adjusted Life Years (QALYs).[43]

First, health effects are measured using Quality Adjusted Life Years (QALYs), which involves determining baseline quality of life scores for affected populations and estimating how interventions will change these outcomes. This requires careful analysis of both the magnitude and duration of health impacts to calculate the total QALY effect, with reference to relevant academic literature on the expected improvements.

Second, resource implications are assessed by calculating both direct healthcare costs (including NHS resources, staffing, and facilities) and indirect costs like social care and informal care requirements. This ensures all financial impacts are captured, including long-term resource needs that may emerge over time.

The third step involves converting QALY impacts into monetary values using standardised metrics. The Green Book recommends a QALY value of £70,000 in 20/21 prices, though these figures must be adjusted for inflation using the Health and Community Health Services (HCHS) pay and prices index.[44] Additionally, the opportunity cost of NHS resources must be considered, currently valued at £15,000 in 22/23 prices.[45]

Finally, health impacts have a different time adjustment from monetary costs to account for the different timing of health impacts. Future QALYs are typically discounted at 1.5% per year (instead of the 3.5% used for monetary values), reflecting society's time preference while recognising the special nature of health benefits compared to other economic goods.

C.3 Indirect Macro-Economic Effects

While the direct costs and benefits of Smart Data initiatives are immediately observable through market prices, revealed preferences, and willingness-to-pay measurements, there are also important indirect and macro-level effects that emerge as second-order impacts. These indirect effects ripple through the economy as Smart Data adoption drives broader systemic changes.

To assess these indirect effects, we use causal chain analysis. This analysis begins with the direct effects already quantified, then traces how these initial impacts propagate through the economy via behavioural responses of firms and households. For macroeconomic variables, causal chains often involve both demand-side effects, such as multiplier impacts from spending changes, and supply-side transformations affecting productivity, capital deployment, and market efficiency.

C.3.1 Supply-Side Indirect Effects

Our supply-side analysis is grounded in the concept that Smart Data investments can enhance a firm's or economy's overall productivity, labour supply and capital stock. To capture these improvements, we employ a Cobb–Douglas production function of the form:

*Y = A * K^(alpha) * L^{1-alpha}*

Here, Y represents the total output, K and L are the inputs of capital and labour respectively, and A is total factor productivity (TFP), which we interpret as multi-factor productivity (MFP) in our

[43] Department of Health and Social Care, 2010. Quantifying health impacts of government policies.
[44] HM Treasury, 2022. The Green Book.
[45] Department of Health and Social Care, 2023. Proposed changes to the statutory scheme to control the costs of branded health service medicines: consultation response.

analysis. Smart Data initiatives are assumed to improve A by enabling better information flows, more informed decision-making, and more efficient resource allocation. Specifically, we have identified the following productivity drivers as relevant to Smart Data:

- Enhanced market efficiency through improved resource allocation
- Increased industry-wide innovation and technological advancement
- Structural changes in market competition and industry organisation
- Productivity gains from streamlined processes and automation
- Development of new business models and service offerings

Historical MFP data from the ONS[46] provides the baseline from which we estimate an incremental improvement in A. The MFP figures are taken directly from ONS publications and where relevant sector specific figures and averaged values from prior years were used to ensure the analysis wasn't affected by one-off changes. By integrating this estimated productivity gain into the Cobb–Douglas model, we can quantify the resulting increase in output (Y). Sensitivity analysis is performed by varying the assumed productivity improvement and testing different elasticity parameters to ensure that our conclusions remain robust under different scenarios.

For capital stock, we model how Smart Data shifts consumer savings and business investments into capital formation. When consumers or businesses achieve cost savings through Smart Data efficiencies, some of these savings flow into productive capital investment rather than consumption. Within this model, we assume that 11-12% of consumer savings are spent, based on Bank of England data on marginal propensity to consume. The remaining are treated as savings, and we model these savings increase as an increase in K, using the gross capital stock as our baseline.

For labour supply impacts, we convert time savings into effective labour supply changes. Using recent studies on time savings, we estimate that 40% of time saved through Smart Data efficiencies becomes productive economic activity, increasing L relative to the current hours worked. This conservative approach acknowledges that while not all time savings directly boost labour market participation, the aggregate effect across the economy creates meaningful contributions to output.

Our supply-side focus for productivity benefits reflects the fundamental nature of Smart Data's impact on economic efficiency. When Smart Data enables businesses to produce more output with the same inputs (like reducing food waste while maintaining sales levels), this represents a true productivity gain rather than just a transfer of value between economic actors. Using supply-side modelling allows us to capture these genuine efficiency improvements in the economy's productive capacity, rather than just tracking transfers of existing value between different market participants.

Additionally, supply-side modelling helps avoid double-counting when dealing with situations where one party's cost savings might be another party's revenue loss. By focusing on the net productivity improvements at the sectoral level, we can better isolate the true economic gains from Smart Data implementation.

By considering all elements of the Cobb-Douglas production function - total factor productivity (A), capital (K), and labour (L) - our analysis captures the complete range of secondary supply-side effects that Smart Data initiatives can have on the economy's productive capacity.

[46] Office for National Statistics, 2023. Multi-factor productivity, annual, UK.

C.3.2 Demand-Side Indirect Effects

The demand-side analysis, which is only included in the net present value outputs, focuses on how the initial Smart Data expenditure cascades through the economy, generating further economic activity. We use input–output (I–O) analysis to capture these effects, applying ONS multipliers[47] to the direct effects previously identified to capture the indirect effects that emerge from the subsequent demand in supplier industries. In our analysis, we will focus exclusively on supply-chain multipliers to capture indirect effects, rather than including induced effects from income re-spending.

Using the direct benefits and costs as a starting point, we determine whether to include multiplier effects in the net present value calculation. We include the full multiplier as a benefit when spending represents new economic activity without an identified opportunity cost. When increased spending in one sector comes at the expense of decreased spending in another sector, we only net off the multipliers if there is clear evidence that the multiplier effects are materially different between the sectors involved. Otherwise, we assume the multiplier effects cancel each other out completely.

Our analysis excludes demand-side effects when calculating GDP impacts from Smart Data use cases. This approach aligns with HM Treasury and Office for Budget Responsibility (OBR) methodology to avoid double-counting, as these bodies model economy-wide demand effects separately. While demand-side effects are excluded from GDP calculations, they remain included in our Net Present Value (NPV) calculations and are discussed qualitatively in our commentary around the headline figures.

C.3.3 Economic Effects Not Considered in Our Analysis

Whilst our analysis aims to be comprehensive, several economic effects have been deliberately excluded to maintain methodological rigour. These include:

- Induced behavioural effects and changes in consumer spending patterns beyond direct impacts
- Complex supply chain adjustments beyond secondary spending effects
- International spill-over effects that extend beyond UK economic boundaries
- Speculative future innovation impacts and potential technological advances

This conservative approach ensures we measure genuine economic value creation while avoiding potential overestimation from more speculative induced and spill-over effects. Our focus remains on capturing direct market impacts, secondary demand effects through input-output multipliers, and comprehensive supply-side effects including productivity improvements, labour supply changes, and capital stock impacts.

[47] Office for National Statistics, 2025. UK input-output analytical tables: product by product.