

Stage 03: Attachment A: Detailed Assessment for P272

P272 'Mandatory Half Hourly Settlement for Profile Classes 5-8'

What stage is this document in the process?

- 01 Initial Written Assessment
- 02 Definition Procedure
- 03 Assessment Procedure
- 04 Report Phase

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About this Document

This is Attachment A to the P272 Assessment Report. It provides additional details of the Workgroup's analysis and discussions.

P272 cost-benefit analysis results

The results of the P272 cost-benefit analysis (CBA) are presented in this document. The results are calculated from the CBA model developed by ELEXON based on the responses to two separate consultations on costs and benefits.

The CBA has estimated that the cost for implementing the P272 Proposed Modification (April 2014) would range from around **£46m to £199m¹** by the end of 2020. In the same period, benefits of between **£71m to £198m** could be realised by the Industry. Median estimates for costs and central estimates for benefits shows costs of **£112m** and the benefits are around **£144m**, suggesting that there could be a **£32m** benefit by the end of 2020. The P272 Alternative Modification (implemented April 2015) would have costs in the range **£41m to £182m** and benefits ranging from **£63m to £176m** (median estimates of costs of **£102.9m** and central estimates of benefits of **£127.6m** give a net benefit of **£24.7m**).

The wide spread of costs are due to range of costs submitted by Suppliers (and to a lesser extent Distribution Businesses (Licenced Distribution System Operators, or LDSOs)). The broad range of benefits is due to the uncertainty surrounding the hypotheses and the sensitivity to their assumptions in the CBA model; for example will Half Hourly (HH) Settlement lead to more innovative tariffs and therefore a 1% reduction in peak demand for customers in Profile Classes 5-8, or would it be 0.5% or 2%? The weighted average costs calculated from all submitted LDSO and Supplier costs give the costs at the upper end of the range. Costs using the lowest costs provided by LDSOs and Suppliers, which may be available to all in an efficient market, give the cost at the lower end of the range. Likewise benefits are sensitive to the assumptions in the model, and high and low estimates of these have been used to show the effect of these and range of the potential benefits in pounds.

The range of costs and benefits for the counterfactual scenarios are lower than those for the P272 scenario. Additionally, the significant costs for the scenarios with high uptakes of elective HH Settlement suggest that these scenarios are unlikely to occur if the market were to be left to its own commercial pressures. Changes to the Distribution Use of System (DUoS) Charging mechanism, to provide more equal charges for HH and Non Half Hourly (NHH) settled customers, could facilitate greater uptake of elective HH Settlement and make these counterfactual scenarios more likely.

If P272 or its Alternative is not implemented then the likely scenario is that there would be no real change in the number of customers in Profile classes 5-8 that would be elected to be settled HH. This reflects the current status quo and has a range of costs from **£1.2m to £4.4m** by the end of 2020 and benefits of **£1m to £3m** over the same period.

Further to the quantified benefits in the CBA a number of qualitative and unquantifiable benefits are also presented. These include a benefit associated with peak reduction which could reduce the need for peak demand generation plant (typically expensive to run).

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¹ The costs provided in this report have not been discounted to 2020.



Introduction

The Workgroup has examined specific costs that may arise as a result of P272. In conducting this work the Workgroup determined the best way forward to be to define specific cost categories which would facilitate clear and accurate responses.

Some costs categories were identified from some cost-benefit analysis originally done by the PSRG before P272 was raised, while others have been developed by the P272 Workgroup. These costs specifically relate to all additional costs for HH Settlement above and beyond the Supply Licence requirement. For example, the cost of the actual meter itself and any installation costs would not be applicable as these costs are sunk within the Supply Licence requirement.

There are two types of costs, which are split between Suppliers and Distributors:

- **One-off costs** are incurred in establishing the systems and processes necessary to settle sites in the HH market, e.g. a site visit to enable communications on the meter; and
- **On-going costs** are incurred in day-to-day management of sites in the HH market, e.g. the costs of retrieving data remotely.

Cost categories

Supplier One-off Costs
Undertake the Change of Measurement Class process
Change internal processes (e.g. billing or settlement processes) to facilitate the increase HH settled customers (includes process changes but excludes Settlement or billing system costs)
Update or change billing or Settlement systems to facilitate the increase in HH Settlement (includes software development costs but excludes hardware costs)
Provision, hosting and security of any additional IT infrastructure
Provision or development of Supplier Agency roles (includes procurement, contractual or qualification costs but excludes contractual arrangements with existing Agents)
Any other costs

Supplier On-going Costs
Additional costs incurred in supporting a meter for HH Settlement and any additional data collection costs incurred (e.g. airtime contracts or dial-up costs)
Additional cost of maintenance for meters with communications suitable to collect HH data for Settlement (based on costs for the AMR Metering Systems for Profile Classes (PCs) 5-8, not on costs for existing large HH Metering Systems, which are mandatory)
Additional MAP costs incurred by using the meter for HH Settlement
Additional DTN cost associated with the Settlement of HH data
Any other costs

P272 Costs

This section summarises the cost categories identified by the Workgroup for P272. These formed the basis for the data received from the Assessment Consultation on Costs.

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Distributor One-off Costs

Update or change billing systems to facilitate the increase in HH Settlement (includes software development costs but excludes hardware costs)

Update or change any other systems to facilitate the increase in HH Settlement (includes software development costs but excludes hardware costs)

Update or change the registration systems to facilitate the increase in HH Settlement (includes software development costs and Change of Measurement Class (CoMC) costs but excludes hardware costs)

Implement process changes driven by the increase in HH Settlement

Provision, hosting and security of any additional IT infrastructure

Distributor On-going Costs

Additional costs associated with processing the increased volumes of HH data (includes additional resource costs but excludes billing costs)

Additional costs associated with the increase in billing activity associated with the increase in HH settled customers

Additional DTN cost associated with the Settlement of HH data

Any other costs



Introduction

The Workgroup has agreed the detailed quantification of the potential benefits. This section provides an overview of the structure of these benefits and the approach that will be used to quantify each benefit. It also describes three categories of benefits:

- Benefits for the market as a whole;
- Benefits for Suppliers; and
- Benefits for Distribution Businesses.

It also details the various benefits in each category, including the hypothesis (or logic) behind each benefit and a high level summary of the methodology that will be used to quantify (calculate) the benefit.

This section describes each potential benefit and lists the hypothesis on how the benefit is derived/realise, e.g. by having HH data, Suppliers can better forecast their outturn demand. It also describes the methodology for the calculation of the benefit, e.g. the calculation of the amount of energy Suppliers can better predict their demand is related to the energy that is incorrectly settled in a half hour due to profiling in comparison to and actual HH energy value.

The P272 Workgroup has reviewed the hypothesis and methodology for each benefit, and has worked through in detail the underlying assumptions, calculations and the extrapolation methodologies. Specifically, the Workgroup has agreed the various assumptions, including the price streams to be used in the applicable benefits' calculations, e.g. market price, retail price, etc. Furthermore, the Workgroup has amended some of the benefits as a result of their review of the Benefits Consultation responses. These amendments have improved the quantification of these benefits.

Benefits definition

There are three main areas of potential benefits:

- **Market Benefits:** These are reductions (or avoided future increases) in energy costs or central administration costs. These would benefit the market as a whole, and would feed either directly to the customer or via the Supplier to the customer. For example, P272 may lead innovative Time of Use (ToU) tariffs that to result in reduced demand or relocated demand which directly benefits the consumer;
- **Supplier Benefits:** These are where a Supplier realises cost reductions in running their Supply business, either in terms of reduction in costs to supply or operational costs (and therefore these benefits could be passed onto the customer in lower tariffs); and
- **Distribution Business Benefits:** These are benefits where the Distribution Business (LDSO) can fulfil their licence obligations in a more cost efficient manner, such as network planning, losses management, etc.

It should be noted that some benefits have a trigger point where they begin to be realised (or are capped) – please see Section 4 for an explanation of the trigger points used in the benefits quantification.

P272 Benefits Pack

This section summarises the benefit identified by the Workgroup for P272.

It details the hypothesis and methodology for each benefit. The hypothesis describes the source of each benefit and the rationale for the gain. The methodology summarises the calculation of the proposed benefit.

For full details of these benefits, please see the P272 Benefits Pack, which can be found as part of the Assessment Consultation on Benefits, on the [P272](#) page of the ELEXON website.

This document set out, for each benefit, a hypothesis, any key assumptions, the proposed calculation/data required and an extrapolation of the potential benefits identified for P272 and the counterfactual scenarios.

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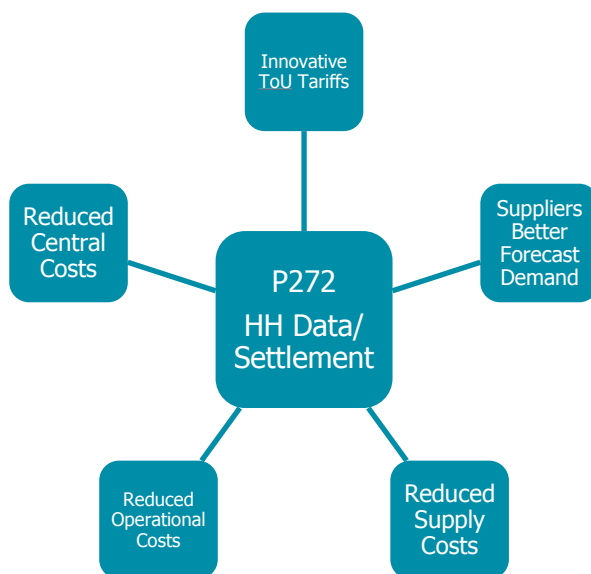
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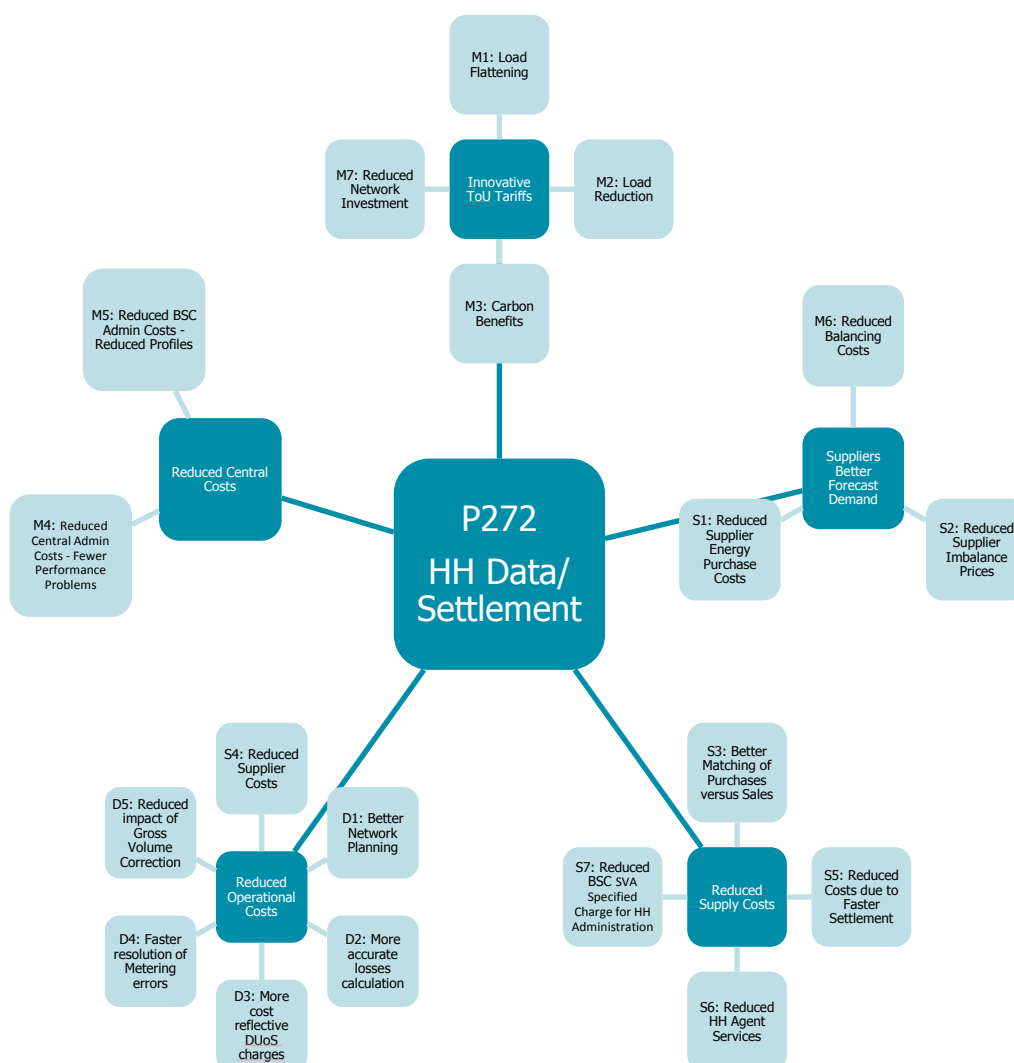
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Benefits sources

There are a number of sources which drive the potential benefits that are created from having HH data in Settlement (either mandated through P272 or increased HH elective). The diagram below depicts these sources, each of which may drive a number of benefits.



The following diagram links each of the benefit sources to the specific benefit, e.g. 'Innovative ToU Tariffs' is linked to Market Benefit M1 'Load Flattening'.



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The links between sources and benefits is summarised in the following table:

Benefit Sources and Related Benefits	
Benefit Source	Related Benefits
Innovative ToU Tariffs	M1 M2 M3 M7
Supplier Better Forecast Demand	M6 S1 S2
Reduced Supply Costs	S3 S5 S6 S7
Reduced Operational Costs	S4 D1 D2 D3 D4 D5
Reduced Central Costs	M4 M5

To help understand the source for the various benefits and ensure there are no overlaps for the benefit calculation, the sources are shown in the hypothesis for each potential benefit in **bold**.

Market Benefits

There are seven potential benefits that P272 would bring that impact on the whole electricity market:

Market Benefits	
No	Benefit
M1	Load Flattening
M2	Load Reduction
M3	Carbon Benefits
M4	Reduced Central Admin Costs – Fewer Performance Problems
M5	Reduced BSC Admin Costs – Reduced Profiles
M6	Reduced Balancing Costs
M7	Reduced Network Investment

M1: Load Flattening

Hypothesis: By having HH data, Suppliers can offer more **innovative ToU tariffs**, thus promoting customers to use less energy at the time of peak (when wholesale prices are higher) and use more energy off peak, thereby flattening their demand shape.

Methodology: This is where energy is moved from one period in the day (high cost) to other periods (lower costs). A percentage volume reduction is calculated from the peak wholesale price period of the day, e.g. between 16:00 and 19:00 in Winter. This energy reduction is then split into two parts: one where the energy is moved to the rest of the day (load moved); and the other which is classed as energy destroyed (load reduction and calculated through Market Benefit M2). The unadjusted and adjusted HH volumes are then multiplied by a HH reference price (forward wholesale market prices) and differenced to give an annual cost benefit.

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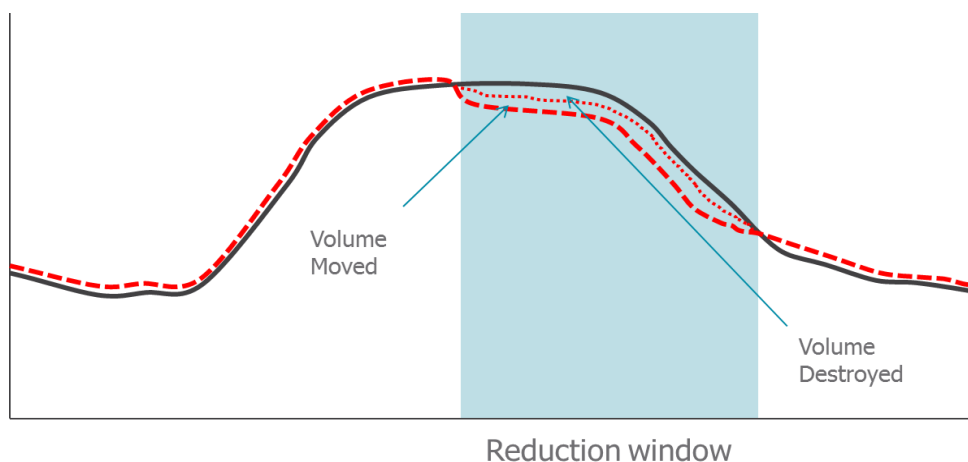
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M2: Load Reduction

Hypothesis: By having HH data, Suppliers can offer more **innovative ToU tariffs** (and other products, such as demand side reduction). This promotes customers to use less energy overall.

Methodology: This uses the same calculation as for M1 above, with the second part of the energy reduction, a percentage volume between 16:00 and 19:00, being removed (energy destroyed). The unadjusted and adjusted HH volumes are then multiplied by a HH reference price (forward wholesale market prices) and differenced to give an annual cost benefit.

M3: Carbon Benefits

Hypothesis: By having HH data, Suppliers can offer more **innovative ToU tariffs** and other products, thus promoting customers to use less energy overall and thus save on carbon costs.

Methodology: This uses the volume of energy from the load reduction calculation in M2 above, and converting into cost of carbon savings. The conversion factors used (to convert energy reduction to cost of carbon saving) are based on the carbon costs of coal fired plant initially, as it is assumed this is a higher merit order plant, and will be plant that will not be used due to the energy reduction. After 2015 a Transmission Network energy conversion factor is then used until 2020. The Carbon Price is initially set to £16 per Carbon Tonne and rises to £30 per Carbon Tonne by 2020.

M4: Reduced Central Admin Costs – Fewer Performance Problems

Hypothesis: By having more customers settled HH, there are less performance problems for Code Administrators to manage. This covers BSCCo, MRASCo and DCUSA Agent, **thus reduced central administration costs.**

Methodology: There is a central administration cost saving based on FTE reduction due to a reduced number of performance problems.

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M5: Reduced BSC Admin Costs – Reduced Profiles

Hypothesis: By settling HH there is no need for profiles to be produced year on year for Profile Classes 5-8, **thus reduced central administration costs.**

Methodology: There are BSCCo service and relevant Agent savings in the production of profiles based on current service costs. It should be noted that the Workgroup believes that there are no quantitative benefit for M5.

M6: Reduced Balancing Costs

Hypothesis: By having HH data, Suppliers can **better forecast their demand**, leading to lower imbalance volumes in general. These lower imbalance volumes would reduce the overall balancing requirements by the System Operator. Also, if Suppliers can better predict their actual demand, they will contract more accurately for the generation they need, resulting in generators' FPNs being more accurate, meaning less balancing actions will be required. This leads to two benefits:

1. less energy balancing actions costs; and
2. lower imbalance prices and less overall market imbalance costs.

Methodology: This calculation was undertaken by National Grid and showed interactions with balancing costs and National Grid's operating margin. It has been removed from the cost-benefit analysis due to this interaction and is being investigated further by Ofgem.

M7: Reduced Network Investment

Hypothesis: By having HH data Suppliers, can offer more **innovative ToU tariffs**, thus promoting customers to use less energy at time of peak which will lead to reduced peak demand. Reducing peak demand will lead to a benefit for the System Operator and Distributors through reduced network investment costs. Use of System tariffs are calculated to apportion the cost of network re-enforcement to different market sectors. Hence, the likely reduction in Distribution Use of System (DUoS) and Transmission Network Use of System (TNUoS) charges associated with the reduction in load and load flattening are likely to be reflective of the cost savings to the System Operator and Distributors in reducing the re-enforcement requirements.

Methodology and Proposed Calculation: The Load Reduction and Load Flattening calculations (M1 and M2) are multiplied by a matrix of red, amber and green DUoS changes for HH Low Voltage (LV) customers to get the revised DUoS charge estimate for Supplier of customers in Profile Classes 5-8. The same calculation is made on the unadjusted volumes. The out-turn values are differenced to get the benefit. For TNUoS, the reduction in average price for HH TNUoS per MPAN is calculated based on the load reduction and extrapolated across the HH customers that were in Profile Classes 5-8.

Supplier Benefits

There are seven potential benefits for Suppliers:

Supplier Benefits	
No	Benefit
S1	Reduced Supplier Imbalance Costs
S2	Reduced Supplier Energy Purchase Costs
S3	Better Matching of Purchases versus Sales
S4	Reduced Supplier Costs
S5	Reduced Costs due to Faster Settlement
S6	Reduced HH Agent Services
S7	Reduced BSC SVA Specified Charge for HH Administration

S1: Reduced Supplier Energy Purchase Costs

Hypothesis: By having HH data, Suppliers **can better forecast their demand** and contract forward better. This reduction in purchase costs would be based on the difference between the costs of a Supplier of contracting forward compared with those of the System Operator of procuring close to real time.

Methodology: A national half-hourly matrix data of data (365*48) is estimated for the whole of the Profile Class 5 to 8 market. The matrix has an error of 0.9 TWh of energy randomly mis-allocated to half-hours within the matrix. This random error is then reduced by a forecast improvement factor. The remaining mis-allocated energy volumes in each half hour are multiplied by the difference between the System Operator Price (System Sell Price (SSP) or System Buy Price (SBP)) depending on the direction of the mis-allocation) and a forward contract price taken from the day ahead market. The results are summated taking into account whether a cost saving would have been made by purchasing more energy in the half hour at a cheaper price or if a cost saving would have been made by not purchasing the energy in the first place.

S2: Reduced Supplier Imbalance Prices

Hypothesis: By having HH data, Suppliers **can better forecast their demand**, leading to lower imbalance volumes. These require less balancing actions and lower imbalance prices and less overall market imbalance costs.

Methodology: An error of 0.9 TWh (roughly 50 MWh per half-hour) is multiplied by a factor (0.33%) which represents the percentage of time the market is short. The resulting volume then has a forecasting improvement factor applied. The price sensitivity to net Imbalance volume (NIV) shows an approximate reduction of average BM offer prices of around £4/MWh for a reduction of 50MWh in NIV (Bid prices are typically flat with no appreciable change with a similar NIV reduction). The resulting volume is multiplied by the BM offer price to get the annual estimate of the benefit.

S3: Better Matching of Purchases versus Sales

Hypothesis: By having HH data, Suppliers can better match what they are getting paid for from the customer against what energy they are purchasing and any other costs they are paying for, such as imbalance costs, DUoS charges (and any other costs incurred to serve the customer). This better match of purchases and sales results in **reduced Supply costs** due to using the same source of meter data for billing (no EACs/AA or use of profiles) and purchasing.

Methodology: Calculation of the benefit to Supply businesses on better matching purchases versus sales is based on improvement in annual imbalance volume due to HH data (0.9TWh) multiplied by the retail energy price (£110/MWh) and then an opportunity cost of 5% gives an annual benefit of £4.95m. The opportunity cost figure is taken from the Workgroup's view on the quantifiable benefit to the Supplier based on consideration of avoided costs, improvements in cashflow, credit cover, the cost of debt and the risk a Supplier is exposed from purchase and sales not being matched.

S4: Reduced Supplier Costs

Hypothesis: By having HH data, Suppliers can **reduce operational costs**. This is based on the activities the Supplier has to undertake in serving the customer HH compared with NHH and the resource savings. There are a number of sources for these operational savings as follows, and these are primarily driven by there being fewer issues in the HH market:

- **Better matching of purchases versus sales:** In the HH market there is no disconnection between purchases and sales, e.g. it is a like for like; buy apples, sell apples;
- **Better billing for customers:** In comparison to the NHH market, in HH there are fewer queries from customers, leading to greater retention of customers and less costs in gaining new customers;
- **Reduced Assurance costs:** This is due to less work needed on performance assurance activities in the HH market compared to the NHH market;
- **Reduced costs due to faster Settlement:** By having faster settlement of the consumption for customers that were in PCs 5-8, Suppliers gain a reduction in FTE due to less work needed on these reconciliation activities; and
- **Reduced costs due to less Change of Supply issues:** By having HH data, Suppliers will have less work on CoS activities, e.g. less problems when they change supply for a HH customer.

Methodology: Calculation of reduction in FTE from having HH data for PCs 5-8 customers. This based on a percentage reduction on the annual costs to serve a PC 5-8 customer multiplied by the number of PC 5-8 customers settled HH. For example if the cost to serve is £65 per customer per year and the number of PC5-8 customers is 154,500 and the percentage improvement is 5%, total annual benefit = £500k

S5: Reduced Costs due to Faster Settlement

Hypothesis: By having faster Settlement of the consumption for customers that were in PCs 5-8, Suppliers realise cash flow and credit cover benefits (and any reduction in FTE due to less work on these activities), resulting in the benefit of **reduced Supply costs**.

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Methodology: The current percentage of actual data for PCs 5-8 is 97% at RF and 90% at R1. With an advanced meter, the assumption is that this will stay at 90% at R1. However, under P272, this would increase to 99% at R1. That movement of 9% gives less error and more certainty, resulting in further benefits, such as less queries on the bill, improved credit cover, better imbalance and bills up front, etc.

S6: Reduced HH Agent Services

Hypothesis: By having an extra 150,000 MPANs settled HH, the average costs of HH services reduces, thereby giving benefits to all currently HH settled customers (>100kW market), hence **reduced Supply costs** for Suppliers.

Methodology: Using an estimate of the reduction in HH services costs and multiply this by the number of metering systems being settled HH (HH mandatory).

S7: Reduced BSC SVA Specified Charge for HH Administration

Hypothesis: The benefit derived from having the HH element of the Supplier Specified Charge calculated over more MPANs will reduce the cost per MPAN to existing Suppliers with HH customers, thereby **reduced Supply costs**.

Methodology: Calculation of reduction in SVA Specified Charge from increase in Metering Systems being settled HH.

Distributor Benefits

There are five potential benefits for Distribution Businesses:

Distributor Benefits	
No	Benefit
D1	Better Network Planning
D2	More accurate losses calculation
D3	More cost-reflective DUoS charges
D4	Faster resolution of Metering errors
D5	Reduced impact of Gross Volume Correction

The main hypothesis underpinning these potential benefits is that more accurate HH Metered Volumes will benefit a Distribution Business in fulfilling its licence obligations.

It should be noted that the Workgroup believes that only D4 has a quantitative benefit.

D1: Better Network Planning

Hypothesis: From having HH data, Distribution Businesses can better plan their networks and **reduce operational costs**.

Methodology: There is a percentage reduction in network planning costs.

D2: More accurate losses calculation

Hypothesis: From having HH data rather than NHH estimates, Distribution Businesses can better reconcile energy input onto the Distribution System with energy taken off, which leads to a more accurate losses calculation and **reduced operational costs**.

Methodology: There is a percentage reduction in losses.

D3: More cost-reflective DUoS charges

Hypothesis: From having HH data rather than NHH estimates, Distribution Businesses can better calculate Distribution Use of System (DUoS) charges, allowing DUoS tariffs for these customers to be modelled more accurately within the CDCM and **reduce operational costs**.

Methodology: There is a more cost reflective set of DUoS charges.

D4: Faster resolution of Metering errors

Hypothesis: Having accurate HH data rather than NHH estimates leads to the ability to identify metering issues sooner, and potentially avoid or resolve disputes to faster timescales and **reduce operational costs**. The benefit is derived by the Distribution Business avoiding losses incentive payments associated with a longer resolution.

Methodology: There is an avoided cost to Distribution Business from their incentive scheme.

D5: Reduced impact of Gross Volume Correction

Hypothesis: From having accurate HH data rather than NHH estimates, this group of customers will no longer be in the NHH market and therefore will not give rise to any Gross Volume Correction (GVC), the losses from which can impact LDSOs. The benefit is derived by the Distribution Business avoiding losses incentive payments associated with the longer resolution and **reduces operational costs**.

Methodology: There is an avoided cost to Distribution Business from their incentive scheme.

4 Rationale for Benefits Triggers

This section provides a rationale for the trigger that is used in some of the benefits calculations. These are for benefits S1, S2 and S5, and determines various levels on when benefits start to be realised or when a cut off is reached. The following section gives the detailed calculation for these trigger levels.

Rationale for the Benefits Triggers

The Benefits Pack contains a number of 'triggers' when either a benefit will start to be realised or when a benefit is realised to a level where more 'information' does not provide an incremental benefit. The P272 Workgroup has considered this rationale as follows.

For example in Benefit S1 (by having HH data, Suppliers can **better forecast their demand** and benefit from reduced imbalance volumes and costs), there is an assumption that the benefit will not be reasonably realised until 30% of the Profile Class 5 to 8 Customers have moved to elective HH Settlement.

The 30% figure has been considered and agreed by the Workgroup and is proposed at around 30% in the Benefits Pack on the following basis:

When each of the Big 6 Suppliers have 30% of their PC 5-8 customers in each GSP Group settled HH then, using a rough calculation:

$$154.5 \text{ k (PC 5 to 8 Customers)} * 30\% = 46,350 \text{ Customers}$$

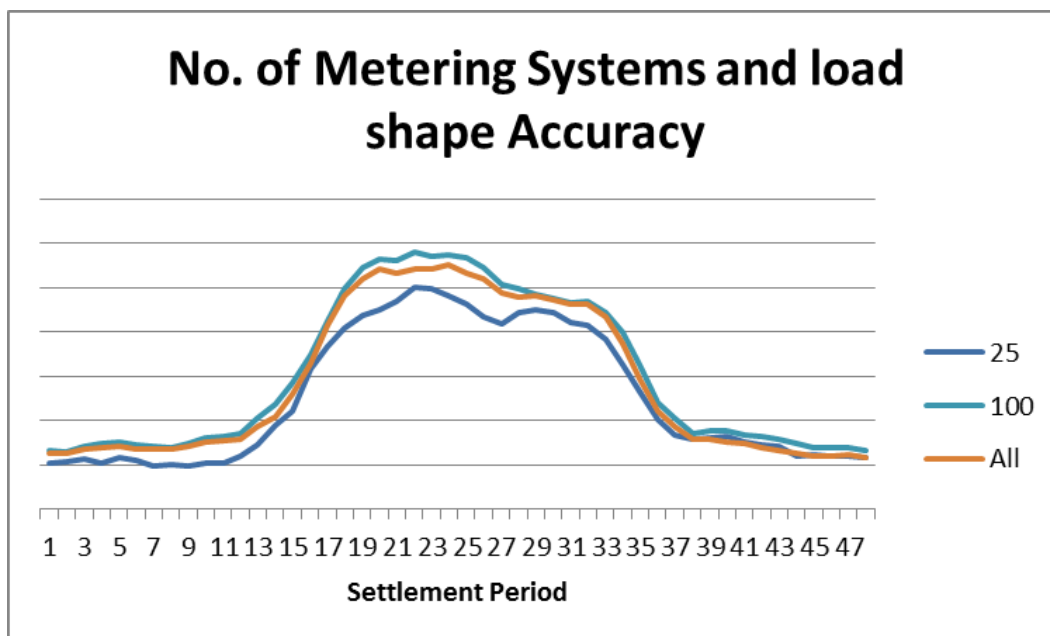
$$\text{Approx. in each GSP Group: } 46,350 \text{ Customers} / 14 \text{ GSP Groups} = 3,311 \text{ Customers}$$

$$\text{Divided by Big 6 Suppliers} = 3,111 \text{ Customers} / 6 \text{ Suppliers} = 552 \text{ Customers}$$

Using the ratios in the total population:

Distributor Benefits				
All	PC5	PC6	PC7	PC8
154,513	37,750	54,536	25,361	36,866
-	24%	35%	17%	24%
552	132	194	94	132

So the large Suppliers can be assumed to have approaching 100 customers in each GSP Group. This quantity of customers should provide a reasonable estimate of the profile for the customers in PCs 5-8 that have not yet moved to HH in that GSP Group. This level of information can be used to start to allow Suppliers to predict their outturn demand more accurately, as per the hypothesis.



In the above example, using Profile Class 5 customer data, the benefit of using 25 customer data is compared to using 100.

Having the upper trigger at 60% means that when you have 60% of the data to predict the remaining 40% of customers that have not yet moved HH, then the additional benefit of more customers moving adds little to the benefit already realised since Suppliers can already predict their outturn demand to a high level of accuracy with 60% of the data.

5 Cost-Benefit Analysis Results

Introduction

The results of the P272 cost-benefit analysis (CBA) are presented in this document. The results are derived from the responses to two separate consultations on costs and benefits. For Parties that did not provide a response to either of the consultations the cost and benefits have been derived from the median cost provided from the Parties that responded.

Weighted average, median and low costs have been used in the analysis to provide the range of likely costs and a central estimate. The **weighted average** of all costs provided (these have been weighted using Supplier or LDSO portfolio counts of customers in Profile Classes 5 to 8) were the highest of the three sets of costs, and so have been used to estimate the upper end of the costs. The **low** costs are derived from only the lowest cost for each cost category by any Supplier or LDSO. The **median** costs have been used to derive a more central estimate.

The benefits are largely based on calculations and assumptions defined in a 'Benefits Pack' provided as part of the Benefits Consultation. Some of the calculations have been amended and improved following consideration by the P272 Workgroup of the consultation responses. Furthermore, high and low estimates have been derived by the Workgroup by using different assumptions for the larger benefits, for example the market benefits M1-M3 and M7.

The results have been extrapolated over a number of scenarios defined below. The analyses results presented are the total cumulative costs by the end of 2020. Additionally, the costs and benefit over time are also presented for selected scenarios.



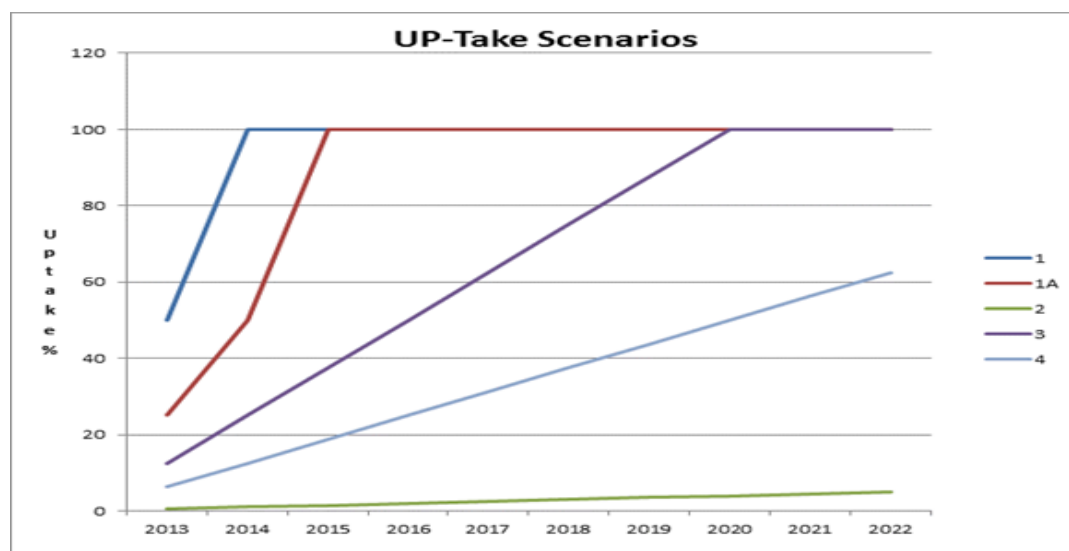
P272 Benefits Pack

You can find the Workgroup's Benefits Pack as part of its Assessment Consultation on Benefits, which can be found on the [P272](#) page of the ELEXON website. A summary of the benefits can be found in Section 3.

Cost-benefit analysis scenarios: P272 and counterfactual

There are four scenarios being examined (P272 and three counterfactual) as follows:

- **Scenario 1:** P272 is implemented as of 1 April 2014 (1A is for P272 Alternative);
- **Scenario 2:** P272 is not implemented and the HH market for elective remains at the same level (as of July 2012) – this scenario can be considered a 'no-change' scenario;
- **Scenario 3:** 100% PC 5-8 customers move to elective half hourly by 2020; and
- **Scenario 4:** 50% of PC 5-8 customers move to elective half hourly by 2020.



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Approach to costs

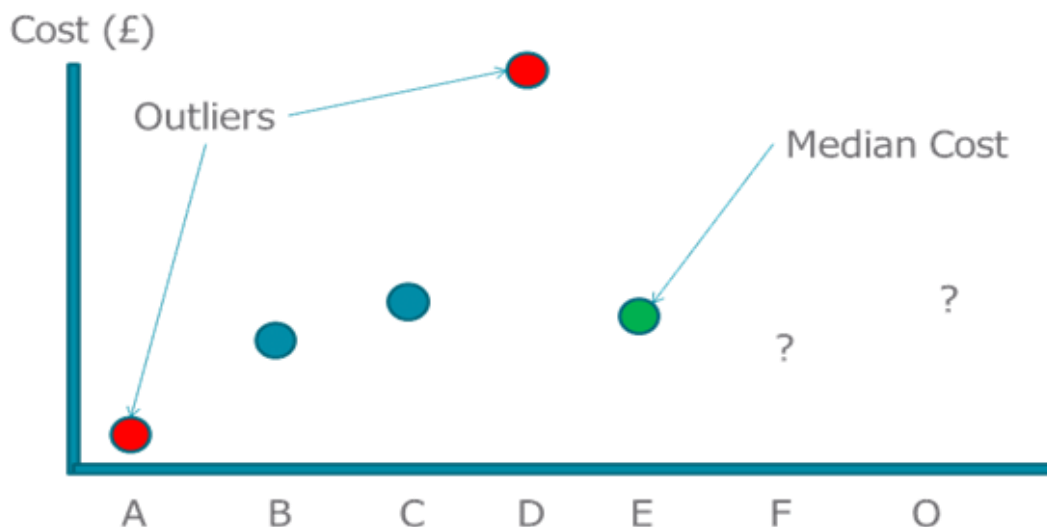
Summary

The costs in this analysis have been based on the responses to the Costs Consultation undertaken in July 2012 (see P272). The following approach has been taken to the calculation of the P272 costs:

1. All costs submitted by Parties have been used (after validation and discussion with the relevant Party).
2. For Parties that did not provide a response to either of the consultations, the costs have been derived from the median cost provided from the Parties that responded.
3. Weighted averages of each cost have been derived using Supplier or LDSO portfolio counts of customers in Profile Classes 5 to 8. These averages have then been shown as per MPAN figures, and have been shown as the highest costs.
4. The lowest submitted and median calculated costs have also been used for low and 'central' estimates.
5. Where costs for IT systems or processes have been given as a range, the mid-point has been taken (e.g. Costs given in range £1m-£3m = mid-point taken = £2m);
6. Suppliers and LDSOs indicated in their responses to the consultation that process and system changes would be required if there was a relatively small move to elective HH Settlement. For the purpose of the analysis the trigger for one-off costs has been set to 10% uptake; and
7. The total costs in any year have been calculated by multiplying the costs by the population of Profile Class 5 to 8 customers that are assumed to be settled Half-Hourly in each scenario.

Detailed approach

This section depicts pictorially the approach to be used for the calculation of P272 costs.



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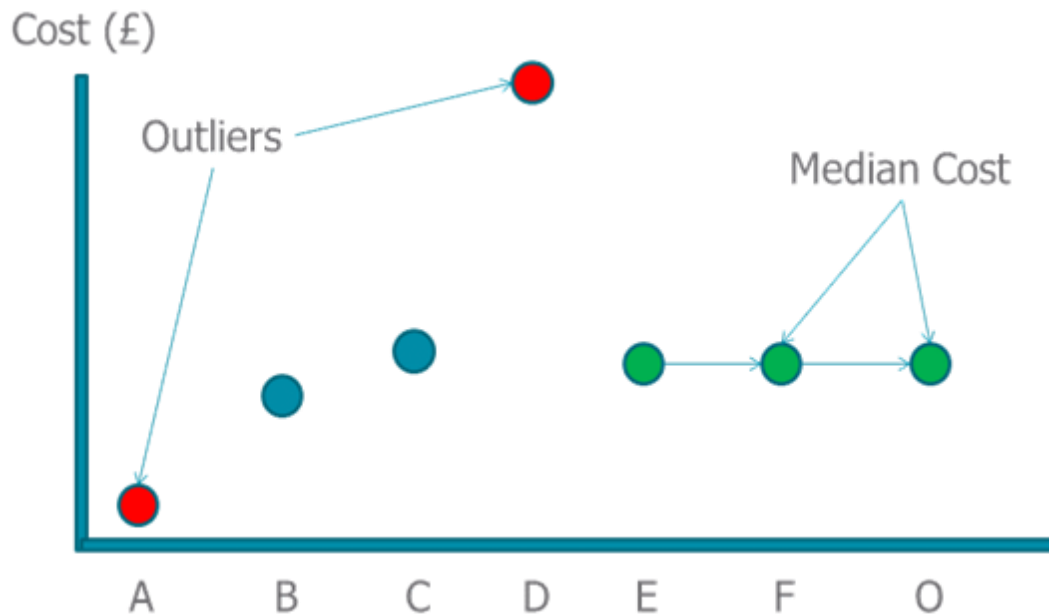
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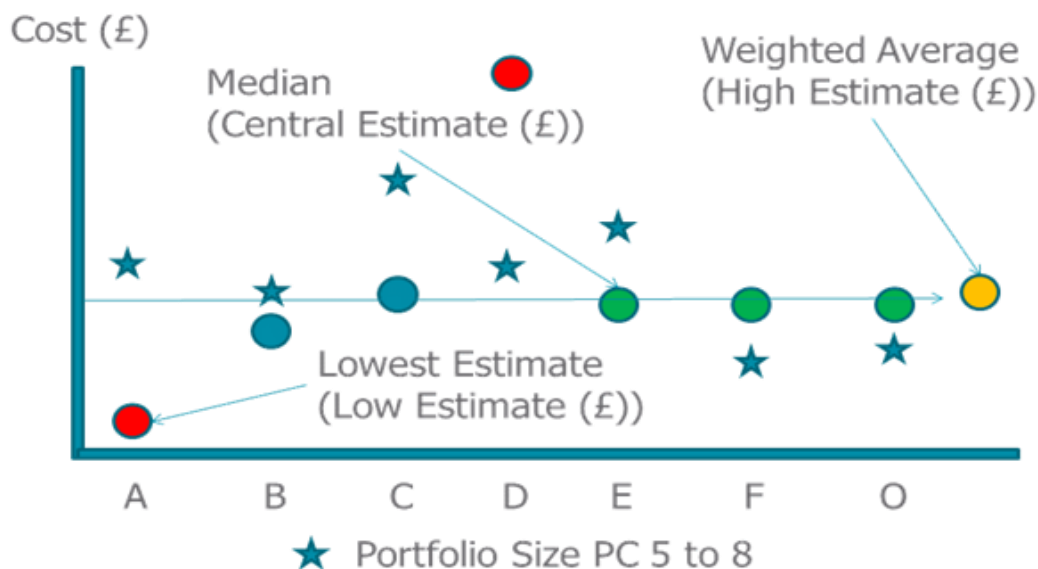
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There were both high and low outliers provided in the responses and some of the costs have been extrapolated to Parties that did not respond to the Costs Consultation based on median costs and their portfolio of customers in Profile Classes 5 to 8. 'A to F' are Big 6 Suppliers and 'O' are the other small Suppliers with portfolios of Profile Class 5 to 8 customers.



All the costs provided, including the outliers, were used for the weighted mean cost per MPAN which been calculated by weighting each cost to the Party's portfolio of Profile Class 5-8 customers.

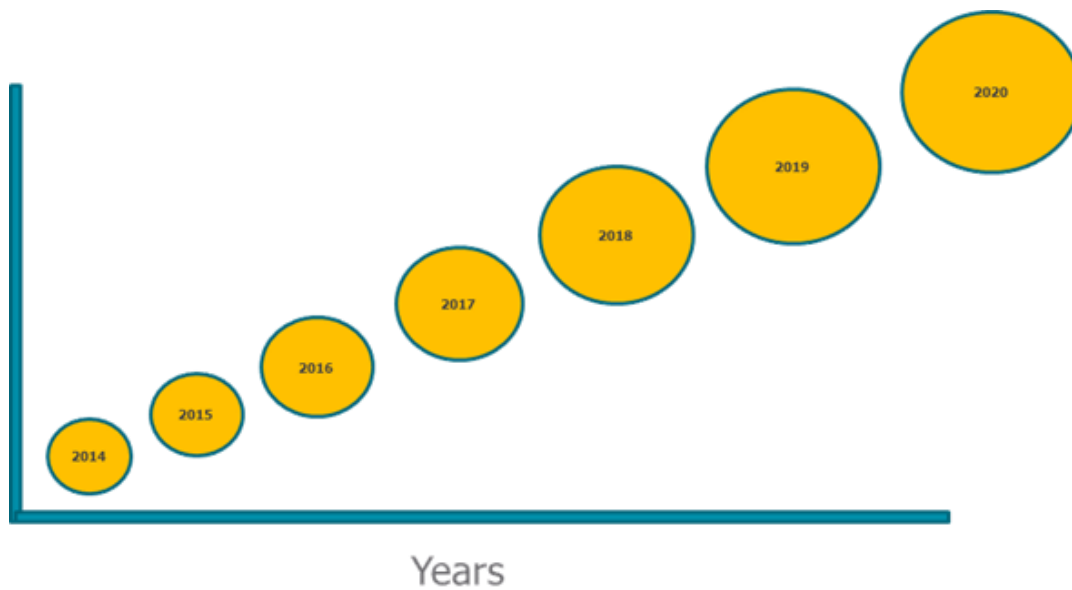


Extrapolation of costs

The total costs in any year have been calculated by multiplying the costs by the population of Profile Class 5 to 8 customers. This approach allows calculation of the costs (weighted average, low and median) for each of the scenarios depending on the level of up-take of HH Settlement at any point in time.

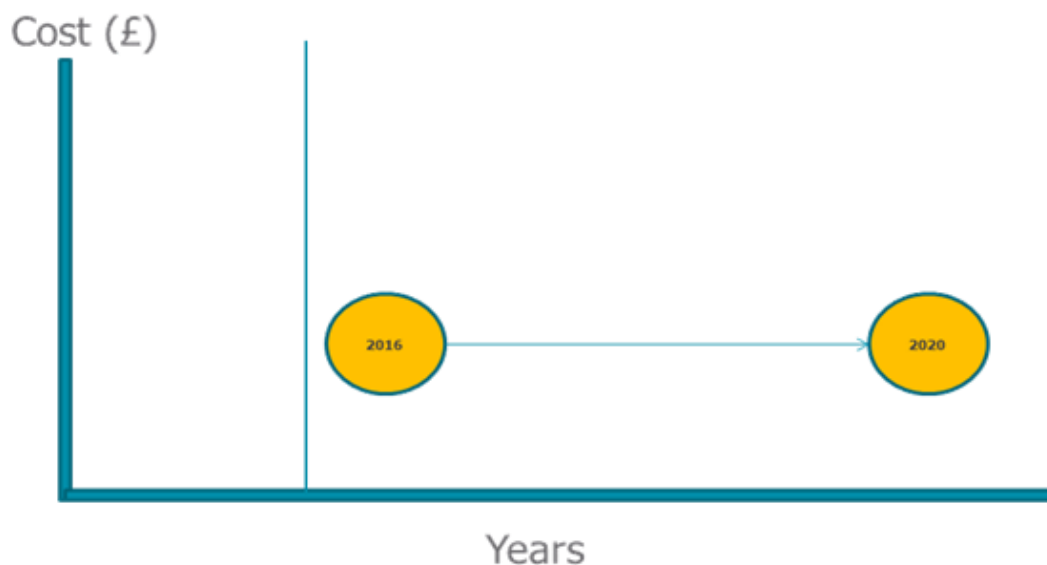


The cumulative costs to 2020 have been calculated for each scenario.



Triggering of one off costs

Some one-off costs have a trigger percentage of up-take at which the one-off cost is realised. These costs are accumulated to 2020.



Supplier costs: P272 costs breakdown and rationale

This section provides a summary of rationale of the P272 Costs Consultation responses.

Table 1: Costs Summary – Supplier On-going Costs (per MPAN per year)

Supplier Costs	Wgt. Av.	Low	Median
Data Collection and Data Aggregation Costs: <ul style="list-style-type: none"> Agent system support Additional resource Costs based on discussion with HH agents Restructuring of existing DC and DA processes/ operational teams To manage an increase in HH customers Revisions required to current system support contract and associated resource requirements Re-training of staff Differential in NHH and HH costs from discussion with their agents 	£76.98	£22.91	£40.10
Meter Maintenance (meter + comms. rather than meter): <ul style="list-style-type: none"> Some said unknown Based on existing HH charges Re-training or introducing additional meter readers Establishing a new communications framework and linking this directly into Billing/Settlement processes 	£19.76	£5.33	£22.91
Meter Rental: <ul style="list-style-type: none"> N/A 	£0.00	£0.00	£0.00

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Table 1: Costs Summary – Supplier On-going Costs (per MPAN per year)

Supplier Costs	Wgt. Av.	Low	Median
DTN Costs: <ul style="list-style-type: none"> Some said uncertain Minimal impact on DTN charges as majority of DTN costs are not volume related 	£2.28	£0.07	£2.67
Other Costs: <ul style="list-style-type: none"> Resource for: <ul style="list-style-type: none"> Validation of Settlement Invoices Additional Volume processing Pricing Hedging Exception Handling Work on existing NHH portfolio to achieve 97% performance Change to 3rd party contract structure Site specific DUoS billing Costs for contract change 	£43.81	£6.41	£12.10
Total On-going cost per MPAN	£142.83	£34.72	£77.77

Table 2: Costs Summary – Supplier One-off Costs (per MPAN per year)

Supplier Costs	Wgt. Av.	Low	Median
Change of Measurement Class: <ul style="list-style-type: none"> Manage Supplier and Supplier Agent Data-flows Agent Management Billing Process Check Any Rework required due to issues and problems on CoMC Based on a similar process used for another project Due to the manual nature of this process Internal Improvements to COMC process System changes associated with the stream lining the CoMC process Additional FTE required to support the new migration 	£32.35	£5.33	£35.00

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Table 2: Costs Summary – Supplier One-off Costs (per MPAN per year)

Supplier Costs	Wgt. Av.	Low	Median
Internal process: <ul style="list-style-type: none"> Amend Customer Contracts Arrange Agent Contracts Update Contract Systems New process different to existing HH customers re MOP contract and education for customers Implement new internal process and train/recruit additional staff to deal with the increase in HH settled customers Significant change to business structure for these customers 	£8.34	£0.00	£0.18
Internal Systems – Billing and Settlement: <ul style="list-style-type: none"> Update forecasting, customer, DUoS billing and Settlement Systems System reconfiguration to handle increased volumes Changes required to existing system structure Expanded billing portfolio for HH customers Changes to the current processes for HH Settlement Current systems not scalable Quoting systems need changing 	£29.03	£8.53	£25.59
Other Costs: <ul style="list-style-type: none"> Assess volume impacts to ensure contractual tolerances are not breached Change of customer contractual terms & conditions Significant change of business structure for these customers 	£60.95	£0.00	£18.00
Hardware/Servers (Hosting and Security): <ul style="list-style-type: none"> Certain systems will need increased data storage and upgrading due to increased volumes Some include theirs in internal systems above 	£27.05	£3.05	£32.78

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Table 2: Costs Summary – Supplier One-off Costs (per MPAN per year)

Supplier Costs	Wgt. Av.	Low	Median
Supplier Agency Costs: <ul style="list-style-type: none"> Update Agent Systems Current agents on NHH so either migration to new agents or undergo HH accreditation Change of agent from NHH to HH MTD issues Changes to DC/MOP systems 	£16.57	£0.00	£0.00
Total One-off cost per MPAN	£174.28	£16.90	£111.55

Supplier costs: breakdown by scenario

The weighted average costs vary slightly with each scenario and are presented in Table 3. The low and median costs are the same for each scenario.

Table 3: Weighted Average Costs

Supplier Costs	1	1A	2	3	4
Supplier On-going					
Data Collection and Data Aggregation Costs	£76.98	£76.98	£76.80	£76.98	£76.80
Meter Maintenance (meter + comms. rather than meter)	£19.76	£19.76	£19.76	£19.76	£19.76
Meter Rental	£0.00	£0.00	£30.00	£0.00	£0.00
DTN Costs	£2.28	£32.28	£32.28	£2.28	£2.28
Other Costs	£43.81	£43.81	£43.60	£43.69	£43.60
Total On-going	£142.83	£142.83	£142.44	£142.72	£142.44
Supplier One-off					
Change of Measurement Class	£32.35	£32.35	£32.35	£32.35	£32.35
Internal process	£8.34	£8.34	£0.00	£8.34	£8.34
Internal Systems – Billing and Settlement	£29.03	£29.03	£0.00	£29.03	£29.03
Other Costs	£60.95	£60.95	£0.00	£60.95	£60.95
Hardware/Servers (Hosting and Security)	£27.05	£27.05	£0.00	£27.05	£27.05
Supplier Agency Costs	£16.57	£16.57	£0.00	£16.57	£16.57
Total One-off	£174.29	£174.29	£32.35	£174.29	£174.29
Total					
Total One-off plus On-going	£317.12	£317.12	£174.79	£317.01	£316.73

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Based on the low, central and high cost per MPAN the costs for one year (one-off and on-going) for the P272 scenario would be as provided in Table 4 below.

Table 4: Total Supplier Costs for One Year			
Supplier Costs	Wgt. Av.	Low	Median
<i>Supplier On-going</i>			
Data Collection and Data Aggregation Costs	£11.9m	£3.5m	£6.2m
Meter Maintenance (meter + comms. rather than meter)	£3.1m	£0.8m	£3.5m
Meter Rental	£0.0m	£0.0m	£0.0m
DTN Costs	£0.4m	£0.01m	£0.4m
Other Costs	£6.8m	£1.0m	£1.9m
Total On-going	£22.1m	£5.4m	£12.0m
<i>Supplier One-off</i>			
Change of Measurement Class	£5.0m	£0.8m	£5.4m
Internal process	£1.3m	£0.0m	£0.0m
Internal Systems – Billing and Settlement	£4.5m	£1.3m	£4.0m
Other Costs	£9.4m	£0.0m	£2.8m
Hardware/Servers (Hosting and Security)	£4.2m	£0.5m	£5.1m
Supplier Agency Costs	£2.6m	£0.0m	£0.0m
Total One-off	£26.9m	£2.6m	£17.2m

BSC Settlement costs

In addition to the above a BSC Settlement cost is added which varies the cost per MPAN as the uptake increases, starting at £0.56 per MPAN per month and falling to £0.24 per MPAN per month when all customer have moved HH. Figure 1 show the BSC costs for Scenario 3 (100% HH by 2020).

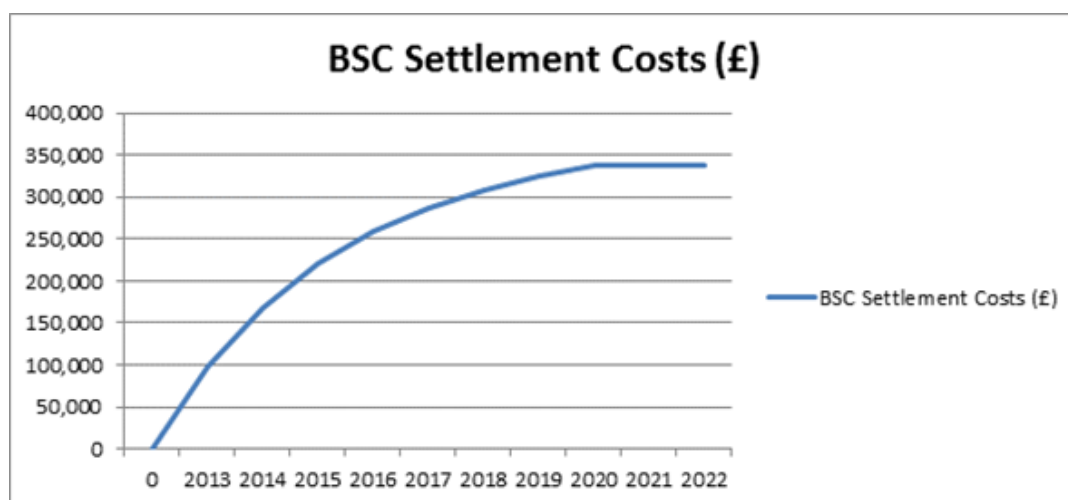


Figure 1: BSC Settlement Costs per year – Scenario 3 (100% HH by 2020)

System and process change trigger

The Suppliers indicated in their responses to the consultation that process and system changes would be required if there was a relatively small move to elective HH Settlement. For the purpose of the analysis the trigger has been set to 10% uptake.

Cumulative costs for Suppliers

The Supplier cumulative cost comparisons for each scenario by 2020 can be seen in Table 5.

Table 5: Cumulative Costs for Suppliers				
Scenario	Supplier One-off	Supplier On-going	Total	Total + BSC Costs
Weighted Average				
1	£26.9m	£165.5m	£192.4m	£195.1m
1A	£26.9m	£149.0m	£175.9m	£178.3m
2	£0.2m	£4.0m	£4.2m	£4.3m
3	£26.9m	£99.2m	£126.2m	£128.2m
4	£18.4m	£49.5m	£68.0m	£69.3m
Low				
1	£2.6m	£40.2m	£42.8m	£45.5m
1A	£2.6m	£36.2m	£38.8m	£41.3m
2	£0.0m	£1.0m	£1.0m	£1.2m
3	£2.6m	£24.1m	£26.8m	£28.8m
4	£2.2m	£12.1m	£14.3m	£15.6m
Median				
1	£17.2m	£90.1m	£107.4m	£110.0m
1A	£17.2m	£81.1m	£98.4m	£100.8m
2	£0.2m	£2.2m	£2.4m	£2.5m
3	£17.2m	£54.1m	£71.3m	£73.3m
4	£13.1m	£27.0m	£40.2m	£41.6m

Commentary

Supplier one-off

The Supplier one-off costs are similar in Scenario 1 and 3 as all the one-off costs are realised in both scenarios. The lower but reasonably high one-off costs for Scenario 4 reflect the fact although the up-take is at a level which would trigger system and process changes the CoMC, Supplier Agency and other costs are only based on half the number of MPANs.

Supplier on-going and one-off costs over time

The differences Supplier on-going cost are mainly driven by the cost to serve differing numbers of MPANs for different lengths of time. The more MPANs move to mandatory or elective, and the earlier they move, the greater the cost. Figure 2 shows Supplier Costs for Scenario 1 over time.

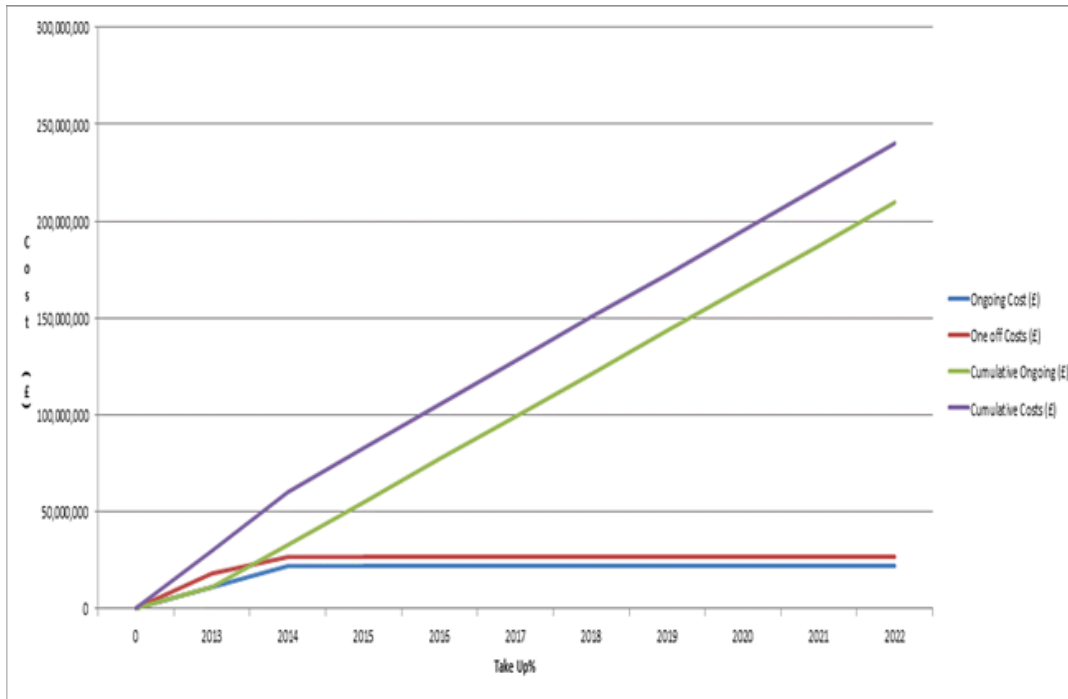


Figure 2: Scenario 1 (P272) Weighted Average Costs

Figure 2 shows that by 2014 all (or nearly all) MPANs are HH. Hence, the on-going costs increase linearly (given the assumption that costs are based on current cost to serve per MPAN provided by Suppliers and not varied over time) until 2020 and all the on-going cost are realised in 2014.

Looking at the same graph for Scenario 3 given in Figure 3 show that the full one off-costs are not realised until all customers have moved HH in 2020.

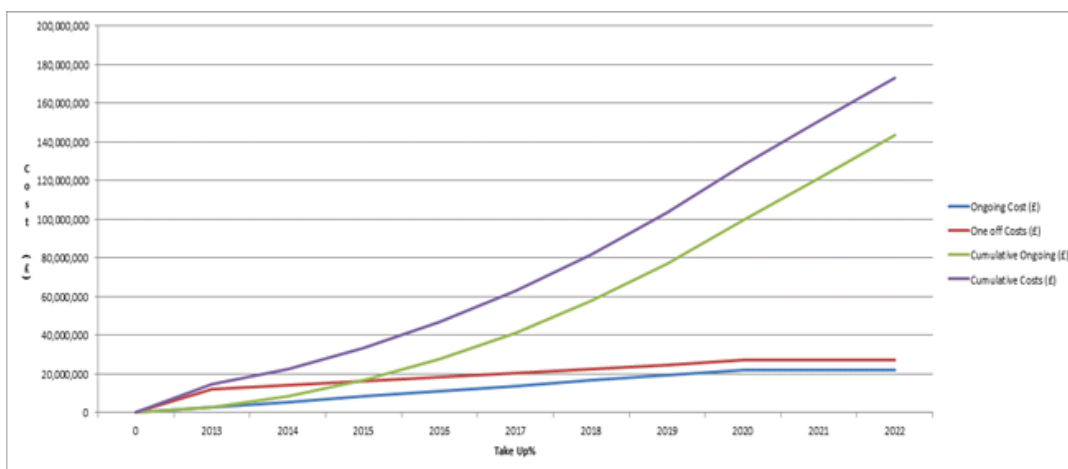


Figure 3: Scenario 3 Weighted Average Costs

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LDSO costs

From the Distributor Costs Consultation responses the costs per MPAN have been extrapolated to facilitate calculation of each Scenario. The extrapolation was required to account for costs for LDSOs that did not respond to the Costs Consultation. The weighted average costs vary slightly by scenario and are presented in Table 6, along with the low and median costs.

Table 6: LDSO Cost per MPAN Breakdown					
LDSO Costs	1	1A	2	3	4
Weighted Average					
<i>LDSO On-going</i>					
Data processing (operational)	£0.60	£0.60	£0.60	£0.60	£0.60
Invoicing	£0.80	£0.80	£0.80	£0.80	£0.80
DTN Costs	£0.06	£0.06	£0.06	£0.06	£0.06
Other On-going costs	£1.13	£1.13	£1.23	£1.31	£1.23
Total On-going (per MPAN)	£2.59	£2.59	£2.68	£2.77	£2.68
<i>LDSO One-off</i>					
Internal Systems: Billing	£5.04	£5.04	£0.00	£4.68	£4.26
Internal Systems: Other	£0.27	£0.27	£0.00	£0.27	£0.27
Registration system	£0.00	£0.00	£0.00	£0.00	£0.00
Process changes	£0.83	£0.83	£0.00	£0.83	£0.83
Hardware/Servers (Hosting and Security)	£1.05	£1.05	£0.00	£1.05	£1.05
Total One-off (per MPAN)	£7.18	£7.18	£0.00	£6.83	£6.41
Low					
<i>LDSO On-going</i>					
Data processing (operational)	£0.00	£0.00	£0.00	£0.00	£0.00
Invoicing	£0.00	£0.00	£0.00	£0.00	£0.00
DTN Costs	£0.00	£0.00	£0.00	£0.00	£0.00
Other On-going costs	£0.00	£0.00	£0.00	£0.00	£0.00
Total On-going (per MPAN)	£0.00	£0.00	£0.00	£0.00	£0.00
<i>LDSO One-off</i>					
Internal Systems: Billing	£0.49	£0.49	£0.00	£0.49	£0.00
Internal Systems: Other	£0.00	£0.00	£0.00	£0.00	£0.00
Registration system	£0.00	£0.00	£0.00	£0.00	£0.00
Process changes	£0.00	£0.00	£0.00	£0.00	£0.00
Hardware/Servers (Hosting and Security)	£0.00	£0.00	£0.00	£0.00	£0.00
Total One-off (per MPAN)	£0.49	£0.49	£0.00	£0.49	£0.00

Table 6: LDSO Cost per MPAN Breakdown					
LDSO Costs	1	1A	2	3	4
Median					
<i>LDSO On-going</i>					
Data processing (operational)	£0.29	£0.29	£0.29	£0.29	£0.29
Invoicing	£0.04	£0.04	£0.04	£0.04	£0.04
DTN Costs	£0.00	£0.00	£0.00	£0.00	£0.00
Other On-going costs	£0.60	£0.60	£0.76	£0.90	£0.76
Total On-going (per MPAN)	£0.93	£0.93	£1.08	£1.23	£1.08
<i>LDSO One-off</i>					
Internal Systems: Billing	£6.18	£6.18	£0.00	£4.85	£4.85
Internal Systems: Other	£0.29	£0.29	£0.00	£0.29	£0.29
Registration system	£0.00	£0.00	£0.00	£0.00	£0.00
Process changes	£0.00	£0.00	£0.00	£0.00	£0.00
Hardware/Servers (Hosting and Security)	£0.87	£0.87	£0.00	£0.87	£0.87
Total One-off (per MPAN)	£7.34	£7.34	£0.00	£6.00	£6.00

The total costs in for LDSOs in 2020 for the P272 Scenario would be as seen in Table 7.

Table 7: LDSO Total Costs			
LDSO Costs	Wgt. Av.	Low	Median
<i>LDSO On-going</i>			
Data processing (operational)	£92.1k	£0.0k	£44.2k
Invoicing	£124.3k	£0.0k	£5.9k
DTN Costs	£9.0k	£0.0k	£0.0k
Other On-going costs	£174.9k	£0.0k	£93.0k
Total On-going	£400.2k	£0k	£143.1k
<i>LDSO One-off</i>			
Internal Systems: Billing	£778.5k	£74.9k	£955.2k
Internal Systems: Other	£42.1k	£0.0k	£44.2k
Registration system	£0.0k	£0.0k	£0.0k
Process changes	£127.5k	£0.0k	£0.0k
Hardware/Servers (Hosting and Security)	£161.7k	£0.0k	£134.0k
Total One-off	£1.10m	£0.07m	£1.10m

It should be noted that the lowest costs provided by LDSOs were zero in many categories. It may be because these costs were accounted for elsewhere in their responses. The weighted average and median estimates provide the same one-off totals which are likely to be more realistic for LDSO costs.

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System and process change trigger

LDSOs indicated in their responses to the consultation that process and system changes would be required if there was a relatively small move to elective HH Settlement. For the purpose of the analysis **the trigger has been set to 10% uptake**.

Cumulative costs for LDSOs

The LDSO cumulative cost comparisons for each scenario by 2020 can be seen in Table 8.

Table 8: LDSO Cumulative Costs by 2020			
Scenario	Weighted Average	Low	Median
1	£4.1m	£0.1m	£2.2m
1A	£3.8m	£0.1m	£2.1m
2	£0.1m	£0.0m	£0.0m
3	£3.0m	£0.1m	£1.8m
4	£1.9m	£0.0m	£1.5m

Commentary

LDSO one-off

As the LDSO one-off costs all relate to system and process changes the one-off costs once triggered is the same for all scenarios. Hence, only Scenario 2 avoids triggering these costs since the level of up-take of elective HH is less than 10% by 2020.

LDSO on-going and one-off costs over time

It can be seen in Figure 4 that P272 triggers the one-off costs immediately that it is implemented. The on-going costs are linear as they are the incremental cost for all of the meters each year (noting there is no variance in the year on year cost in the model).

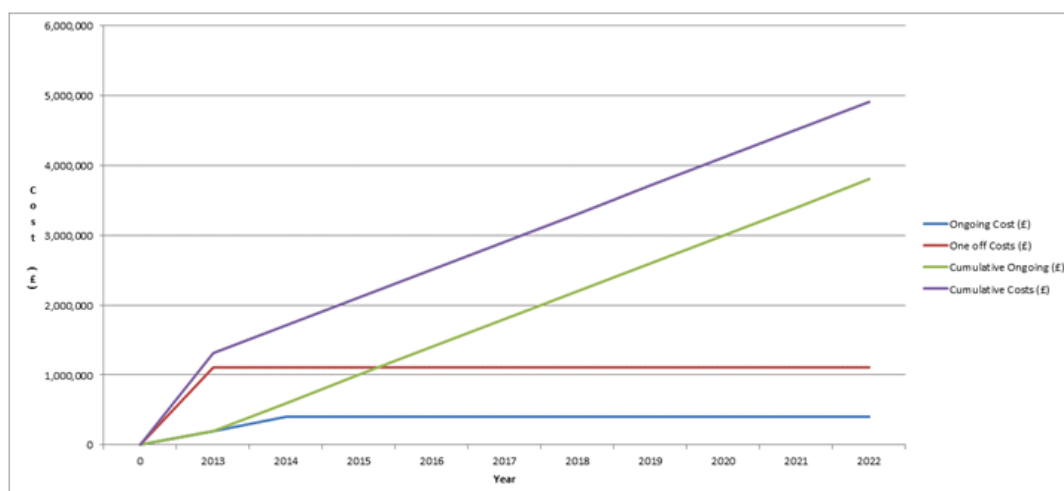


Figure 4: Scenario 1 (P272) depicting weighted average costs

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In Scenario 3 shown in Figure 5 the one-off cost are also triggered immediately since it assumes an initial 12% increase in elective HH in the first year. The on-going cost increase relative to the incremental up take of elective HH to 100% by 2020 and are linear thereafter.

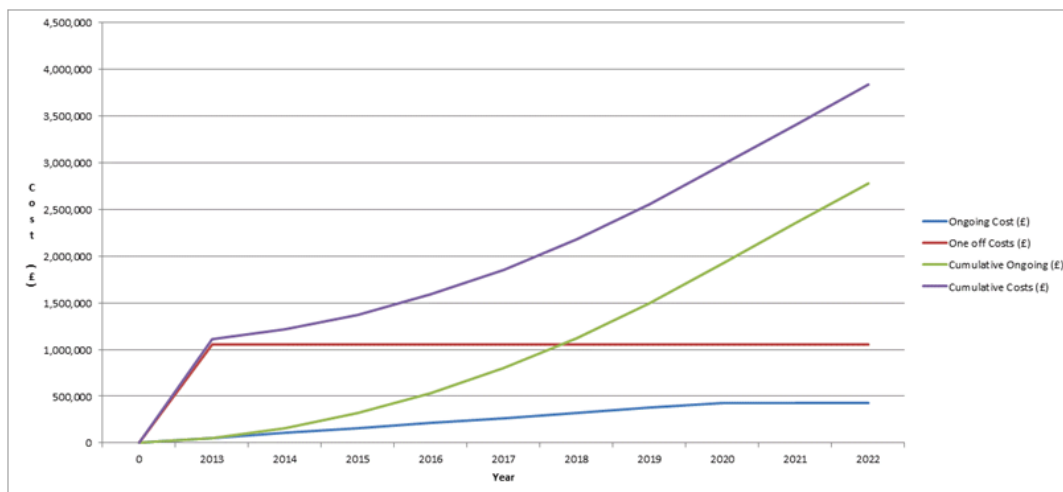


Figure 5: Scenario 3 showing weighted average costs

Other costs

Termination costs and customer own appointed agents

Following the Workgroup consideration of the costs provides through the consultation, Suppliers were requested to provide contract termination costs where moving the customer from NHH to HH Settlement. The majority of the responses showed that no termination costs would be incurred. However, some did mention that this could trigger a price review by the Supplier.

Furthermore Suppliers were asked to provide figure for the number of customers that were in PCs 5-8 who had appointed their own agents. Based on the figure provided it is estimated there is between 25,000-30,000 customers who have their own agents. There is the potential for customers to be charged a termination fee/incur costs from their own appointed agents if these agents cannot support HH Settlement.

No other costs have been identified and included in the model. The model allows for MRA changes to data flows, to include extra decimal places, to be included but it has been assumed that these will not be required.

Summary of total cumulative costs by 2020

Total costs for by the end of 2020 broken down by scenario, Table 9.

Scenario	Total Wgt. Av. Costs	Total Low Costs	Total Median Costs
1	£199.2m	£45.5m	£112.2m
1A	£182.2m	£41.4m	£102.9m
2	£4.4m	£1.2m	£2.6m
3	£131.1m	£28.8m	£75.1m
4	£71.3m	£15.6m	£43.0m

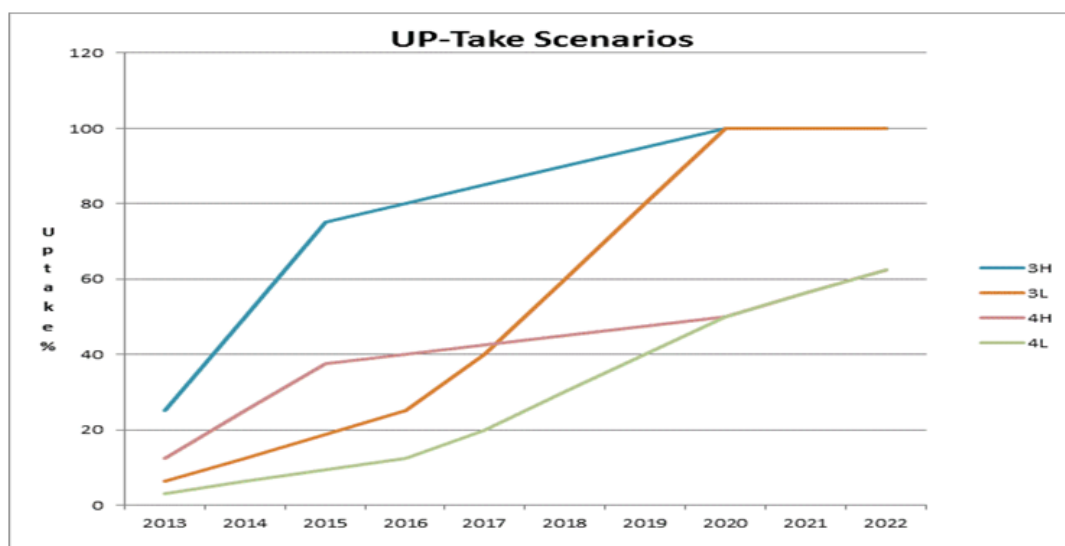
The total costs for the P272 Scenario 1 range from **£45.5m to £199.2m**. The Alternative scenario is lower as the mandate is applied a year later and the on-going costs are therefore lower. Similarly, the range of costs is lower for the other counterfactual scenarios due to the reduced level of up-take of elective HH Settlement.

Cost sensitivity analysis

Costs sensitivity to high/low up-takes for Scenarios 3 and 4

The costs are sensitive to the rate of uptake of elective HH Settlement of uptake. To understand the sensitivity to the rate of uptake, high and low scenarios have been modelled for Scenarios 3 and 4.

Scenario 1 is also modelled with the Alternate implementation date (1A). Scenarios 3 and 4 also have a high (H) and low (L) initial up-take variants to demonstrate the sensitivity to the rate of up-take of elective HH Settlement.



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The difference in total costs and benefits costs for these scenarios can be seen in Table 10.

Table 10: Difference in Costs for High/Low Scenarios			
Scenario	Supplier Costs	LDSO Costs	Total Costs
Weighted Average			
3	£128.2m	£3.0m	£131.1m
3H	£161.6m	£3.6m	£165.2m
3L	£104.1m	£2.5m	£106.6m
4	£69.3m	£1.9m	£71.3m
4H	£86.2m	£2.2m	£88.4m
4L	£57.2m	£1.7m	£58.9m
Low			
3	£28.8m	£0.1m	£28.8m
3H	£37.2m	£0.1m	£37.2m
3L	£22.6m	£0.1m	£22.7m
4	£15.6m	£0.0m	£15.6m
4H	£20.0m	£0.0m	£20.0m
4L	£12.5m	£0.0m	£12.5m
Median			
3	£73.3m	£1.8m	£90.6m
3H	£91.7m	£2.0m	£118.8m
3L	£60.0m	£1.6m	£66.4m
4	£41.6m	£1.5m	£42.8m
4H	£50.9m	£1.6m	£60.6m
4L	£34.8m	£1.4m	£32.4m

On-going costs sensitivity: DC and DA costs

The costs above are sensitive to the 'Data Collection and Data Aggregation Costs'. The DC/DA costs given above are based on an estimated cost of around £77 per MPAN, a change in this value of £10 equates to **±£1.5m per annum (or ±£11.6m by 2020) for the P272 scenario**.

Sensitivity to the costs of IT systems

The one-off costs are particularly sensitive to the actual cost of process and IT system changes. The costs presented above are based on the mid-point of a number of consultation response ranges for these costs. Based on the responses where the Supplier processes and systems s are based on range estimates the change in one-off costs could be **±£1.8m**. The equivalent based on LDSO responses is **±£130k**. It should be noted that the costs provided by other Parties will be estimated as such the actual uncertainty of the costs provided is likely to be greater than those presented.

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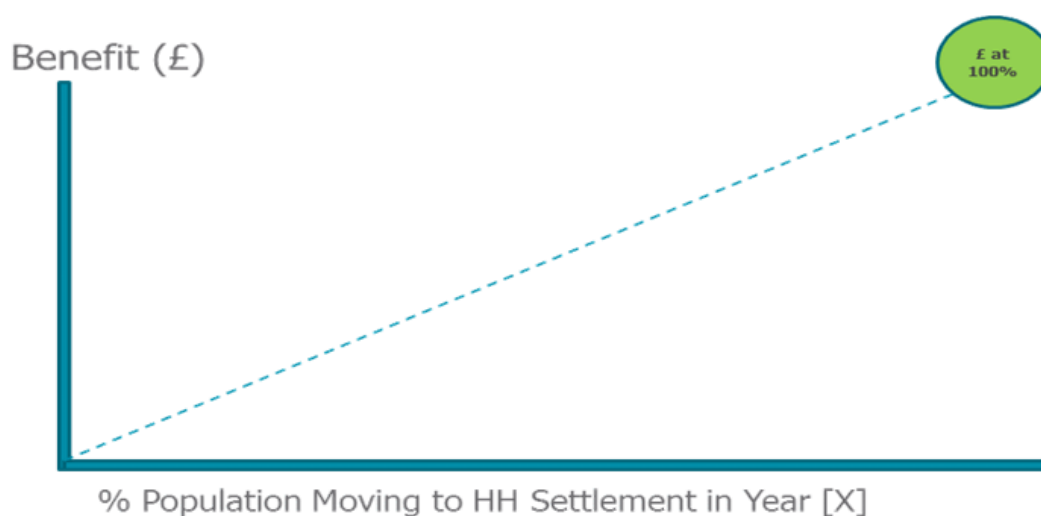
Benefits

The benefits in this analysis have been based on the calculations defined in the Benefits Pack and responses to the Benefits Consultation, and subsequent consideration and agreed variation by the P272 Workgroup.

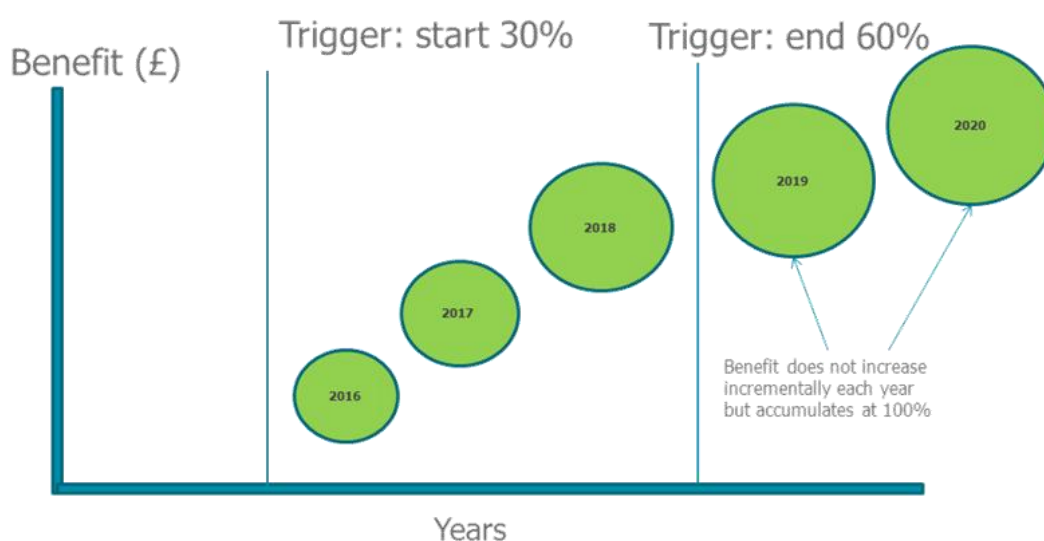
Some benefits have factors that vary year on year. For example, the £ per tonne for carbon benefits rise from £16 per tonne to £30 per tonne by 2020 and the conversion factor is also varied.

Approach to benefits

Similar to the approach to costs, the benefits are extrapolated to each of the scenarios using the up-take percentages and trigger volumes that define the level of up-take at which the benefit starts to be realised. The benefit in any year for each scenario is calculated as the percentage of uptake multiplied by the total potential benefit.



Trigger Volumes are used to allow for the level of up-take that is required before the benefits are likely to be realised. The total benefits are then accumulated to 2020.



Market benefits

The market benefits have been modelled based on all benefits identified within the benefits pack (as reviewed and modified by the P272 Workgroup). The cost sensitivity to those benefits (and their underlying assumptions) has then been calculated.

Table 11 shows the market benefits that have been modelled and are shown as £m per year.

No	Benefit	Benefit at 100% up-take of HH Settlement per year
M1	Load Flattening (0.97%)	£0.4m
M2	Load Reduction (0.97%)	£1.6m
M3	Carbon Benefits (0.97% and £16 – £30 per Carbon Tonne)	£0.5m-£0.6m
M4	Reduced Central Admin Costs – Fewer Performance Problems	£0.0m
M5	Reduced BSC Admin Costs – Reduced Profiles	£0.03m
M6	Reduced Balancing Costs	£0.0m ²
M7	Reduced Network Investment	£2.7m

Market benefits for each scenario

The market benefits by 2020 for each of the scenarios can be seen in Table 12.

Scenario	Market Benefits M1-M3 & M7	BSC Benefits M4 & M5 (no Profiles 5-8)	Total Benefits
1	£38.1m	£0.2m	£38.4m
1A	£34.3m	£0.2m	£34.5m
2	£0.9m	£0.0m	£0.9m
3	£22.9m	£0.0m	£22.9m
4	£11.4m	£0.0m	£11.4m

Commentary

The earlier the benefits are realised and the greater the up-take of HH Settlement, the greater the benefit that would be achieved. For Scenario 4, profiling would still be required for Profile Classes 5 to 8 as there is still 50% settled NHH in 2020. It is assumed for Scenario 3 that no profiling would be required in the final year (if this were earlier the £ quoted can be deducted for each year removed).

² This benefit has been removed as there are issues with the calculation and the resultant projected impact on National Grid's operating margin. This area is to be progressed separately by Ofgem and has not been included in the CBA assessment.

Market benefits over time

Figure 6 shows the benefits over time for Scenario 1 (P272) which show that the benefits would be realised when customers are mandated in 2014.

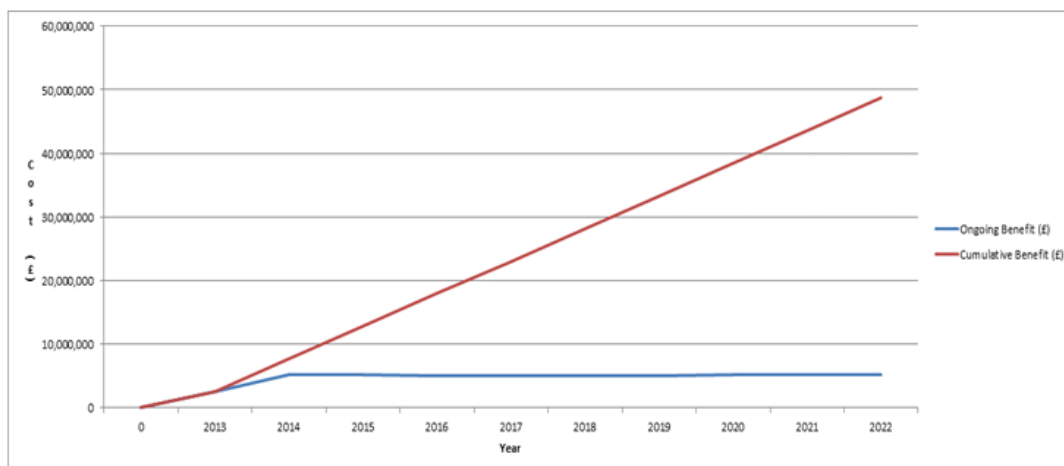


Figure 6: Scenario 1 (P272)

Figure 7 shows for Scenario 3 (100% elective HH by 2020). It shows that the benefits increase incrementally as more customers move to elective HH Settlement.

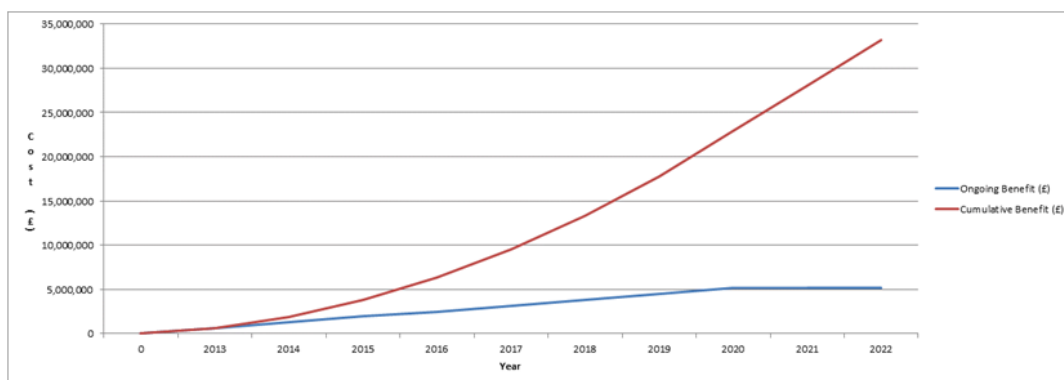


Figure 7: Scenario 3, cumulative benefits over time

Supplier benefits

Supplier benefits have been calculated as defined in the Benefits Pack (as reviewed and amended by the P272 Workgroup) and extrapolated using the up-take and trigger events for each scenario.

Table 13: Supplier Benefits

No	Benefit	Benefit at 100% up-take of HH Settlement per year
S1	Reduced Supplier Energy Purchase Costs (Revised calculation)	£4.8m
S2	Reduced Imbalance Costs (revised calculation)	£0.48m
S3	Better Matching of Purchases versus Sales	£4.9m
S4	Reduced Supplier Costs	£0.5m
S5	Reduced Costs due to Faster Settlement	£0.2m

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Table 13: Supplier Benefits		
No	Benefit	Benefit at 100% up-take of HH Settlement per year
S6	Reduced HH Agent Services	£2.3m
S7	Reduced BSC SVA Specified Charge for HH Administration	£0.4m

Cumulative Supplier benefits for each scenario by 2020

The Cumulative Supplier benefits by 2020 are presented in Table 14.

Table 14: Supplier Benefits by 2020	
Scenario	Supplier Benefits S1-S7
1	£103.1m
1A	£91.2m
2	£1.2m
3	£66.4m
4	£30.8m

Supplier benefits over time

Figure 8 shows the Supplier benefits over time for Scenario 1 (P272).

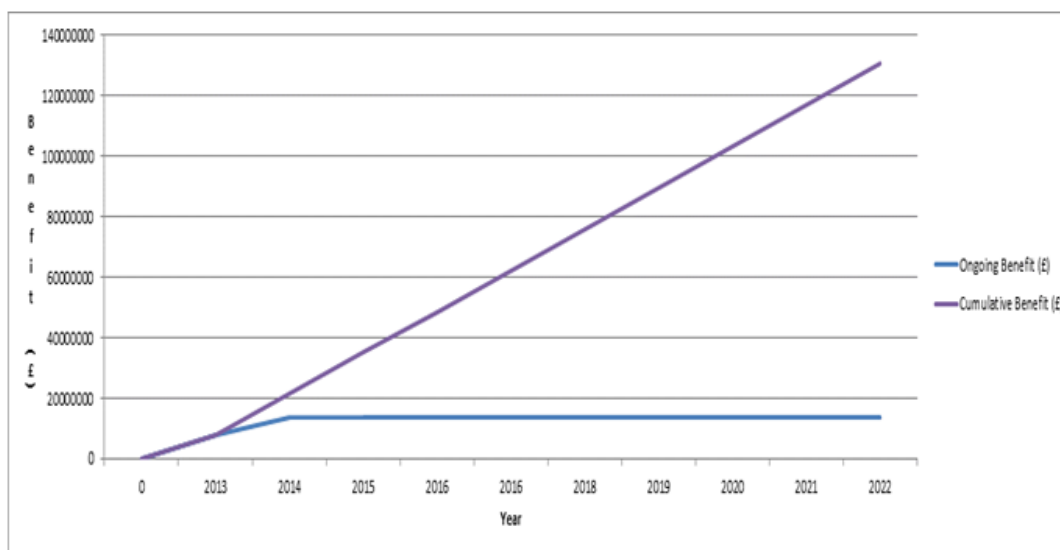


Figure 8: Scenario 1 (P272)

Figure 8 shows that the benefits are triggered on implementation. Figure 9 show the same graph for Scenario 3.

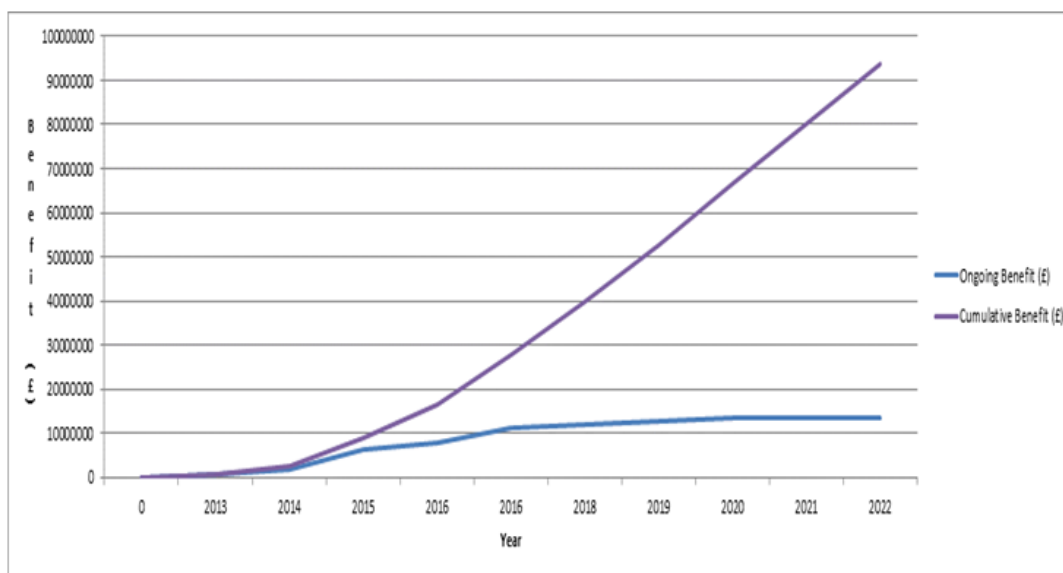


Figure 9: Scenario 3

Distributor benefits

Distributor benefits have been calculated as defined in the Benefits Pack and extrapolated using the up-take and trigger events for the defined scenarios.

Table 15: Distributor Benefits

No	Benefit	Benefit at 100% up-take of HH Settlement per year
D1	Better Network Planning	£0.0k
D2	More accurate losses calculation	£0.0k
D3	More cost-reflective DUoS charges	£0.0k
D4	Faster resolution of Metering errors	£282.2k ³
D5	Reduced impact of Gross Volume Correction	£0.0k

Distributor benefits for each Scenario

The cumulative Distributor benefits by 2020 are presented in Table 16.

Table 16: Distributor Benefits by 2020

Scenario	Supplier Benefits D1-D5
1	£2.1m
1A	£1.9m
2	£0.1m
3	£1.3m
4	£0.6m

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³ This calculation has been adjusted following identification of an error in the calculation contained in the Benefits Pack.

Commentary

It can be seen from Table 11 that the earlier the implementation and the greater the level of up-take the greater the realisation of the potential benefits.

Distributor benefits over time

Figure 10 shows the benefits over time for Scenario 1 (P272).

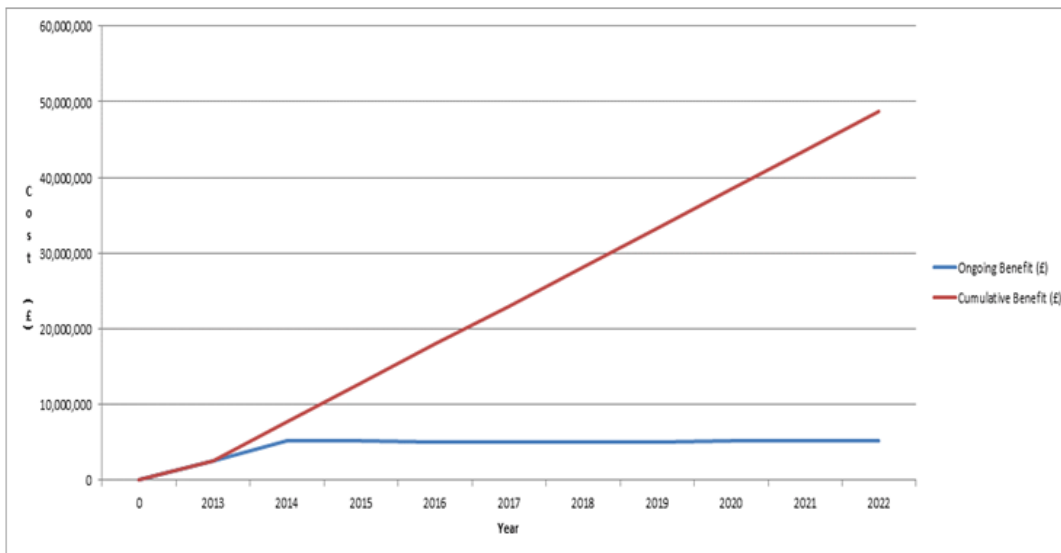


Figure 10: Scenario 1

Figure 11 show the benefits for Scenario 3 (100% by 2020).

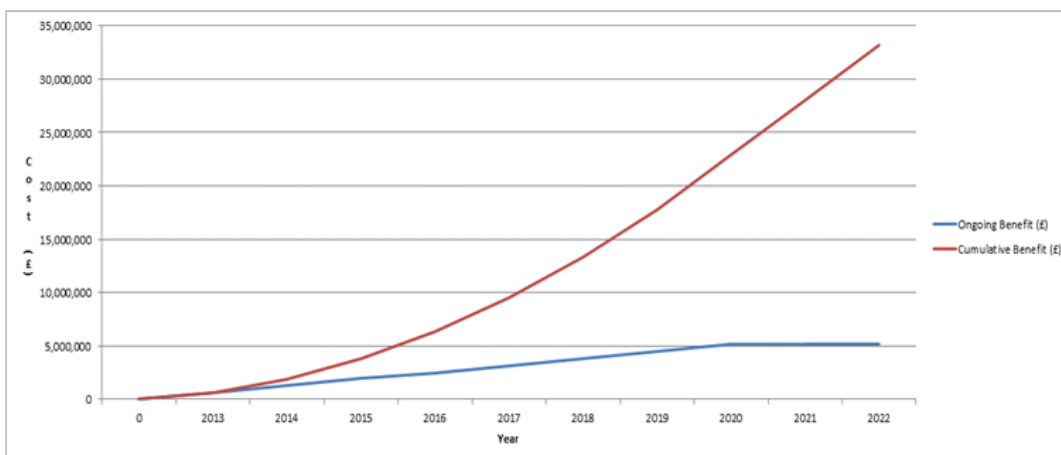


Figure 11: Scenario 3

Total benefits by scenario

The total benefits by the end of 2020 for each Scenario are presented in Table 17.

Scenario	Market Benefits	Supplier Benefit	Distributor Benefits	BSC Benefits	Total Benefits
1	£38.1m	£103.1m	£2.1m	£0.2m	£143.6m
1A	£34.3m	£91.2m	£1.9m	£0.2m	£127.6m
2	£0.9m	£1.2m	£0.1m	£0.0m	£2.2m
3	£22.9m	£66.4m	£1.3m	£0.0m	£90.6m
4	£11.4m	£30.8m	£0.6m	£0.0m	£42.8m

Benefits sensitivity

Market benefits M1-M3 & M7

The market benefits M1 to M3 and M7 are based on a load flattening and/or energy reduction factor of 0.97%. If this factor is changed to 1.4%, as suggested in a Benefits Consultation response, then the cumulative P272 market driven benefits would increase each year by approximately £2.7m. The Workgroup considered the responses to the Benefits Consultation and believe that realistic variations on the percentage used in the range of 0.5%-2%, shown in Table 18.

	0.5%	0.97%	1.4%	2%
M1	£0.2m	£0.4m	£0.6m	£0.8m
M2	£0.8m	£1.6m	£2.3m	£3.3m
M3	£0.2m	£0.4m	£0.6m	£0.9m
M7	£0.7m	£1.4m	£2.1m	£3.0m
Total per year	£2.0m	£3.9m	£5.6m	£8.0m
Total by 2020	£24.1m	£38.1m	£50.9m	£68.8m

Supplier benefit S1 (reduced Supplier energy purchase costs)

The Supplier benefit S1 is based on a forecasting improvement of 40% that is facilitated by both having the HH data and having it faster. Based on discussions with demand forecasting experts, it is believed that a realistic range of improvement would 20%-50%. The sensitivity to this percentage factor can be seen in Table 19.

	20%	30%	40%	50%
Cumulative Benefit	£21.0m	£28.5m	£36.8m	£43.5m

Supplier benefit S3 (purchases verses sales)

The Supplier benefit S3 is based on an opportunity cost of 5%. Table 20 show the sensitivity to the assumed percentage.

Table 20: Sensitivity Analysis for S3						
	3.5%	4%	5%	6%	8%	10%
Cumulative Benefit	£25.9m	£29.7m	£37.1m	£44.6m	£59.4m	£74.3m

Supplier benefit S6 (reduced HH Agent services)

Supplier benefit S6 is based on a cost reduction for existing HH customers of £20 per MPAN. The sensitivity to this value can be seen in Table 21.

Table 21: Sensitivity Analysis for S6					
	£10/MPAN	£15/MPAN	£20/MPAN	£25/MPAN	£30/MPAN
Cumulative Benefit	£8.5m	£12.8m	£17.0m	£21.3m	£25.5m

Summary of sensitivity ranges

Using the data in the above tables the Workgroup considered a high and low case for the assumptions to calculate the high and low estimates for benefits.

Table 22: Summary of Sensitivity Ranges				
Range	M1-M3 & M7	S1	S3	S6
Low	0%	20%	3.5%	£10/MPAN
High	2%	50%	6%	£30/MPAN
Central	0.97%	40%	5%	£20/MPAN

The change in the estimated benefit for each scenario is shown in Table 23.

Table 23: Change in Benefits from Sensitivities		
Scenario	Low (Change from Central)	High (Change from Central)
1	-£73.4m	+£54.0m
1A	-£65.2m	+£48.1m
2	-£1.2m	+£0.9m
3	-£45.7m	+£33.0m
4	-£21.4m	+£14.6m

Cost benefits high and low estimates

Using the changes in benefits given in Table 23, the high and low estimates are as given in Table 24.

Scenario	Low Case	High Case	Total Central Benefits
1	£70.2m	£197.6m	£143.6m
1A	£62.4m	£175.7m	£127.6m
2	£1.0m	£3.1m	£2.2m
3	£44.9m	£123.6m	£90.6m
4	£21.4m	£57.4m	£42.8m

Table 24 shows that benefits for the P272 scenario can range from **£70.2m to £197.6m** due to the sensitivity of the assumptions used in the modelling.

Costs versus benefits

The total cumulative costs verses benefit based on the above analysis is presented in Table 25.

Scenario	Total Costs			Total Benefits		
	Low	Wgt. Av.	Median	Low	High	Central
1	£45.5m	£199.2m	£112.2m	£70.2m	£197.6m	£143.6m
1A	£41.4m	£182.2m	£102.9m	£62.4m	£175.7m	£127.6m
2	£1.2m	£4.4m	£2.6m	£1.0m	£3.1m	£2.2m
3	£28.8m	£131.1m	£75.1m	£44.9m	£123.6m	£90.6m
4	£15.6m	£71.3m	£43.0m	£21.4m	£57.4m	£42.8m

Figure 12 show a breakdown comparison for Scenario 1 (P272) using central costs and central benefits.

For the P272 scenario it can be seen that there is a wide range of both costs (**£46m to £199m**) and benefits (**£70m to £198m**) as both are sensitive to the underlying assumptions used in the modelling. Therefore, any calculation of the net cost or benefit is dependent on which assumptions you use for each. This is demonstrated in Figures 12 and 13. Figure 12 implies a net benefit of around £30m for the P272 scenario whereas Figure 13 show the net cost of £55m. Comparing median costs and central benefits implies there is a benefit of around **£32m over the years to 2020 for P272**.

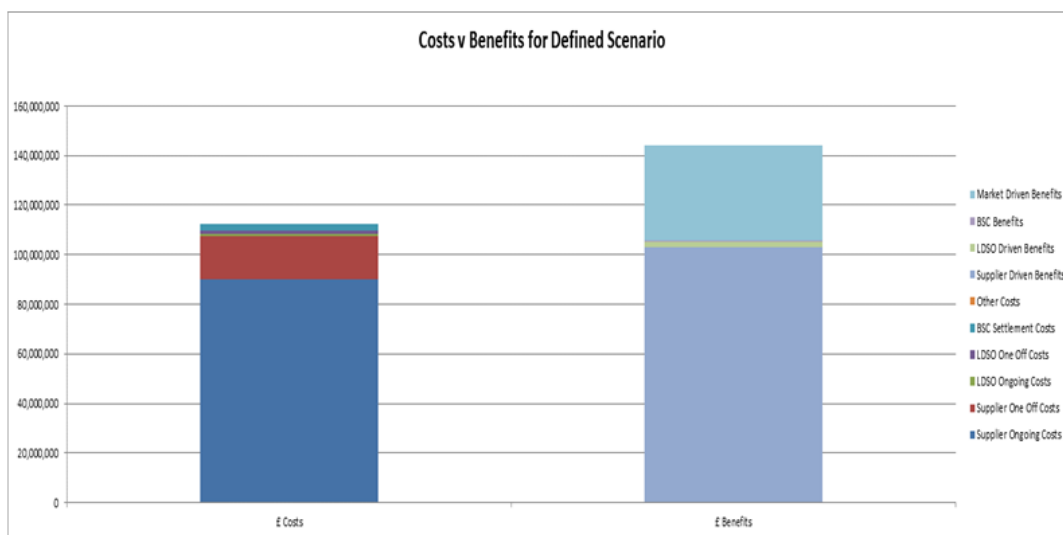


Figure 12: Scenario 1 (P272) median estimate of costs and central estimate of benefits

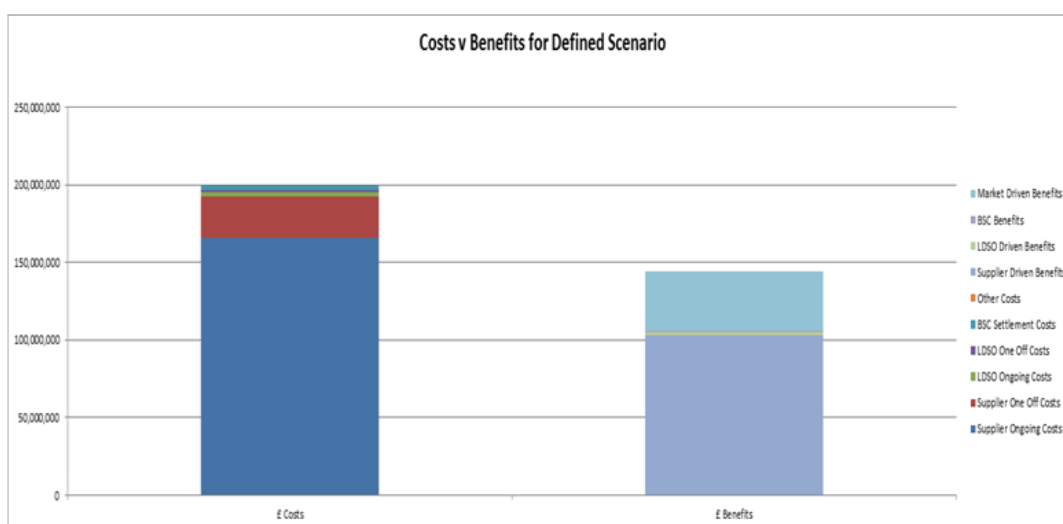


Figure 13: Scenario 1 Weighted Average Costs and Central Benefits

DUoS and P280

The Costs Consultation contained the following question on aggregated billing:

Question 2: For the costs you have submitted in response to question 1, in each scenario, would the costs be affected if the half-hourly sites could be settled on an aggregate (all customers for a Supplier being billed as one customer) rather than site-specific basis?

The responses provided by responding LDSOs were as follows:

- It is assumed that this question means using the P280 solution of utilising new Half-hourly aggregation measurement classes in preference to the site specific approach. In reality we expect a mixture of the two, and will no doubt depend on the outcome of the use of System charges currently being undertaken.

Since all of these scenarios are post the implementation of P280, and as a distributor we would have to be process and system ready by October 2013 in

order to comply with P280 we see no additional costs being incurred by us for any of the scenarios.

It is our belief that the data flow highlighted in our earlier response above would be benefit to settlements at an earlier date and should align to the P280 implementation date.

- It is assumed that aggregated data would be provided within the existing D0030 data flow. If this is the case it is estimated that the cost would be decreased as existing processes would be utilised.
- Costs would reduce by £324,000 pa
- If the PC 5-8 customers continued to be billed through SuperCustomer Billing then there would be a one-off cost of approximately £80-130,000 to change the billing system to be able to process the new data flow (cost data taken from our P280 response).

Qualitative benefits for P272

A number of qualitative benefits were identified by parties in their responses to the Benefits Consultation, these are summarised below:

1. The greatest qualitative benefit is the correct allocation of costs.
2. Peak reduction should reduce the need for peak demand generation plant, which if called is likely to be the most expensive.
3. If a reduction in peak demand is realised it is reasonable to assume that less expensive generation should be required to meet the peak. The original Impact Assessment by DECC⁴ leading to the mandate to install Advanced Meters estimated a £1.55Bn benefit from demand reduction, peak load shifting and reduced generation requirement. It is difficult to see how this can be realised without the use of the HH consumption data available in Settlement.

The P272 Workgroup discussed these and felt that the correct allocation of costs was covered through benefit S1. The Workgroup then considered the reduction in peak demand generation plant and the £1.55bn benefit figure quoted. It asked ELEXON to further investigate the costs and benefits as calculated in the DECC Impact Assessment which covered Profile Classes 3-4 (and gas) and an earlier DECC consultation for the provision of advanced metering for larger business sites, which covered Profile Classes 5-8 and larger commercial gas consumers⁵.

ELEXON presented these results to the Workgroup and highlighted that both these documents cover benefits and costs for electricity and gas consumers. In particular:

DECC Impact Assessment on smart advanced meters for small and medium businesses

The Impact Assessment showed:

- Costs £600m (meters, communications and installation costs only)

⁴ [Impact Assessment of smart / advanced meters roll out to small and medium businesses](#)

⁵ [DECC consultation for the provision of advanced metering for larger business sites](#)

- Benefits £2.8bn (£1.61bn due to energy reduction)
- Over 21 years
- Energy reduction 2.8%
- 3.7m consumers (2.2m electricity PCs 3-4 and 1.5m gas)

DECC consultation for the provision of advanced metering for larger business sites

- Costs £170m (meters, communications and installation costs only)
- Benefits £915m (range £470m-1465m)
- Over 25 years
- Profile Classes 5-8 so applicable to P272 analysis
- Energy reduction 2.8%

The Workgroup noted that the above DECC work shows an energy reduction of 2.8% due to the installation of a smart or advanced meter. The P272 analysis uses the central assumption of a 1% energy reduction from settling PC 5-8 customers HH. Some commented that they believed without HH Settlement the 2.8% may not be achieved (and that should be figure used for P272) and others felt that an additional 1% on top of the 2.8% may be hard to achieve.

The Workgroup were also seeking from the DECC work a price for peak demand reduction to help quantify the qualitative benefit above. One was not available in the work so the Workgroup could not quantify the potential benefit of peak demand generation reduction. The Workgroup also noted that the implementation costs were shown as £170m and the central estimate for P272 implementation was £112m.

General assumptions used for the analysis

1. The cost associated with Suppliers existing HH elective customers are not included in the model on the basis that these cost are already sunk and that any additional cost or benefits from the implementation of P272 cannot be assessed.
2. The model assumes that the total number of customers in Profile Classes 5 to 8 will not increase over time as the rate of increase/decrease cannot be estimated e.g. new builds not considered.
3. The snapshot date for MPAN counts was on 1 May 2012 using data from the 11 April 2012 SF Settlement Run.
4. The total SVA cost for the both BSC Administration costs and benefits are not varied over time and are set against the current baseline.
5. Costs for Parties that did not respond to the consultations are set to the median cost for those that responded.
6. Where Suppliers have provided a range of potential costs a mid-range cost has been used in the modelling.

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Detailed requirements

This section summarises the requirements for the proposed solution to P272.

The requirements for the alternative solution are identical except for the relevant dates (as detailed in the main document), which will be one year later.

Requirement 1: All HH capable Metering Systems in Profile Classes 5-8 will be settled HH by 1 April 2014

With effect from 1 April 2014, customers in PCs 5-8 with HH capable Metering Equipment installed must be settled on a HH basis.

Suppliers would have to update the relevant Metering System registration data through the CoMC process, in order to define the Profile Class as '00' rather than '05' to '08'. This would change the customer's MPAN.

Requirement 2: Suppliers will submit their plan for the transition to HH to PAB

Individual Suppliers will be able to choose how they phase in the new requirement ahead of 1 April 2014. For example, a Supplier may choose to switch customers to HH Settlement as soon as they install advanced metering, or they choose to perform a bulk CoMC process on or just before 1 April 2014.

However, Suppliers will be required to produce a high-level plan on how they intend to complete their transition, which will need to be presented to the PAB by 31 May 2013. This will enable the PAB to obtain a better view of the impacts of the transition and better advise Suppliers who wish to avoid any problems with a bulk CoMC. This will help facilitate an efficient transition from NHH to HH.

Requirement 3: HH elective Metering Systems will not be able to revert to NHH

Those Metering Systems under the 100kW limit that would otherwise be within PCs 5-8 but for which their Supplier has elected to be settled HH will not be able to switch back to being settled NHH (unless they leave Profile Classes 5-8 for PCs 1-4) after the P272 Implementation Date.

For the avoidance of doubt, assuming that the Modification is approved, until the approved Implementation Date any HH elective customers will still have the option of reverting to being settled NHH.

Requirement 4: 99% of energy will be settled on actual data at R1

Suppliers will be required to achieve 99% of energy settled on actual data by the First Reconciliation (R1) Run for Measurement Class E, instead of the current 99% by the Final Reconciliation (RF) Run. The existing Performance Assurance Reporting and Monitoring System (PARMS) Serial SP08c will be amended accordingly.

Requirement 5: The profiles for PCs 5-8 will be 'frozen'

The Profile Administrator will discontinue load research for PCs 5-8. The regression equations for the BSC Year 2014/15 will therefore be 'frozen', and apply to all subsequent years. These frozen profiles will be used for those customers who do not have an advanced Meter installed, as well as for other types of customer currently settled on these profiles, such as NHH unmetered supply and micro-generation profiling. It may also be used for estimation of missing data by HH Data Collectors.

Although the regression profiles will be frozen, the Default Period Profile Coefficients will still need to be determined annually as they are based on the calendar for each year. ELEXON will develop a process for this to occur, which would likely form part of the annual refresh.

For clarification, the intention is to freeze the regression coefficients for PCs 5-8. This means that the Profile Administrator will no longer collect sample data for customers within these Profile Classes, and no new regression coefficients will be created. The regression data in Market Domain Data (MDD) and the SVAA systems will then be used to create the out-turn profile coefficients for these Profile Classes by selecting the regression coefficients for the appropriate season and day-type, and evaluating them at out-turn temperature and sunset variable, as they would currently do.

The regression data would also be used with long run temperatures to calculate date-specific Default Profile Coefficients for the HH market. Again this is no change from normal practice, with the only change being that the underlying data will not be updated.

Requirement 6: PARMS Serial SP04 will be expanded to include advanced Meters being settled NHH after 1 April 2014

PC 5-8 Metering Systems with an advanced Meter that are being settled on a NHH basis after 1 April 2014 will be included within the scope of PARMS Serial SP04.

Serial SP04 'Installation of HH Metering' relates to the obligation to install a HH Meter at sites which have qualified for mandatory HH metering. Currently the standards include:

- Number of days for which a HH Meter should have been installed;
- Number of days for which HH Meter was not installed when it should have been; and
- Percentage of days for which a HH Meter was not installed when it should have been.

For the avoidance of doubt, this means that the Supplier Charge associated with Supplier Serial SP04 would be payable in respect of any Metering System that is subject to the Licence condition requiring an advanced Meter, has an advanced Meter installed, but is not being settled HH for Settlement Dates on or after 1 April 2014.

Requirement 7: A new PARMS Serial will be created to monitor sites where an advanced Meter has not been installed

A new PARMS Serial will be created for PC 5-8 Metering Systems that do not have an advanced Meter (e.g. those where the Supplier has been unable to install one, despite taking all reasonable steps to do so, as required by the Licence Condition). This Serial is for monitoring purposes only, and will not have an associated Supplier Charge. This will

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enable the PAB to understand the number (and hence the impact on Settlement) of residual NHH metered customers.

Removed Requirement: Resolution of relevant DTC Flows will be increased

The Workgroup originally considered that the DTC Flows that contain HH meter data would need increased resolution to ensure low HH volumes are accurately processed. The format for the relevant data items is currently set to one decimal place. It was proposed that these are changed to a three decimal place resolution to avoid rounding issues and energy being inaccurately accounted for in Settlement.

The following data flows/items were proposed to be amended to increase the format for HH meter readings from one to three decimal places as part of P272:

Impacted Data Flows and Items	
Data Item	Data Flow(s)
J0177 'Period Meter Consumption'	D0036 'Validated Half Hourly Advances for Inclusion in Aggregated Supplier Matrix' D0275 'Validated Half Hourly Advances'
J0021 'Meter Period Value'	D0003 'Half Hourly Advances'
J0281 'Total kWh (and kVArh) of Estimated Periods'	D0022 'Estimated Half Hourly Data Report'

The P272 Workgroup had decided against including D0010 (Meter Readings) in this requirement as the D0010 flow is used in both HH and NHH markets. The data it holds is an advance (over many Settlement Periods), not a HH value, so it is less susceptible to rounding issues.

The Workgroup has since elected not to include this requirement as part of P272, and consider that it should be raised separately.

Workgroup's Terms of Reference

Specific areas set by the BSC Panel in the P272 Terms of Reference

Development of the P272 Proposed solution
Any alternative solutions
Implementation approach
Assessment of P272 against the Applicable BSC Objectives
Quantification of P272 costs and benefits where possible
Implications for micro-generation
Potential extension to Profile Classes 3-4

Assessment Procedure timetable

P272 Assessment Timetable

Activity	Date
Panel submits P272 to Assessment Procedure	09 Jun 11
Workgroup Meeting 1	23 Jun 11
Industry Impact Assessment undertaken	22 Jul 11 – 12 Aug 11
Workgroup Meeting 2	24 Aug 11
Assessment Consultation undertaken	23 Sep 11 – 14 Oct 11
Workgroup Meeting 3	21 Oct 11
Second Assessment Consultation undertaken	04 Nov 11 – 29 Nov 11
Workgroup Meeting 4	05 Dec 11
Panel considers Workgroup's Assessment Report	12 Jan 12
Workgroup Meeting 5	03 May 12
Workgroup Meeting 6	31 May 12
Assessment Consultation on Costs undertaken	03 Jul 12 – 27 Jul 12
Workgroup Meeting 7	24 Jul 12
Assessment Consultation on Benefits undertaken	14 Aug 12 – 10 Sep 12
Workgroup Meeting 8	09 Oct 12
Workgroup Meeting 9	16 Oct 12
Panel reconsiders Workgroup's Assessment Report	08 Nov 12

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Workgroup membership and attendance

P272 Workgroup Attendance										
Name	Organisation	23/07/11	24/08/11	21/10/11	05/12/11	03/05/12	31/05/12	24/07/12	09/10/12	16/10/12
Members										
Adam Lattimore	ELEXON (<i>Chair</i>)	✓	✓	✓	✓	x	x	x	x	x
Justin Andrews	ELEXON (<i>Chair</i>)	x	x	x	x	✓	✓	✓	✓	✓
Michael Edwards	ELEXON (<i>Lead Analyst</i>)	✓	✓	✓	✓	✓	✓	x	x	x
David Kemp	ELEXON (<i>Lead Analyst</i>)	x	x	x	x	x	x	✓	✓	✓
Colin Prestwich	SmartestEnergy (<i>Proposer</i>)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Colette Baldwin	E.ON	✓	✓	✓	✓	✓	✓	✓	✓	✓
Eric Graham	TMA Data Management Ltd	✓	✓	x	x	✓	✓	✓	✓	✓
Graham Smith	Western Power Distribution	✓	x	x	x	x	x	x	x	x
Howard Gregory	Npower	✓	✓	✓	✓	✓	x	x	x	x
Jane Griffith	Western Power Distribution	✓	x	✓	✓	x	✓	☎	✓	☎
Jo Fallows	ENWL	✓	✓	✓	✓	✓	✓	x	✓	✓
Justin Vroone	IMServ	✓	✓	✓	✓	x	x	x	x	x
Kevin Woollard	British Gas	✓	✓	✓	✓	✓	✓	☎	✓	✓
Lisa Waters	Waters Wye Associates	✓	x	x	x	x	x	x	x	x
Jill Ashby	Gemserv	✓	✓	✓	✓	x	x	x	x	x
Phillip Russell	Independent	✓	✓	✓	✓	✓	✓	✓	x	x
Peter Gray	SSE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Steve Whitehead	Bglobal Metering	x	x	x	x	x	x	x	x	x
Tim Roberts	Scottish Power	x	✓	✓	✓	✓	✓	✓	✓	✓
Paul Mott	EDF Energy	✓	✓	✓	✓	✓	x	x	x	x
Walter Hood	Scottish Power	x	x	✓	✓	✓	✓	✓	✓	✓
Seth Chapman	G4S Utility Services (UK) Ltd	x	✓	✓	✓	✓	✓	x	✓	✓
Attendees										
John Lucas	ELEXON (<i>Design Authority</i>)	✓	✓	x	x	x	x	x	x	x
Kevin Spencer	ELEXON (<i>Market Analysis</i>)	✓	✓	✓	✓	✓	✓	x	✓	✓
Jonathan Priestley	ELEXON (<i>Market Analysis</i>)	x	x	x	x	x	x	✓	x	x
Jonathan Amos	Ofgem	✓	x	✓	✓	✓	✓	✓	✓	✓
Andrew Wallace	Ofgem	✓	x	✓	✓	✓	✓	✓	x	x
Ben Smithers	Ofgem	x	x	x	x	✓	✓	✓	✓	✓
Martin Mate	EDF Energy	x	✓	✓	x	x	✓	✓	✓	✓
Stewart Green	Bglobal Metering	x	x	x	x	x	x	✓	x	x
Steve Wright	Npower	x	x	x	x	x	x	x	✓	✓

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