Department for Energy Security & Net Zero

Smart Metering Implementation Programme

Costs and Benefits Report

Parliamentary Report - 2024

Contents

Overview

Smart meters are a vital upgrade to our national energy infrastructure that will make our energy system cheaper, cleaner, and more efficient, enabling us to use more renewable energy and reduce our reliance on imported fossil fuels. The rollout is simplifying energy for millions of consumers by bringing an end to estimated bills and manual meter reads, providing households with information about their energy use, and enabling prepayment customers to top-up remotely. The Government sees smart metering as a crucial component of achieving a clean and flexible power system by 2030.

Great Britain's smart metering rollout is being carried out under powers included in the Energy Act 2023, which extended legal powers for smart metering until 2028.

The successful delivery of smart metering benefits depends upon coordinated effort from a wide range of organisations. The rollout is led by the Smart Metering Implementation Programme (SMIP) within the Department for Energy Security and Net Zero (DESNZ), regulated by the Office of Gas and Electricity Markets (Ofgem), and delivered by energy suppliers. The Department's role includes developing smart metering policy and regulation, providing the right planning framework for energy suppliers and network operators, and ensuring that benefits are delivered to consumers and all users of the system. Ofgem are responsible for the regulation (including monitoring, reporting and enforcement) of the licence obligations placed on energy suppliers and network operators to deliver smart meters.

As a major infrastructure programme, there remains regular scrutiny of the rollout. In 2023, the rollout was the subject of reviews by the National Audit Office and Public Accounts Committee (PAC). The Department agreed with the NAO's recommendation to update Parliament annually on the costs and benefits of the rollout (set out as part of the *Update on the Rollout of Smart Meters*, published in October 2023). This is the first in a planned set of annual reports that will state the costs and benefits of the smart meter rollout to date.

Programme update

As at the end of June 2024 there were 36.2 million smart and advanced meters in homes and small businesses across Great Britain, representing 63% of all gas and electricity meters. They are the default metering technology for energy suppliers, and the norm for households and smaller non-domestic sites across Great Britain.

A four-year 'Targets Framework' was introduced on 1 January 2022 and sets individual minimum annual smart meter installation targets for energy suppliers. Government has set expectations for suppliers to achieve a minimum installation coverage in homes of 74% by the

end of 2025. These targets are binding obligations set out in licence conditions and Ofgem is responsible for their regulation and enforcement.

The costs and benefits of the Smart Metering Implementation Programme (SMIP) as a whole have been reviewed regularly since the programme began, the most recent of these analyses being published in 2019. This cost-benefit analysis (CBA) aims to quantify all the costs and benefits to the whole of society that will be realised due to the initial rollout of smart meters in Great Britain.

As part of our oversight the Programme monitors both costs and benefits of the smart metering rollout on an ongoing basis. Table 1 shows the Cost and Benefit areas identified in the 2019 CBA.

Table 1: Costs and Benefits areas of the 2019 CBA.

Costs/Benefits	Explanation
In-premises costs	All costs relating to the installation and ongoing operation of smart meters, including meter asset and communications hub costs as well as the costs of installation visits.
DCC costs	Costs relating to the core smart metering offer that the DCC (Data Communications Company) is required to provide, which ensures the secure transmission of smart meter data and messages.
Energy suppliers' and others' IT system costs	IT capital and operating costs experienced by suppliers and other stakeholders relating to the rollout of smart meters.
Other costs	A group of costs including energy consumption of the smart meters and Smart Energy GB costs. Smart Energy GB is the independent, non-profit organisation that campaigns to help households and small businesses to understand and realise the benefits of smart meters.
Projected future costs	In the 2019 CBA three future projects were included here: (1) Enduring Change of Supplier Programme (now in DCC costs); (2) SEGB costs post-2019 (now in "Other" costs); (3) a contingency cost for Alt HAN[1] (not needed).
Customer benefits	The majority of customer benefits are derived from the reduction in consumer energy use enabled by smart meters, with benefits from time savings (due to no longer needing to submit readings or topping up remotely) also included.
Supplier benefits	A collection of benefits that suppliers will realise due to the rollout of smart meters (e.g. fewer site visits for reading meters).
Demand-shifting benefits	Demand-shifting benefits are seen as smart meters enable incentives for consumers to shift electricity demand away from peak time

[1] Alt HAN programme delivers a technical solution to properties where smart meters and the In-Home Display (IHD) are too far apart from each other to communicate using standard smart metering equipment.

	towards off-peak or towards periods when cheap, low-carbon generation is available.
Network benefits	Network benefits are realised due to data from smart meters, allowing Distribution Network Operators (DNOs) to identify faults in the network, restore electricity supply more quickly when outages occur and take better informed investment decisions.
Carbon and air quality benefits	Benefits of avoided carbon emissions and improved air quality due to reduced energy consumption.

Through the Programme's ongoing work to maximise benefits from the rollout, evidence on new costs and benefits that were not anticipated at the time of the 2019 CBA is now available. The impact of these is not quantified in this report, however DESNZ will continue to gather evidence that may support further analysis in future.

Examples of some of the costs and benefit changes seen include:

The COVID-19 pandemic introduced several new costs around installation visits for energy suppliers, for example the requirement to provide smart meter installers with appropriate personal protective equipment. While this will have increased installation costs, particularly in the period 2020 to 2021, this was partly offset by lower installation volumes (as installation activity was impacted by social distancing requirements).

In 2022/23 the Energy Bill Support Scheme (EBSS) leveraged smart metering to provide support directly to customers with smart pre-payment meters, resulting in time and efficiency savings benefits compared to the experience of consumers on traditional pre-payment meters. The EBSS gave households in Great Britain £400 towards their electricity bills over winter 2022/23. Prepayment (PPM) households received this either through monthly physical vouchers (traditional meter) or directly credited onto their smart meter each month. Latest statistics[2] showed that over 12 million payments were made to smart meters in PPM mode, with the proportion of successful payments over 98%.

Another innovation enabled by smart meters has been the recent winter Demand Flexibility Service[3], which encourages consumers to shift their electricity demand outside of specified peak periods. This initiative was enabled by smart meters being able to send half hourly consumption readings and saved 3,600 MWh in winter 2023/24 when over 2.5 million households and businesses registered (representing a 56% increase on the consumers registered in winter 2022/23)[4].

[2] https://www.gov.uk/government/publications/energy-bills-support-scheme-payments-made-by-electricity-suppliers-to-customers
[3] https://www.nationalgrideso.com/industry-information/balancing-services/demand-flexibility-service-dfs
[4] https://www.nationalgrideso.com/document/308731/download

There is also emerging evidence of potential benefits being realised through innovation building on the smart meter platform. For example:

- The Smart Meter Enabled Thermal Energy Research (SMETER[5]) project has shown how smart meter-enabled in-use performance measurement tools can improve our understanding of the performance of individual homes and the overall housing stock.
- The Smarter Tariffs, Smarter Comparisons[6] project demonstrated how smart meter data can support households in understanding the potential benefits of smart Time of Use tariffs, while the Non-Domestic Smart Tariff Comparison Project[7] is currently exploring this application for businesses and non-domestic consumers.
- The Smart Meter Energy Data Repository innovation programme is currently exploring the feasibility of facilitating access to smart meter data, maintaining or exceeding the current levels of security and data privacy. Early results are showing how easier access to smart meter data can unlock additional benefits to consumers, energy suppliers, distribution companies, energy management companies and non-for-profit organisations.
- The Smart Meter Internet of Things innovation programme is investigating how the smart metering system could be used to deliver additional data (other than energy) to enable further benefits.

Update on Costs and Benefits

This analysis uses the 2019 Cost Benefit Analysis (2019 CBA[8]) as the underlying framework, with assumptions updated to reflect observed data and evidence where possible. Following similar modelling undertaken for the National Audit Office[9], this analysis uses a “dead-stop” scenario. In this scenario, costs and benefits are accrued from the smart meters already installed, along with the future costs and benefits associated with maintaining those meters to 2034, consistent with the existing business case appraisal period. It assumes that no further smart meters were installed after the end of 2023. The “dead-stop” provides an overview of the economic costs and benefits of the rollout to date and is not comparable to the published 2019 CBA which modelled the entirety of the rollout.

[5] https://www.gov.uk/government/publications/smart-meter-enabled-thermal-efficiency-ratings-smeter-technologies-project-technical-evaluation
[6] https://www.gov.uk/government/publications/smart-meter-enabled-tariffs-comparison-project-smarter-tariffs-smarter-comparisons
[7] https://www.gov.uk/government/publications/non-domestic-smarter-tariff-comparisons-innovation-programme-successful-projects/non-domestic-smarter-tariff-comparison-programme-phase-1-project-information
[8] https://www.gov.uk/government/publications/smart-meter-roll-out-cost-benefit-analysis-2019
[9] https://www.nao.org.uk/reports/update-on-the-rollout-of-smart-meters/

This “dead-stop” analysis for those smart meters installed before the end of 2023 shows a total Net Present Value (NPV) of £1.8 bn[10] over the appraisal period. This indicates that the Programme will achieve higher benefits than costs, even if no further meters were installed after the end of 2023.

The underlying cost and benefit areas making up the “dead-stop” NPV are shown in Table 2 below. Each of these cost and benefit areas and how they have been estimated for this analysis are described following an overview of the general assumptions and differences compared to the 2019 CBA modelling. It is important to note that only a proportion of the total costs and benefits included in the “dead-stop” calculation have been realised to end 2023, with the remainder being incurred over the rest of the appraisal period.

Table 2: Summary of Cost and Benefits of the Smart Metering Programme, under a “dead-stop” scenario where no further installations were completed after end of 2023.

Costs/Benefits	£bn 2011 prices
Total Costs	**11.8**
In-premises costs	5.2
DCC costs	4.1
Energy suppliers’ and others’ IT system costs	1.1
Other costs	1.4
Total Benefits	**13.6**
Customer benefits	5.4
Supplier benefits	4.5
Demand-shifting benefits	0.9
Network benefits[11]	*
Carbon and air quality benefits	2.9
Net Present Value (Benefits minus Costs)	**1.8**

[10] In 2011 prices, discounted from 2019

[11] DNOs are seeing benefits at current smart meter coverage levels. However, the 2019 CBA had fixed thresholds of smart coverage for when benefits were expected to be realised which are slightly higher than coverage seen at the end of 2023. Therefore, the prudent decision was made not to quantify network benefits for this report.

Key differences with Programme CBA

This analysis replaced 2019 CBA estimates of rollout progress with actual data on SMETS1, SMETS2 and advanced meter installations, the proportion of prepayment meters in operation and total (smart and traditional) meters in operation taken from DESNZ official statistics[12] and industry sources. As the "dead-stop" scenario is based on no new smart meter installations after 2023, no estimations of future installations are required.

Additional subsets of rollout data were updated in the modelling by utilising DESNZ's regular data collections. This included the number of Alt HAN solutions deployed to the end of 2023 which was provided by Alt HAN Co.[13] and the number of dual band[14] communications hubs (CHs) installed to the same date. The inclusion of both of these ensures that the additional costs of these solutions, which enable benefits in specific scenarios where a typical smart meter installation is not feasible, are included.

There is ongoing work within SMIP, and beyond, around managing the impact of the switch-off of Great Britain's 2G/3G mobile networks[15], and how to ensure those smart meters that will be impacted will continue to communicate. The final date for this switch-off is currently due to be the end of 2033, which is within our economic appraisal period, however, the transition to 4G will support smart metering beyond this period and into the 2040s. To maintain a clear distinction between the original rollout and the technological upgrade from 2G/3G we have not included costs relating to this transition. To treat costs and benefits consistently, benefits for 2034 have been decreased to reflect the switch-off of 2G/3G networks.

Description of Costs

The largest cost in this analysis is "in-premises costs", which included the cost of installing smart meters as well as the costs of meters, communications hubs (CHs) and in home display (IHD) units. A regular annual data collection[16] from larger energy suppliers is used by DESNZ to monitor various aspects of the rollout and provided the basis for updating the costs of installing meters, smart meters and IHDs. Monitoring of the cost of CHs, shows that these costs have remained stable over time. The annual costs of operating and maintenance of the metering assets used the 2019 CBA assumption, applied to the updated rollout, to the end of the appraisal period.

DCC costs incurred from 2019 to 2023 are based on data received from DCC, that used their price control submissions to Ofgem and did not include costs that do not relate to the smart metering rollout. Forecasted costs to the end of the financial year 2027/28 were also received

[12] https://www.gov.uk/government/collections/smart-meters-statistics
[13] https://althanco.com/
[14] https://smartenergycodecompany.co.uk/glossary/dual-band-comms-hub/
[15] https://www.ofcom.org.uk/phones-telecoms-and-internet/information-for-industry/policy/2g-and-3g-switch-off
[16] Since 2012 SMIP has collected costs data to facilitate the monitoring of supplier costs and benefits.

from DCC, with forecasts beyond that date modelled by incorporating the "dead-stop" scenario. Enduring Change of Supplier costs are included here[17] as it has been substantially delivered.

The costs of IT capital and operating for both supplier and industry as well as DCC adaptor services have largely been kept unchanged from the 2019 CBA. This is because the vast majority of the IT costs were initial investment to support the introduction of the DCC and SMETS2 systems and therefore took place early in the appraisal period.

"Other costs" includes a collection of smaller costs:

- Smart Energy GB[18] and Alt HAN Co. costs[19] which have been updated based on recent budgets received from both companies, adjusted for the "dead-stop" scenario.
- Energy consumption of smart meters and CHs remains unchanged as these are defined in their technical specifications.
- The cost of a variety of legal, institutional and organisational set-up costs are largely historic costs and are unchanged.
- Pavement reading inefficiencies and disposal of meters have been updated based on rollout progress.

Description of Benefits

The largest consumer benefit is energy savings resulting from access to feedback on energy use enabled by smart meters (in addition to energy efficiency advice provided at smart meter installations to domestic consumers). Additionally, domestic consumers benefit from time savings, in particular prepayment customers who are able to top up their credit balance remotely. Analysing energy savings requires large volumes of data across several years, both before and after installation and is therefore done through bespoke evaluation projects rather than regular monitoring. Two recent projects[20] have shown that domestic energy savings are in line with previous assumptions.

There are a group of benefits that smart metering provides to energy suppliers including avoiding having to send meter readers to read meters, faster and more accurate information at switching, fewer customer billing enquiries, lower cost to serve for prepayment customers, and reduced debt, theft and losses across supplier customer portfolios. Each of these benefits is calculated as a saving between the cost of supplying smart meter customers compared to traditionally metered customers. Based on a review of monitoring data collected from energy suppliers, assumptions underlying these savings have remained unchanged compared to

[17] Enduring Change of Supplier costs were a "Projected Future Cost" in the 2019 CBA as the project had not started.
[18] https://www.smartenergygb.org/
[19] Some of these costs were included in "Projected Future Costs" at the time of the 2019 CBA.
[20] https://www.gov.uk/government/publications/impacts-of-smart-metering-roll-out-on-household-energy-use

previous analysis. This approach also recognises that while SMIP collects this evidence for smart and traditionally metered customers, costs for traditionally metered customers are likely to have been influenced by the rollout of smart meters and therefore cannot be used to calculate realised savings. We have removed a saving that was included as part of switching benefits as the final design of market-wide half hourly settlement is different to that predicted.

Smart meters, and the granular energy consumption data they record, are a key enabler of large-scale demand shifting, as they allow consumers to shift electricity demand away from peak time towards periods where cheaper, low-carbon generation is available. For this analysis we have scaled savings results, using the "dead-stop" assumption, from the "Dynamic Dispatch Model" (DDM[21]) which is a comprehensive, fully integrated power market model. Alongside continuing to assess the case for re-running the underlying modelling, the programme monitors the uptake of smart meter enabled Time of Use tariffs, along with more recent developments such as the Demand Flexibility Scheme.

There were two broad areas of benefits that were predicted to be realised by the electricity DNOs these were: improvements in electricity network investment decisions; and better outage detection and management. For both of these high thresholds of smart meter coverage were assumed to be needed. Despite growing evidence that DNOs are seeing benefits both along the lines envisaged and through other smart meter enabled routes, we have taken the cautious assumption to maintain the 2019 CBA thresholds for network benefits at this point. This means that under the "dead-stop" scenario no quantifiable benefits are included in this Parliamentary Report. We anticipate that future reporting will include network benefits as smart meter coverage rises and the maturity of benefits reporting from DNOs is consolidated based on work SMIP is undertaking with the DNOs.

As a result of reductions in energy use there are savings from avoided carbon emissions and improved air quality. These have been refreshed using updated carbon valuation[22] and air quality appraisal guidance[23].

[21] https://www.gov.uk/government/publications/dynamic-dispatch-model-ddm
[22] https://www.gov.uk/government/collections/carbon-valuation--2
[23] https://www.gov.uk/government/publications/assess-the-impact-of-air-quality

Annex: Evidence sources

Table 3: Monitoring evidence for cost and benefit areas

Area of Costs/Benefits	Monitoring evidence
In-premises costs	Annual data collection and ongoing bilaterial engagement with energy suppliers.
DCC costs	Bespoke data collection, based on annual price control data provided to Ofgem.
Energy suppliers' and others' IT system costs	Largely upfront costs pre-2019 and therefore no additional monitoring.
Other costs	Annual Smart Energy GB budgets and regular monitoring of Alt HAN rollout costs.
Projected future costs	Bespoke data request to the DCC (for Enduring Change of Supplier programme), annual SEGB budgets (SEGB post 2019 costs) and regular monitoring of Alt HAN rollout costs.
Customer benefits	Standalone evaluations of energy usage impacts, alongside regular (monthly) monitoring of customer contacts and complaints through various channels.
Supplier benefits	Annual data collections from energy suppliers, with bilateral engagement with suppliers.
Demand-shifting benefits	Regular, quarterly reporting from energy suppliers on time of use tariffs.
Network benefits	Regular bilaterals with DNOs, with supporting structured data collection on benefits progress.
Carbon and air quality benefits	Underlying assumptions are determined by government appraisal guidance.