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Electricity theft – Draft Impact Assessment

Impact Assessment

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Overview:

This document sets out our initial assessment of the proposed policy measures to support suppliers in investigating, detecting and preventing electricity theft.

This assessment is being published in support of a wider consultation on measures to improve the arrangements to tackle electricity theft. It focuses on the impact of the Theft Risk Assessment Service (TRAS) and other proposed measures and incentives on suppliers' activities to tackle theft.

Context

This document reflects the commitment set out in Ofgem's Forward Work Programme 2013-14, to support industry initiatives to introduce revised theft arrangements and consider whether further action is required.

The focus of this document is on the electricity market. We have developed new arrangements for tackling gas theft and set out our decision on the way forward in November 2012.

Our proposals also support several key themes outlined in the Ofgem's Corporate Strategy and Plan 2011-16. These include: promoting value for consumers and protecting the interests of vulnerable consumers, helping to maintain security of supply and contributing to the achievement of a low carbon economy.

Associated documents

- DCP080/80A – Theft in conveyance, September 2011, Ofgem http://www.ofgem.gov.uk/Licensing/ElecCodes/DCUSA/Changes/Documents1/DCP080%20080A%20D.pdf
- Standing Issue 39 Final Report, February 2011, Elexon http://www.elexon.co.uk/Pages/Issue39.aspx
- Strategy consultation for the RIIO-ED1 electricity distribution price control - Outputs, incentives and innovation, September 2012, Ofgem (Ref 122/12) http://www.ofgem.gov.uk/Networks/ElecDist/PriceCntrls/riio-ed1/consultations/Documents1/RIIOED1SConOutputsIncentives.pdf

Contents

1. Introduction

Background

1.1. In this chapter we describe the purpose of this document. We also outline our proposed package of policy measures to support the industry's efforts to tackle electricity theft, which include the introduction of a Theft Risk Assessment Service (TRAS) and incentive schemes for suppliers.

1.2. This document supports our accompanying consultation document on improving the arrangements for tackling electricity theft[1]. It sets out our draft Impact Assessment (IA) of the proposed policy measures to support investigation, detection and prevention of theft in the electricity market.

1.3. The purpose of this draft IA is to explain the commercial disincentives that electricity suppliers may face in preventing and detecting theft, and to explore the potential for a TRAS and incentive schemes to help tackle electricity theft by encouraging electricity suppliers to take action relating to electricity theft that is in the interests of consumers.

Ofgem's proposal to support theft investigation, detection and prevention

1.4. Our proposals to tackle electricity theft build on Ofgem's final proposals to increase gas theft detection as set out in our March 2012 Consultation[2]. They include the following elements[3]:

- New licence obligations for suppliers to: investigate, detect and prevent theft, to keep accurate records of their performance in relation to the new obligation, and provide these records to Ofgem upon request.
- Incentive measures. The aim of the incentive measures is to encourage suppliers to carry out theft investigation, detection and prevention activities where this would result in benefits to the whole industry and consumers.
- TRAS. The main functions of the TRAS are to generate the leads for suppliers to investigate and to gather information on their performance in tackling theft.

[1] In this document, electricity theft covers a range of activities that involves the unauthorised use of electricity. This includes offences under section 13 of the Theft Act 1968 and paragraph 6(1) of schedule 6 of the Electricity Act 1989.
[2] See "Tackling gas theft – consultation", August 2011 published on Ofgem website: http://www.ofgem.gov.uk/Markets/RetMkts/Compl/Theft/Documents1/Gas%20Theft%20Consultation%20112-11.pdf
[3] We have provided more detail on our proposals in Chapter 4 of the consultation document

- Supporting measures. Besides the new electricity Theft Code of Practice currently under development, we are asking the industry to introduce a series of supporting measures to help detect theft, such as a national 24-hour tip-off service for the public and other third parties to report suspected theft.
- Setting out our approach to new obligations for DNOs to tackle theft in circumstances where it is not the responsibility of suppliers.

1.5. The aim of our policy proposals for suppliers is to give them obligations and incentives that will make them strike a reasonable balance between the benefits (to consumers) and costs of carrying out theft investigation, detection and prevention. This would result in an increase of the level of activities to tackle theft if the total benefits of such actions outweigh the costs.

1.6. In this draft IA we focus on the specific incentive schemes and policy measures that we have developed within our policy proposals to target three desirable actions by suppliers: theft detection and investigation; reporting of accurate estimates of unrecorded units into settlement; and theft prevention. We discuss the impact of the following measures:

- A detection-based incentive
- A settlement cost-sharing mechanism
- A volume-based incentive
- Enhanced audit and performance assurance of settlement arrangements

1.7. We will also discuss the potential benefits of setting up the TRAS in supporting electricity suppliers in their actions to tackle theft.

1.8. These measures assessed in this IA are summarised below. More detail on these proposals is included in Chapter 4 of the accompanying consultation. We have also provided a high-level summary of the findings of our draft IA in Chapter 5 of the consultation document.

1.9. While we present each measure separately, we note that a package that features two or more individual incentive measures may deliver the best outcome for consumers. In this document we will assess what combination of incentive schemes and other measures has the potential to deliver most benefits to consumers. We welcome views on variations of incentive schemes based on the proposed (or alternative) measures.

1.10. In making our assumptions on set-up and operating costs of each incentive scheme and the TRAS in the electricity sector, we have assumed that such costs may be comparable to the costs estimated in the gas theft proposals. In addition, where possible we have relied on assumptions made by the industry as part of other related work (eg gas theft proposals and industry modification proposals).

1.11. In carrying out our quantitative assessment of these measures, we have made assumptions about the values that incentive parameters can take (eg detection

incentive rates and cost sharing proportions). Although based on data gathered from the industry, these values are illustrative only and are intended to demonstrate how these measures could work in practice.

Detection-based incentive

1.12. The detection-based incentive scheme would offer suppliers an incentive payment for each confirmed case of theft detected.

1.13. There are two main types of detection-based incentive schemes. We summarise below the main features of both types and provide a detailed description of each type in Chapter 4 of the consultation document:

- The first type would have no annual cap on the eligible number of detections or the overall amount that can be paid out under the scheme. In this case, suppliers would receive a fixed amount for each confirmed case of theft detected. The amount may vary by type of theft (eg domestic, commercial and cannabis farm).
- The second type would have an annual industry-wide target for theft detections and an incentive pot funded by all suppliers in proportion to their market share[4]. The incentive pot would be distributed to suppliers based on the number of detections achieved at the end of the incentive period.

1.14. We have assumed a total annual industry cost of setting up and operating a detection-based scheme (including auditing) of £100,000[5].

1.15. For the detection-based incentive mechanism, we have assumed that suppliers would receive £400 per each confirmed theft detection for all types of theft.

1.16. The detection-based incentive may operate in conjunction with other schemes, for example a settlement cost-sharing scheme.

Settlement volume-based incentive

1.17. The volume-based incentive scheme would offer suppliers an incentive payment for each unrecorded stolen unit of electricity they will enter into settlement following a confirmed case of theft.

1.18. There are two main types of volume-based incentive schemes. We summarise below the main features of both types and provide a detailed description of each type in Chapter 4 of the consultation document:

[4] The market share may be defined based on number of MPANs or settled volumes

[5] Estimates are based on SETS and enhanced SETS assumptions discussed in the Gas Theft Impact Assessment.

- The first type would have no annual cap on the eligible volume of unrecorded units or the overall amount that can be paid out under the scheme. In this case, suppliers would receive a fixed amount for each unrecorded unit entered into settlement following a confirmed case of theft detected. The amount per unit may vary by type of theft (eg domestic, commercial and cannabis farm).
- The second type would have an annual target for unrecorded volumes and an incentive pot funded by all suppliers in proportion to their market share[6]. The incentive pot would be distributed to suppliers based on verified unrecorded volume entered into settlement by the end of the incentive period.

1.19. We have assumed a total annual industry cost of setting up and operating a volume-based scheme (including auditing) of £100,000[7].

1.20. For the volume-based incentive mechanism, we have assumed that suppliers would receive 3p per KWh of unrecorded units they would enter into settlement following a confirmed case of theft. We have also assumed that the volume-based incentive would operate in conjunction with a 100 per cent cost-sharing arrangement.

1.21. The settlement volume-based incentive may operate in conjunction with other schemes, for example a settlement cost-sharing scheme.

Settlement cost sharing arrangements

1.22. A settlement cost-sharing scheme would allow suppliers to share, with all suppliers, part of the settlement charges a supplier will incur when entering previously unrecorded stolen units into settlement following detection of theft. It may be combined with a detection-based incentive.

1.23. We have assumed a total annual industry cost of setting up and operating a cost-sharing scheme of £300,000.

1.24. For this scheme, we have assumed that suppliers would share 80 per cent of the actual cost of entering stolen units into settlement for domestic and non-domestic theft. In other words, the supplier would only be liable for 20 per cent of the settlement charge. For theft linked to cannabis cultivation, we have assumed 100 per cent cost-sharing.

[6] The market share may be defined based on number of MPANs or settled volumes

[7] Estimates are based on SETS and enhanced SETA assumptions discussed in the Gas Theft Impact Assessment and include costs of administering the scheme and audit costs.

Enhanced audit and performance assurance of settlement process for theft-related units

1.25. We understand that unrecorded units that are not typically reported for settlement following detection of theft are recovered from all consumers. In accordance with their obligations under the Balancing and Settlement Code (BSC), we expect suppliers to take steps to ensure that accurate estimates of consumption at premises supplied by them are used in the supplier volume allocation process following each case of detection.

1.26. The introduction of enhanced audit and performance assurance of settlement arrangements can be viewed as a self-standing measure that seeks to ensure that suppliers produce reasonable estimates of unrecorded units and enter these units into the settlement system. If new licence obligations for suppliers to tackle theft are implemented, this measure may create an incentive to take action to prevent theft to avoid incurring in the cost of entering estimated stolen units into settlement.

1.27. While this measure is not necessarily conditional on the theft-related incentive measures discussed earlier being implemented, we consider that there are advantages of both being implemented alongside each other.

1.28. We appreciate that this measure might involve additional obligations on data collectors when reading meters and perhaps changes to IT systems to allow better tracking of volumes of electricity entered into settlement following detection of theft. We consider any costs to the industry resulting from actions taken to support compliance with existing BSC obligations to be outside the scope of this IA. However, we welcome views on the potential scale of costs associated with this measure.

TRAS

1.29. The TRAS will provide information to suppliers on the risk of theft at premises that they supply. It should do this by profiling the risk of electricity theft at premises using data from all relevant sources.

1.30. The TRAS will also require suppliers to submit their policies for tackling theft and to report on their performance in achieving the objectives set out in those policies. Actions will include activities for investigating, detecting and preventing electricity theft.

1.31. We have assumed set-up and operating costs for the TRAS of £700,000.

Summary of impacts

1.32. We present in Table 1 below a summary of the impact on consumers and on competition of each of the three incentive measures, enhanced audit and TRAS. We discuss in more detail how each measure can improve theft investigation, detection and prevention and provide positive benefits in the following chapters of this

document. As discussed in the consultation, we consider that a combination of these policy measures has the potential to provide greatest benefits to consumers.

Table 1 - Summary of impacts of each measure

Potential policy measure	How suppliers' incentives are affected	Overall impact on consumers
Detection incentive	Encourages theft detection by providing a reward for each detected case of theft	If incentive are set up at the right level, positive impact through reduced tariffs if benefits from increased theft detection are passed-through
Volume-based incentive	Encourages theft detection by providing a reward for each unit of electricity entered into settlement following detection	If incentive are set up at the right level, positive impact through reduced tariffs if benefits from increased theft detection are passed-through
Settlement cost-sharing	Encourages theft detection by lowering the cost incurred by suppliers following detection	If incentive are set up at the right level, positive impact through reduced tariffs if benefits from increased theft detection are passed-through
Enhanced audit of settlement	On its own, this measure could discourage theft detection. However, if licence obligations are in place for suppliers to tackle theft, it may encourage theft prevention by ensuring that suppliers are fully exposed to the cost of unrecorded units when a theft is detected.	If combined with licence monitoring and enforcement, positive impact through reduced tariffs if benefits from theft prevented are passed-through
TRAS	Encourages theft detection by gathering data and providing analysis on electricity theft Encourages theft prevention by requiring suppliers to report on their theft policies Promotes competition by acting as an independent administrator of the incentive scheme	If incentive are set up at the right level, positive impact through reduced tariffs if benefits from increased theft detection are passed-through

2. Objectives and approach

In this Chapter we set out our objectives and approach to carrying out an IA of enhanced incentive measures to tackle electricity theft. We explain the objectives of the incentive schemes and discuss the theoretical nature of the draft IA.

IA Question 1: Do you consider we have captured all relevant actions that, if undertaken by suppliers, can contribute to tackling electricity theft?
IA Question 2: Do you consider our approach to the draft IA suitable for demonstrating the current commercial disincentives and challenges suppliers face to tackle theft? If not, what alternative approach would you suggest to be best?

Objectives of the electricity theft policy measures

2.1. We have developed measures to increase suppliers' actions to tackle theft. The proposed arrangements will give suppliers obligations and incentives that will support them in carrying out theft detection and prevention activities to the benefit of all consumers. The TRAS will help them respond to new obligations and incentives. There are specific actions that, if undertaken by suppliers, are likely to be beneficial to consumers. They are:

- Actions to prevent or deter theft
- Actions to investigate, detect and prevent theft from registered premises
- Actions that will facilitate suppliers to make accurate estimates of the volume of electricity stolen following each detection, and then enter this volume into the settlement system

2.2. Each of our policy measure is aimed at facilitating one or more of the actions presented above.

Approach to the IA

2.3. In this section we set out our approach for conducting this IA. We also outline our approach to the qualitative and quantitative assessments of the impacts.

2.4. IAs are a useful economic tool to represent how different economic measures may deliver policy objectives. Typically, Ofgem's IA would consist of a Cost-Benefit Analysis (CBA) that compares the costs and risks of implementing a set of policy measures with the benefits such measures have the potential to deliver to energy consumers and the industry.

2.5. Our consultation puts forward a range of measures to support efforts by suppliers in tackling theft. These are being put forward for consideration by suppliers and other stakeholders because we think these measures could be beneficial to consumers. We welcome stakeholders views on these measures.

2.6. We would expect a suitable package of measures to support theft detection and prevention to be implemented through modifications to existing industry codes. We would look favourably upon any proposal that can deliver additional benefits to consumers through theft detection and prevention.

2.7. Our approach is to demonstrate through our analysis, both quantitative and qualitative, that there is scope for making improvements to the current arrangements for theft detection thereby delivering additional benefits to consumers.

2.8. Our quantitative analysis illustrates the nature of financial disincentives that suppliers face in carrying out theft detections and shows that those disincentives are not necessarily aligned with the interests of the industry as a whole, and ultimately consumers. It then shows how certain incentive schemes or cost-sharing arrangements can deliver benefits to consumers by better aligning a supplier's incentives with the interests of the industry as a whole, and with the interests of consumers.

2.9. The quantitative assessment aims to characterise the financial incentives that suppliers face and the potential impacts of calibrated incentive schemes on consumers and competition. To serve this purpose, we make use of stylised assumptions which inevitably drive the resulting figures. Therefore, our assessment should not be taken as a precise indication of the effect of each policy measure.

2.10. We complement our quantitative analysis with a detailed qualitative discussion of the likely effects of various measures put forward in our consultation on desirable aspects of supplier behaviour. We also set out the associated risks and unintended consequences of the proposed measures.

2.11. As result of our assessment, we propose to establish through Direction under a new supply licence condition a new Theft Arrangement that seeks to, as a minimum, maintain the current level of theft detection performance in the short term before establishing revised targets that can better meet consumers' interests. We encourage initiatives to develop and implement incentive measures to improve the existing actions to tackle theft and we will support such work to be progressed through industry modification process.

Structure of the document

2.12. The remainder of the document is structured as follows:

- Chapter 3 assesses the impacts on consumers
- Chapter 4 assesses the impacts on competition
- Chapter 5 assesses the impact on sustainable development
- Chapter 6 assesses the impact on health and safety
- Chapter 7 considers risks and unintended consequences
- Chapter 8 considers other impacts

3. Impact on consumers

In this chapter we assess the consumer impacts of each of our policy measures to improve electricity theft investigation, detection and prevention. This includes the potential impact on consumers bills, the consumer experience during theft investigation and when theft is detected, data protection and theft deterrence. We address in later chapters the impact on consumer health and safety and specific issues relating to vulnerable consumers and the fuel poor.

IA Question 3: What do you consider to be the scale of theft in the GB electricity market?
IA Question 4: Do you consider that there is material difference in the prevalence of electricity theft between suppliers' customer portfolio? What factors drive any considered difference in theft distribution?
IA Question 5: When theft has been detected, what actions do you take to ensure accurate estimates of the volume stolen and to ensure stolen units are entered into settlement?
IA Question 6: What is your estimate of the re-offending rates? Are there any actions you take to prevent re-offence at a premise where theft is detected?
IA Question 7: For each incentive measures, are the proposed compliance measures sufficient to ensure suppliers conduct investigations to satisfactory standards and thereby protect consumer interests? In addition to the proposed new Revenue Protection Code of Practice on theft investigation being developed under the DCUSA, are there any further measures that should be introduced to help address any perceived weakness?

3.1. Electricity theft increases bills for paying consumers, as the cost of supplying the stolen electricity is smeared across suppliers. In 2010, suppliers reported around 19,000 detected cases of theft[8], which we estimated had a retail value of approximately £20m[9]. Data for the same year also show that suppliers incurred in around £18m of costs (including costs of investigations[10]). Suppliers reported that £8.9m was recovered from consumers. The total value of electricity stolen each year is potentially much higher. Industry estimates have valued electricity theft at more than £200m per year (or around £6.7 per electricity customer). We would welcome further views on the likely scale of theft in the GB electricity market.

3.2. This section considers potential impacts on consumer bills of each incentive measure. The impact on consumer bills is likely to be influenced by:

- Theft detection and prevention rates

[8] This estimate does not include theft detected by DNOs. For the same year, DNOs reported around 10,000 detected cases of theft. Ofgem decision not to activate the electricity distribution losses mechanism in DPCR5 may result in theft that was previously detected by DNO and reported to the supplier to be directly investigated and detected by the supplier itself. As result of this, we note that estimates of theft detected by suppliers may be larger than what previously estimated.
[9] This is the total of the retail value indicated by suppliers in our 2010 questionnaire.
[10] When we refer to the investigation cost in this document we are also including within this all associated costs such meter replacement, disconnection and reconnection costs and debt recovery.

- Recovery rates for revenue lost through theft
- Cost of industry arrangements to detect theft
- Allocation of these costs between industry parties
- The extent to which suppliers pass through costs and benefits to consumers

Analytical framework

3.3. Suppliers benefit from detecting theft in two ways. First, they may recover a proportion of lost revenue. Second, they may increase the amount of billed consumption by reducing the volume of stolen units going forward[11].

3.4. Our expectation is that some, if not all, of the benefits from improved theft detection would be passed through to consumers in terms of lower bills. Our assumption is that any benefit that is felt uniformly across all suppliers (eg through lower GSP group correction factors[12] or network use of system charges) would be passed through to consumers. The precise extent to which supplier-specific benefits are passed through to consumers would depend on the nature of competitive pressures acting on those suppliers. For the purpose of this impact assessment, we assume that the full extent of benefits to suppliers would be passed through to consumers.

3.5. We have developed a simple theoretical model of the financial impacts of theft detection activity on an electricity supplier and the wider industry. The model draws on assumptions in relation to a wide range of factors that may affect the costs and benefits of theft investigation and detection activities. The purpose of the model is to:

- Illustrate the nature of the financial incentives that suppliers currently face in carrying out theft investigation and detection activities
- Demonstrate that a supplier, acting purely in its own financial interests (ignoring any licence or statutory obligations), would carry out less activity than is desirable from the point of view of the whole industry and bill-paying consumers
- Show how potential regulatory financial incentives or cost-sharing schemes can help alleviate this problem by aligning the incentives that suppliers face with the interests of the industry as a whole, and those of consumers

3.6. A detailed description of the model is presented in Appendix 2.

[11] There may also be an additional impact on revenues as customers may decrease their electricity consumption once theft has been detected. In Chapter 5 we seek views on the materiality of this issue.
[12] Grid Supply Point (GSP) Group Correction Factors (GGCFs) are used to ensure that the total energy allocated to suppliers in each settlement period in each GSP Group matches the energy entering the GSP Groups from the transmission system, adjoining GSP Groups and through embedded generation.

Analysis of impacts

3.7. We have tried to make our assumptions on input data as representative as possible. In doing so, we have drawn on information provided by electricity suppliers and DNOs in response to a questionnaire circulated by Ofgem in January 2011. We have met with several suppliers and DNOs earlier this year to check that the data in their responses to the questionnaire are still valid, and to reduce the risk that we misinterpret the data provided. Despite our efforts, the input data used in the model may not completely reflect the circumstances that individual suppliers face. In IA Question 3 we seek views on the accuracy of the assumptions used in the model.

3.8. Several input data parameters in the model consider three different values (low, medium and high). For our base-case scenario we have assumed "medium" values. A full list of input data used, including the different values representing the low, medium and high scenarios are presented in Appendix 2. We welcome stakeholders' views on the appropriateness of these values.

Counterfactual and the base case

3.9. Throughout our analysis we have assumed a counterfactual of no theft investigations and detections by suppliers. This means that the financial impact associated with each modelled scenario is the benefit to consumers compared to a counterfactual of no theft detections.

3.10. The "base case" in our analysis is the reported levels of activity by all suppliers. The financial impact under the base case is the financial benefit, relative to the counterfactual, of the reported levels of activity.

3.11. When interpreting results, the following should be noted:

- The analysis in this section of the Chapter focuses on the quantitative assessment of the impact and does not take into consideration a qualitative discussion of risks and unintended consequences. These issues are discussed in Chapter 7 of this document. An evaluation of the full potential of each incentive measure would take into consideration both the quantitative and qualitative assessment.
- Two or more incentive measures could be implemented alongside each other. While the paragraphs below present results for some combinations, we welcome industry's view on alternative combinations.

3.12. Our analysis of the impact of different measures is based on the assumption that each supplier will carry out an additional theft investigation only if they can benefit from theft detection. We also assume diminishing returns to each additional investigation, where returns are defined in terms of the probability of a successful detection. We seek views on this assumption and welcome additional data that could further inform our analysis.

3.13. For the purpose of our analysis we have assumed different set-up and operating costs for incentive measures where the features of the schemes differ (eg there are different costs associated with setting-up detection-based, volume-based, and cost-sharing schemes). Further detail on our assumptions (including assumptions on costs of the TRAS) is set out in Appendix 2.

3.14. We have summarised our results in Table 2 below. We have considered the annual market aggregate number of detections and the financial impact on the industry for a single year of spending on each incentive measure. We discuss the positive impact of the TRAS in our qualitative discussion of the TRAS in Chapter 4.

3.15. In analysing the results of the optimisation exercise we have compared the following two scenarios:

- First, they should be compared with the base case, ie the performance as reported by suppliers in the Ofgem 2011 questionnaire. In Table 2 we estimate the current expected industry-wide net benefit based on the reported level of investigation and detections.
- Second, they should be compared with the potential benefits that the industry as a whole may get if it acted as one single firm, thus addressing the incentive problem. This would be similar to a situation where the market is served by an hypothetical monopoly supplier. We further discuss this assumption in Chapter 4 of this IA. In the same chapter, we consider that, under a hypothetical monopoly the total financial benefits of theft detection could be around £67m. Although dependent on the modelling assumptions, this estimate is useful to show that there is scope for the industry to considerably improve the current position through incentives that support theft investigation, detection and prevention.

Table 2 – Industry financial benefits compared to current position

	Industry financial benefits (£)	Market aggregate number of detections
Current position	20,107,338 (calculation result based on current reported level of theft investigations and detections)	15,956 (Domestic) 750 (Commercial) 1,683 (Cannabis farm)
Hypothetical monopoly supplier	67,147,631	58,924 (Domestic) 1,864 (Commercial) 2,060 (Cannabis farm)
Optimisation results (hypothetical supplier in a multi-firm competitive market – no licence obligations)		
No incentive measure	6,317,636	Zero (Domestic) 1,443 (Commercial) Zero (Cannabis farm)
Enhanced audit	6,085,780	Zero (Domestic) 1,401 (Commercial) Zero (Cannabis farm)
Enhanced audit + 80 per cent cost sharing	5,785,780	Zero (Domestic) 1,401 (Commercial) Zero (Cannabis farm)
Enhanced audit + 80 per cent Cost sharing + £400 Detection-based incentive	38,224,881	24,528 (Domestic) 1,517 (Commercial) Zero (Cannabis farm)
Enhanced audit + 100 per cent Cost sharing + 3p/kWh Volume-based incentive	37,543,395	22,784 (Domestic) 1,670 (Commercial) 2,361 (Cannabis farm)

Source: Ofgem analysis, 2013

3.16. Our initial conclusions from the model are set out below:

- According to data submitted in the Ofgem questionnaire in 2011, suppliers, at least in 2010, reported to carry out more domestic and cannabis theft detections than our model would suggest in the absence of any policy

measure and assuming no licence obligations. This result should also be seen in the context of actions DNOs may have taken to tackle theft as result of the electricity distribution losses incentive mechanism.

- The value of electricity stolen at premises where theft was detected in 2010 is between £20m and £25m. This is a small fraction of the estimated £200m lost due to electricity theft each year.
- By developing and implementing policy measures that can support suppliers in their theft investigation, detection and prevention activities additional benefits could be delivered to consumers
- While enhancing audit requirements and performance assurance may impact the type actions suppliers may take to tackle theft, other mechanisms that include a financial incentive for suppliers to increase their level of theft detection have the potential to deliver larger benefits
- The scale of benefits of each incentive measure would depend on the assumptions underpinning each measure. Taking the assumptions set out in Appendix 2Appendix 2 – Theft modelling, our initial view is that there is scope for achieving best results if a combination of different measures is implemented. A detection-based incentive coupled with cost-sharing arrangements can substantially improve the industry performance. Incentive schemes that include a volume-based incentive (in addition with all other incentive measures) may as well deliver an increased level of theft detection. These incentive measures, however, carry some risks. We will address these as part of our discussion on risks and unintended consequences in Chapter 7.

Consumer experience of theft detection and investigation

3.17. In this section we consider the potential impact of the discussed incentive measures on the likelihood of a consumer being investigated and the quality of that investigation. Chapter 5 considers specific effects of the potential incentive measures on vulnerable consumers.

Likelihood of investigation

3.18. All proposals aim to increase the number of investigations that lead to theft detection. In particular, by providing a payment for each confirmed case of theft detected, an incentive scheme would help reduce disincentives and potentially encourage suppliers to increase their level of theft detection activities for all types of theft.

3.19. In addition, there may be scope for developing incentives that differ by type of consumer to tackle specific types of theft (eg small businesses, cannabis farms, etc). This, however, would need to be carefully assessed against the risk of perverse incentives of increasing the detection of certain types of theft even when it would be more efficient not doing so or detecting other types. Different rates for different types of theft may also discriminate among suppliers based on their portfolio of customers. If implemented, this incentive scheme would need to address these issues as well.

3.20. In addition, the enhanced audit requirement, the cost-sharing arrangements and volume-based incentives aim to incentivise suppliers to enter stolen units into settlement. If we assume that the benefits associated with these incentive measures (in the form of lower per unit network and balancing charges and more accurate GSP group correction amount) are fully captured, suppliers may respond to these incentives by focussing on cases with higher volumes of theft, for example non-domestic customers and cannabis farms.

Quality of investigation

3.21. When theft is suspected or identified we consider that consumers should be treated in an appropriate and consistent manner, irrespective of who supplies them with electricity. In this section we consider the ability of each proposal to deliver satisfactorily standards of investigation. We have also considered whether the design of each proposal will impact on a supplier's view on whether to declare that an incident should be declared as theft[13].

3.22. We consider that there are strong commercial drivers under all options to declare an incident as theft. However, we believe that a standard definition of investigation and detection should be developed to avoid behaviours to the detriment of consumers, for example by declaring theft where this is not the case. In addition to licence conditions setting out investigation standards, we consider a Code of Practice (CoP) should contain a clear definition of investigation and detection setting out standards for all relevant parties.

3.23. Industry is currently developing a CoP that would detail how investigations should be undertaken. This work has been developed under the Distribution Connection and Use of System Agreement (DCUSA) governance rules within the context of change proposal 054 (DCP054). The CoP would set out the roles and responsibilities for investigating theft of suppliers and DNOs.

3.24. Each proposal intends that the incentive measures are supported by the code of practice. Given the progress on DCP054, we believe that each incentive measure is likely to be supported by common rules for theft investigations.

3.25. The CoP is divided into three sections - "Obligations", "Best practice" and "References":

- Sections marked "Obligations" detail actions to be taken by the relevant party. Failure to undertake these actions constitutes a breach of the CoP
- Sections marked "Best practice" provide information on how a party may proceed. They confer no obligation, and parties may choose whether they follow the advice provided or another course of action

[13] The implication of declaring a theft is significant for customers. Besides the legal offence they may be charged with, they would be required to pay charges, such as the value of the electricity illegally consumed and the costs of the investigation and any meter replacement. Customers may also be disconnected, for example if they are not willing to pay associated charges.

- Sections marked "References" provide detail on relevant information from documents outside the CoP, but which are relevant to party's actions in theft of electricity administration.

Data protection

3.26. Data analysis is an important method for detecting theft[14]. There are likely to be additional data sources that could be used to detect theft when there is smart metering[15]. For any proposal, industry participants would need to ensure they meet their obligation under the Data Protection Act (DPA) 1998.

3.27. In addition, further consideration should be given to the case of change of supplier, where a supplier that is investigating a potential theft may be required to disclose information to the new supplier.

3.28. The CoP currently under development seeks to address data protection issues and issues related to change of supplier. In particular, the DCP054 workgroup has committed to carry out a Privacy Impact Assessment. Our initial view is that all options are capable of being compliant with the DPA but that careful consideration would need to be given to data privacy as part of their implementation.

3.29. In the Gas TRAS direction we set out explicit measures on data privacy and we would expect the same measures to be included in any electricity TRAS direction.

Theft deterrence and theft prevention

3.30. There are a number of factors that may determine whether a consumer decides to take an illegal electricity supply. These include:

- The ease with which theft can take place
- The customer's perceived risk of detection
- The perceived consequences of detection

3.31. We consider that all incentive measures are likely to increase the rate of theft detection from current levels. This may have a consequential deterrence effect if customers perceived an increased risk of being detected. The ability of each incentive measure to increase theft detection is discussed in Chapter 4.

[14] Sources of leads on electricity theft varied significantly between suppliers, with data analysis contributing to 8 per cent of the leads, data collectors to 26 per cent meter operators to 21 per cent, RPS to 14 per cent, DNOs to 7 per cent and other sources (tip-off, housing association, police) to 24 per cent.
[15] These additional sources of data are expected to be anti-tempering flags sent by the smart meter and more detailed consumption data. DECC has developed rules for the access and use of smart metering data, see: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/43046/7225-gov-resp-sm-data-access-privacy.pdf

3.32. We also consider that incentive measures would be likely to increase theft prevention activities, such as re-visits to sites and follow-up. This could be incentivised, for example, by requiring suppliers to report information on their performance to the TRAS. That may then be used for benchmarking activities. We would also expect rules on re-visits to be set out in the CoP on theft investigation.

Summary

3.33. In this section we set out a summary of our assessment of the impact on consumers of the three incentive measures, the enhanced audit and the TRAS and of the qualitative analysis presented in this chapter. Our initial conclusion is that some of the proposed measures could provide financial incentives to suppliers to increase their efforts to tackle electricity theft. Those efforts are likely to deliver additional benefits that could be transferred to consumers through lower bills.

3.34. Our analysis relies on the input data used to set out the baseline and on the assumptions on the costs and level of incentives for each measure. The potential benefit for consumers would be impacted by the input data used in each incentive measure and on the level of pass-through of industry benefits to consumers. Table 3 below sets out a summary of the qualitative analysis presented in the chapter.

Table 3 - Summary of qualitative consumer impacts

	Enhanced audit	Detection-based incentive	Settlement cost-sharing	Volume-based incentive	TRAS
Likelihood of investigation	Weak impact on likelihood of investigation	Driven by suppliers response to commercial incentives	Driven by suppliers response to commercial incentives	Driven by suppliers response to commercial incentives	Increase for some suppliers as they will have access to the leads
Quality of investigation	Incentive to ensure accurate estimates of stolen volumes and that units are entered into settlement	Commercial incentive for suppliers to identify theft Incentive to ensure accurate estimation of volumes stolen Potential risk that suppliers may over-estimate theft	No impact expected	Commercial incentive to identify theft Incentive to ensure accurate estimation of volumes stolen Potential risk that suppliers may over-estimate stolen units	No impact
Data protection	No data protection issues expected	No data protection issues expected	No data protection issues expected	No data protection issues expected	Potential issues, therefore any TRAS Direction will include provisions on DP
Theft deterrence effect	Positive impact by making theft detection more costly	Increased theft detection provides additional deterrence effect	Weak impact on theft deterrence if not implemented with other incentive measures	Increased theft detection provides additional deterrence effect	Increased theft detection provides additional deterrence effect

Source: Ofgem analysis, 2013

4. Impacts on competition

In this chapter we assess the potential impact of the proposed policy measures on suppliers and on competition in the electricity supply market. We first consider the impact of theft on a single supplier. We describe the analytical framework we have developed to represent the incentive problem and assess how proposed policy measures can help address this problem. Finally, we assess the competition impacts on small suppliers and new entrants.

IA Question 8: Do you consider the incentive problem described in the consultation to be a reasonable representation of the issues and challenges suppliers face to tackle theft?
IA Question 9: To what extent do you consider the detection-based and the volume-based incentive schemes are likely to establish and realise targets for theft detection that are proportionate to the potential consumer benefits? Do you have any views on the two variations (cap / no cap) of each of those incentives schemes?
IA Question 10: Do you consider that the cost-sharing mechanism could address the disincentive suppliers face to enter estimated stolen units into settlement?
IA Question 11: Do you consider that additional or alternative measures to the three incentive measures, to the enhance audit and to the TRAS are needed to address the incentive problem and improve theft investigation, detection and prevention?
IA Question 12: Do you consider that the cost and availability of services to support theft detection and investigation is a material issue for small suppliers?

4.1. This section presents our analysis of the impacts of the incentive measures, enhance audit and TRAS on suppliers and on competition in the market for the supply of electricity. It explains how the detection-based, volume-based and cost-sharing incentive schemes, as well as enhanced audit and TRAS can promote electricity theft detection and encourage theft prevention.

4.2. Our analysis of supplier impacts is qualitative in nature. A quantitative financial analysis is less relevant for the supplier as we expect any benefits or costs arising from efforts to tackle theft to be passed through to consumers. A detailed description of the contribution of our model to the discussion on the incentive problem and on the impact of our proposed incentive measures is set out in Appendix 2.

Impact on suppliers

4.3. Suppliers face a range of costs when carrying out activities to detect theft. These include:

- The cost of carrying out investigations, the cost of remedial action following detection (eg meter replacement) and the costs to recover money from consumers that engaged in electricity theft
- Settlement charges if and when the supplier enters an estimate of the volume of electricity stolen to settlement

4.4. Suppliers may also receive benefits from theft detection, in particular the value of any money recovered and the profit from future lawful consumption by the consumer (some of this may be lost if the consumer switches supplier soon after detection).

4.5. As discussed in Chapter 2 of the consultation document, suppliers face an incentive problem relating to the pass-through of the costs of undetected electricity theft stemming from the fact that suppliers face costs in excess of the investigation costs alone when theft is detected. This means that the net benefit to suppliers from theft detection is likely to be less than the net benefit to the industry from theft detection. Our quantitative analysis shown in Appendix 2 also indicates this.

4.6. This problem means that there are risks that suppliers will not carry out a sufficient level of theft detection activities. The incentive measures proposed are intended to change the financial incentives suppliers face to reduce the extent of the incentive problem and promote levels of theft detection that are beneficial to consumers.

4.7. We have identified three schemes which act to increase the net financial benefit (or reduce the net costs) to an electricity supplier from theft detection:

- The detection-based incentive scheme would offer an incentive payment for each detected case of theft
- The settlement volume incentive would offer a per unit incentive payment for each theft unit entered into settlement following detection
- The settlement cost sharing arrangement would offset part of the settlement charge that the supplier would be liable for when theft units are entered into settlement

4.8. Each of these incentive measures will tend to encourage suppliers to be more proactive in detecting theft.

4.9. Different incentive rates for different types of theft detections (eg domestic, commercial, cannabis farms) can make this schemes work more effectively by taking account of differences in the cost incurred by suppliers.

4.10. There are important differences between the incentive measures as far as the incentives for detection and settlement processes are concerned:

- The detection incentive rewards detections. The amount that a supplier can earn depends only on the number of detections, not on the value of electricity stolen or reported for settlement. This means that detecting low value theft (or short running theft) is just as rewarding for the supplier as high value theft (or longer running theft)
- The settlement volume incentive rewards volumes entered into settlement. The amount that the supplier can earn is determined by the volumes stolen (and reported for settlement), not the number of detections. This means that detecting higher value theft is more rewarding than lower value theft

- The settlement cost sharing arrangement would pass through, to other suppliers, part of the settlement charge faced by suppliers when a theft is detected

4.11. Whether the settlement cost sharing arrangements would improve the current situation depends on how suppliers have responded to their current obligations to report accurate assessments of the volume of electricity stolen into settlement. It will certainly encourage detections by suppliers who take their obligations on settlement seriously. However, it can be argued that non-compliance with the obligation is a de facto settlement cost sharing arrangement, and that a new scheme can only legitimise what is already standard practice for some suppliers.

4.12. Our forth measure, the enhanced audit and performance assurance measures on the reporting of unrecorded volumes into settlement is an important component in our package of measures. The impact of the enhanced audit arrangements on the level of theft detection activity is uncertain. By potentially making each detection more costly (in terms of settlement charges), this measure may discourage detections by those suppliers that do not currently report a reasonable estimate of volumes for settlement. However, this cost could be offset if an incentive scheme or a settlement cost sharing scheme is implemented.

4.13. The impact of enhanced audit arrangements on theft prevention and deterrence is likely to be positive. By making theft more costly to them, suppliers are encouraged to take steps to prevent or deter theft, particularly those that involve higher volumes. However, the positive effect of this measure on prevention could be lost if a generous incentive scheme is put in place.

4.14. In any case, if one or more of the financial incentive measures discussed in the consultation are to be implemented, they would need to be accompanied by arrangements to minimise the risk of fraud or error. There would be considerable overlap between the arrangements to prevent fraud and the arrangements that suppliers would need to have in place to ensure that an accurate estimation of consumption data is entered into settlement following a detection of theft.

TRAS

4.15. Building on our work in the gas sector, we propose to require electricity suppliers to set up, fund and maintain a new Theft Risk Assessment Service (TRAS) for the electricity sector.

4.16. Mirroring the arrangements in the gas sector, the electricity TRAS would perform the following functions:

- Collect and analyse relevant information to profile the risk of the illegal abstraction of electricity, including theft, at any premises served by a DNO
- Provide information to suppliers and DNOs that would enable them to both identify the location of a suspected theft, and to investigate and prosecute any theft that may be taking place at that location

- Determine, if and when necessary and in accordance with a methodology published by it, an appropriate target for the detection of theft to be met by all electricity suppliers such that it is likely to result in an overall benefit to consumers.

4.17. Suppliers would be required to take reasonable steps to provide such information to the electricity TRAS as it may require to carry out its functions and inform it about the outcome of investigations that they will carry out.

4.18. As is the case in gas, the electricity TRAS would potentially have an objective to act "in a manner that is most likely to facilitate the development, operation and maintenance of an efficient, economical and coordinated Theft Arrangement", where the term "Theft Arrangement" is used to describe the new industry arrangements to tackle theft.

4.19. The purpose of the electricity TRAS would be to support suppliers in investigating, detecting and preventing theft. It would do this by collecting and coordinating information from suppliers and turning this into actionable intelligence, and doing so more efficiently than the supplier could have done itself. It would also support the industry by calibrating any incentive scheme, setting targets or standards and monitoring performance against standards.

4.20. Table 4 below summarises the positive and negative impacts that each measure could have on different aspects of supplier behaviour in relation to tackling electricity theft.

Table 4 - Summary of supplier impacts

	Enhanced audit	Detection-based incentive	Settlement cost-sharing	Volume-based incentive	TRAS
Action to investigate and detect theft	Likely to deter supplier action to detect theft since there is a higher risk of settlement liabilities No impact on suppliers who already report accurate estimates for all detected units	Likely to reduce disincentives and potentially encourage detections Low value and easy to detect theft would be particularly attractive for the supplier	Likely to reduce disincentives and potentially encourage detections	Likely to reduce disincentives and potentially encourage detections The more electricity illegally taken, the stronger the incentive	Likely to reduce disincentives and encourage detections
Action to prevent and deter theft	May improve incentives for theft prevention action as it is more difficult to pass on the cost of unrecorded volumes to other suppliers and consumers	Likely to weaken direct incentives to prevent theft Re-offenders or repeat offenders if found provide greater revenue to the supplier. Indirect deterrent effect through the increase in the perceived risk of detection if publicity surrounding detections increases	Likely to weaken direct incentives to prevent theft Indirect deterrent effect through increase in the perceived risk of detection if publicity surrounding detections increases	Likely to weaken direct incentives to prevent theft The longer a theft goes undetected, the greater the reward upon detection. Indirect deterrent effect through the increase in the perceived risk of detection if publicity surrounding detections increases	Positive impact by encouraging suppliers to submit policies on their actions to tackle theft that also include theft prevention
Reporting accurate estimates of unrecorded volumes for settlement	Provided there is a credible threat of enforcement action, this is likely to encourage more accurate	No impact	Positive impact through reduced liabilities for suppliers when volumes are reported for settlement	Positive impact through reduced liabilities for suppliers when volumes are reported for settlement	Potential indirect effect as result of requesting suppliers to report on their performance

	estimates for settlement				
Recover money following theft detection	Likely to improve recovery rates since suppliers are exposed to the full cost of stolen electricity	Likely to improve recovery rates since suppliers are exposed to the full cost of stolen electricity	Likely to improve recovery rates since suppliers are exposed to the full cost of stolen electricity	Likely to improve recovery rates since suppliers are exposed to the full cost of stolen electricity	Likely to improve recovery rates since suppliers may be incentivised to meet the target set in their theft policies

Source: Ofgem analysis, 2013

New entrant and smaller supplier issues

4.21. An incentive scheme that enables suppliers to benefit financially from theft detection may affect suppliers in different ways.

4.22. The main aim of the incentive schemes is to promote desirable behaviour by suppliers by changing the financial incentives they face in carrying out such activities. Suppliers can vary significantly in terms of their size (number of customers), by their types of customers in their portfolio and in relation to their geographical focus. They may also differ in their approach to tackling electricity theft.

4.23. Incentive schemes that offer a reward for detection could disproportionately benefit those suppliers that have a relatively high number of undiscovered theft cases as a proportion of their total customers. Suppliers that have done little to detect and deter electricity theft would have greater scope to generate financial rewards from the incentive scheme than suppliers that have been effective at theft prevention and deterrence in the past. This may be seen as unfairly rewarding previous poor performance and not recognising good performance.

4.24. We recognise the concerns of some small parties that smaller suppliers would be affected differently from larger ones purely as a result of their size. One possible source of this impact would have been the need for suppliers to incur a fixed cost in tackling theft, eg the use of a computer data analytic tool to help identify theft. This impact is likely to be mitigated because this fixed cost is scalable and, most importantly, TRAS would provide this service.

4.25. However, were incentive schemes implemented without the TRAS, there would be a risk that such schemes could have negative distributional effects. In other words, while all suppliers may be required to contribute to the incentive pot, large suppliers may be in a better position to get most of the payments from theft detection.

4.26. Due to economies of scale, large suppliers may be able to decrease theft investigation and detection costs and therefore to carry out revenue protection (RP) activities more cheaply. Should small suppliers not be able to carry out RP services due to constrained resources, they would need to rely on third parties, including large suppliers. With no TRAS in place to assess data on (among others) costs of investigation, there may be a perverse incentive for large suppliers to gain by charging higher tariffs for investigating to small suppliers, thus making it more expensive for them tackling theft. This may create a disincentive for small suppliers to increase their level of theft detection activities.

4.27. By making information on theft available to all suppliers and requesting them to submit their proposed policies to tackle theft, the TRAS would also encourage small suppliers to be more proactive and take action against unlawful behaviour by their customers.

Role of suppliers in tackling theft related to cannabis cultivation

4.28. Theft related to cannabis cultivation is a serious threat for electricity consumers. Cannabis farms require large volumes of electricity, with industry estimating that the scale of theft at one of those sites to be on average around 40 times higher than theft found at domestic premises. In Chapter 1 of the consultation document we outlined the importance of putting in place arrangements that tackle this type of theft. We acknowledge that detection of theft related to cannabis cultivation is likely to have a wider social impact. For the purpose of our analysis, however, we have not attempted to measure the extent of such impact We are open to consider whether the TRAS, if implemented, should establish targets for theft detection that take into account broader social impacts on consumers.

4.29. However, we consider that suppliers should make an effort to detect theft related to cannabis cultivation. We recognise that there may be strong commercial disincentives for suppliers to carry out theft detection activities on cannabis farms, such as higher investigation costs and potential exposure to higher settlement, distribution charges and low chance of recovery. By allowing different incentives rates by type of theft, the detection-based and volume-based incentive measures have the potential to provide payments that would partially offset the higher costs to detect theft related to cannabis cultivation.

4.30. The incentive schemes, however, could have different effects on suppliers with a disproportionately higher share of high value theft cases, such as those which could result from cannabis farms. Cannabis farms are not evenly distributed across GB and these patterns can change over time. Suppliers that have a bigger market share in the areas with a higher density of cannabis farms would be affected to a greater extent by these incentive schemes. Whether this effect is positive or negative would depend on the calibration of the incentive. For example, a scheme that enables the supplier to profit from the detection of a cannabis farm (taking into account legitimate settlement costs) could generate greater financial rewards for these suppliers than others, but it could also have a larger positive impact on consumers provided those benefits are passed through to them.

4.31. We also considered that, given the social impact of this type of theft, there is scope for other parties to take action against cannabis cultivation. We are, for example, involved in the Home Office initiative to work together with the Police, suppliers, DNOs and other industry organisations to create a network of intelligence to increase the rate of the investigation and detection of theft related to this criminal activity. This may also act as a deterrent for potential future theft.

5. Impacts on sustainable development

This chapter assesses the potential impact of the proposed policy measures on four key sustainable development themes[16]. These are: (1) promoting energy savings; (2) managing the transition to a low carbon economy; (3) eradicating fuel poverty and protecting vulnerable consumers; and (4) ensuring a secure and reliable electricity supply.

IA Question 13: Do you agree with our initial views on consumer behaviour in respect of energy efficiency?
IA Question 14: What percentage reduction in consumption would you expect consumers to make when an illegal electricity supply is detected? To what extent do you consider that this would result from a response to increased costs and/or an increased propensity to invest in energy efficiency measures?

Promoting energy savings

5.1. Where electricity is illegally taken, consumers are less likely to be price sensitive and motivated to moderate consumption. While not all consumers that take an illegal supply will necessarily increase their consumption, reducing theft is likely to have a positive impact on reducing consumption and will therefore promote energy savings.

5.2. In addition, consumers that are taking an illegal supply are likely to be less inclined to invest in energy savings measures as the return on investment would be moderated by the reduced consumption recorded.

5.3. We welcome views on the extent to which consumers would be expected to moderate their consumption if it was charged for rather than stolen, including any increased incentives that consumers may have to invest in energy efficiency measures.

Managing the transition to a low-carbon economy

5.4. In earlier chapters we outline the potential for each policy measure to increase the level of theft detection. Our initial view is that combinations of incentive measures together with the TRAS would provide a positive impact on carbon savings. However the final impact will depend on the combination of incentive measures employed and their calibration.

[16] Our December 2009 Guidance on Impact Assessment notes that we will consider five broad themes. In addition to the themes set out in this chapter we have also considered the potential ability of the policy measures to support improved environmental performance. In respect of this theme we do not consider there are likely to be additional benefits to those noted in this chapter.

5.5. Based on the responses to Question 14 above, we intend to assess the potential carbon savings that could be made if a decrease in electricity consumption associated with theft detection is realised. We will present this analysis in an updated IA in Q4 2013.

Eradicating fuel poverty and protecting vulnerable consumers

5.6. Improved detection of theft is likely to benefit the broader interests of fuel poor and vulnerable consumers by reducing consumer bills and improving safety[17].

5.7. In relation to those already in fuel poverty, the proposed increase in theft detection is likely to feed through into a reduction in consumer bills. Consumers caught taking an illegal supply are likely to be requested to pay back charges. This would be expected to have a greater impact for vulnerable consumers and those in fuel poverty that have taken an illegal electricity supply. It may also move some consumers into fuel poverty.

5.8. As noted in chapter 3 of this document, a new CoP on theft investigation is currently being developed under the DCUSA governance arrangements. Our expectation is that this code would contain specific provisions for the treatment of vulnerable consumers and those that would have difficulty paying charges. In addition, if implemented, the new licence condition will set out new requirements in relation to treatment of consumers in vulnerable situation.

Ensuring a secure and reliable electricity supply

5.9. We consider that increased theft detection could improve network reliability. This effect may result from a reduction in electricity blackouts that require an emergency partial shutdown of the distribution network. This is expected to have a positive impact on consumers' ability to use electricity in their homes, including alternative uses, for example cooking.

5.10. Reducing theft (and therefore better understanding patterns of electricity consumption) has the potential to assist DNOs with network planning to ensure that electricity demand can be met. We seek views from industry on the materiality of the impact of theft reduction on network planning.

[17] Our initial assessment of the impact of policy measures on customer bills and on safety is set out in Chapter 3 and 6 respectively.

6. Impacts on health and safety

In this chapter we assess the direct and indirect impacts of electricity theft on health and safety and examine the potential benefits that could result from the proposed incentive measures.

IA Question 15: Do you consider the proposed incentive measures would have any direct or indirect impacts on health and safety others than the areas discussed in this draft IA?
IA Question 16: What incentive measure (or combination of incentive measures) do you consider would have the greatest impact on health and safety?

Direct impacts on health and safety

6.1. Physical interference with metering and associated equipment for the supply of electricity to premises carries safety risks for those that undertake this activity and for those that live in, or close to, premises where this has occurred. Those parties that work with this equipment, such as meter installers, installers of consumer appliances, meter readers and the emergency services that attend incidents may also be placed in danger.

6.2. Data on injuries and fatalities linked to illegal abstraction of electricity are not easily accessible. The only information available consists in the reporting submitted to the Health and Safety Executive (HSE) by some DNOs and meter operators in accordance with Paragraph 31 of the Electricity Safety, Quality and Continuity Regulations (ESQCR)[18]. Information available shows that in 2012 there were four reported cases of serious injuries (ie electric shock and burns to hands and face) that may be related to electricity theft. It is worth noting, however, that the reporting requirements of paragraph 31 ESQCR do not apply to suppliers. As such, there is the possibility that the actual number of cases is higher than what reported to the HSE.

6.3. We welcome further evidence, in particular from suppliers and DNOs, on the number of dangerous, or potentially dangerous, incidents associated with electricity theft and, in particular, where these have led directly to consumer harm.

6.4. We consider that increased detection rates are likely to reduce the overall direct impact of electricity theft on health and safety. As noted above, we have discussed the relative merits of each measure and the TRAS in detecting theft in Chapter 4. We would welcome views on whether any of the proposals could improve the overall safety of certain individuals when compared to the current position.

6.5. We would also welcome views on which measure (or combination of measures) is likely to have the greatest overall benefit on health and safety.

[18] See: http://www.legislation.gov.uk/uksi/2002/2665/regulation/31/made

Indirect impacts on health and safety

6.6. Increased theft detection is likely to improve network reliability by reducing fatalities due to overheated meters and wires which require an emergency partial shutdown of the distribution network. This will positively impact consumers' ability to use electricity in their houses. In such instances, there may be beneficial impacts on the health of consumers, in particular those that are vulnerable.

7. Risks and unintended consequences

In this section we consider the potential risks and unintended consequences associated with each incentive measure not covered elsewhere in this IA.

IA Question 17: Do you consider there are other risks or unintended consequences of the proposed policy measures not discussed in this draft IA? What alternative policy measures do you consider could address these risks?

Introduction

7.1. The next subsections highlight a number of risks that may arise in relation to the proposed incentive measures. These will depend on the way incentive schemes based on such measures are calibrated.

7.2. By requiring suppliers to submit their proposed policies to tackle theft, monitoring their performance and administering the Theft Arrangement, we expect the TRAS to play a key role in preventing those risks from materialising.

Risk of promoting excessive theft detection activity

7.3. We have described how detection incentives can promote greater levels of theft detection activity. However, greater amounts of theft detection activity do not necessarily have a positive impact. Theft detection has costs as well as benefits. To be sustainable, every incentive measure should be implemented taking into account the proportionality between costs and benefits.

7.4. There is a risk that detection incentives — either on their own or in combination with settlement cost-sharing — are set at levels that are so high as to mean that the incentive arrangement causes a net detriment in terms of theft detection activity, by promoting excessive number of investigations for which the costs to the industry and to consumers do not justify the benefits.

7.5. Any scheme will require to be carefully calibrated to strike a balance between encouraging worthwhile investigations and not encouraging a level of activity that is not cost-effective from an industry and consumers perspective. The TRAS would have a key role in assessing the performance of the industry and in providing information that could be used by each suppliers to develop theft policies that would deliver improved levels of theft detection and prevention in the most effective ways.

Risk of dampening suppliers' efforts to prevent and detect theft early

7.6. The detection-based, settlement volume-based and settlement cost-sharing schemes may have an adverse impact on suppliers' theft prevention and detection activities.

7.7. Apart from compliance with their licence obligations, suppliers currently have a commercial incentive to prevent theft, or detect it as early as possible, because they could face settlement charges proportional to volumes stolen when a theft is detected. The more theft occurs amongst a supplier's customers, the greater is its potential exposure to settlement charges. However, the supplier's perceived exposure will also depend on the likelihood that theft will ultimately be detected and the extent to which the actual volume of stolen electricity is estimated and entered to the settlement system following detection.

7.8. Settlement cost-sharing arrangements and a settlement volume-based detection incentive reduce the potential scale of the liability to an electricity supplier for each unit of electricity stolen. The risk of these measures may be to reduce suppliers' financial incentives to prevent theft or to detect it earlier rather than later.

7.9. An incentive payment per detection does not have the same type of effect. However, such an incentive scheme could still dampen a supplier's incentives to prevent theft from arising by reducing the net cost to a supplier from tackling cases of theft once they arise. A supplier however might feel obliged to investigate some cases in light of its licence conditions even if it would face a net cost, and this might encourage it to take steps to prevent theft in the first place.

Risk of perverse incentives for suppliers to avoid steps to prevent cases of theft

7.10. All cases of theft are different, in terms of both the costs of investigation and the benefits of detection. It is therefore difficult to calibrate incentive schemes in a way that does not create any risk. Indeed, one of the main ways in which such incentive schemes work is by providing a financial reward for theft detection. To be effective, any incentive scheme would need to be calibrated to strike a balance between the following two issues:

- If the financial incentives (in combination with any settlement cost-sharing) are set too low, the schemes would be ineffective in encouraging theft detections
- If the financial incentives are too high, the schemes could dampen or undermine a supplier's actions to prevent and deter theft

Risk of perverse incentives for suppliers to delay investigating suspected cases of theft

7.11. Further to the concern above, a volume-based detection incentive presents an additional risk of providing perverse financial incentives for an electricity supplier to delay detection of electricity theft.

7.12. If a supplier receives a certain amount per kWh entered into the settlement system, there is therefore a risk that the supplier may have financial incentives to delay the investigation and detection of a suspected case of electricity theft, so that

it receives a larger financial reward from detecting a large-scale theft. This would be against the interests of the industry as a whole.

7.13. This risk does not arise under either a standalone settlement cost-sharing arrangement or a per detection incentive in which the incentive payment is not linked to the volume or duration of theft.

8. Other impacts

In this chapter we assess the other impacts of the policy measures not previously considered. These include the implementation timescales.

IA Question 18: Do you consider that the implementation timescale for our proposals is realistic and achievable? If not, what do you consider to be a realistic timeframe? What additional measures, if any, do you consider should be undertaken to secure implementation within a reasonable timeframe?
IA Question 19: Do you consider that our approach to enhancing obligations on DNOs would provide more focussed action on tackling theft in conveyance? If not, what do you consider to be an alternative approach?

Implementation and future development

8.1. We propose to require that the TRAS is implemented in Q1 2015. We would also welcome a change to the relevant industry codes being raised to introduce an incentive scheme in accordance with the principles set out in Chapter 4 of the accompanying consultation document. We propose that such scheme should be in place before implementation of the TRAS.

8.2. We aim to introduce new licence requirements on suppliers to detect, prevent and investigate theft during Q1 2014. Suppliers would be required to act in accordance with these licence obligations, if introduced, and therefore make efforts to detect theft from this point in time.

8.3. We aim to consult on new licence obligations for DNOs to provide more clarity on the requirement for DNOs to tackle theft. This would include taking the necessary action when there is no supplier responsible for the site (unregistered sites). We would expect such obligations to be in place from Q2 2015.

Appendices

Index

Appendix 1 - Consultation Response and Questions

1.1. Ofgem would like to hear the views of interested parties in relation to any of the issues set out in this document.

1.2. We would especially welcome responses to the specific questions which we have set out at the beginning of each chapter heading and which are replicated below.

1.3. Responses should be received by 28 August 2013 and should be sent to:

Smarter Markets
9 Millbank
London
SW1P 3GE
smartermarkets@ofgem.gov.uk

1.4. Unless marked confidential, all responses will be published by placing them in Ofgem's library and on its website www.ofgem.gov.uk. Respondents may request that their response is kept confidential. Ofgem shall respect this request, subject to any obligations to disclose information, for example, under the Freedom of Information Act 2000 or the Environmental Information Regulations 2004.

1.5. Respondents who wish to have their responses remain confidential should clearly mark the document/s to that effect and include the reasons for confidentiality. It would be helpful if responses could be submitted both electronically and in writing. Respondents are asked to put any confidential material in the appendices to their responses.

1.6. Having considered the responses to this consultation, Ofgem intends to set out its decision on whether to propose new licence obligations for electricity suppliers and on which, if any of the policy measures (or a combination of them) should be implemented. Any questions on this document should, in the first instance, be directed to:

Chiara Redaelli
Smarter Markets
9 Millbank
London
SW1P 3GE
020 7901 7196
Chiara.redaelli@ofgem.gov.uk

CHAPTER: TWO

IA Question 1: Do you consider we have captured all relevant actions that, if undertaken by suppliers, can contribute to tackling electricity theft?

IA Question 2: Do you consider our approach to the draft IA suitable for demonstrating the current commercial disincentives and challenges suppliers face to tackle theft? If not, what alternative approach would you suggest to be best?

CHAPTER: Three

IA Question 3: What do you consider to be the scale of theft in the GB electricity market?

IA Question 4: Do you consider that there is material difference in the prevalence of electricity theft between suppliers' customer portfolio? What factors drive any considered difference in theft distribution?

IA Question 5: When theft has been detected, what actions do you take to ensure accurate estimates of the volume stolen and to ensure stolen units are entered into settlement?

IA Question 6 What is your estimate of the re-offending rates? Are there any actions you take to prevent re-offence at a premise where theft is detected?

IA Question 7: For each incentive measures, are the proposed compliance measures sufficient to ensure suppliers conduct investigations to satisfactory standards and thereby protect consumer interests? In addition to the proposed new Revenue Protection Code of Practice on theft investigation being developed under the DCUSA, are there any further measures that should be introduced to help address any perceived weakness?

CHAPTER: Four

IA Question 8: Do you consider the incentive problem described in the consultation to be a reasonable representation of the issues and challenges suppliers face to tackle theft?

IA Question 9: To what extent do you consider the detection-based and the volume-based incentive schemes are likely to establish and realise targets for theft detection that are proportionate to the potential consumer benefits? Do you have any views on the two variations (cap / no cap) of each of those incentives schemes?

IA Question 10: Do you consider that the cost-sharing mechanism could address the disincentive suppliers face to enter estimated stolen units into settlement?

IA Question 11: Do you consider that additional or alternative measures to the three incentive measures, to the enhance audit and to the TRAS are needed to

address the incentive problem and improve theft investigation, detection and prevention?

IA Question 12: Do you consider that the cost and availability of services to support theft detection and investigation is a material issue for small suppliers?

CHAPTER: Five

IA Question 13: Do you agree with our initial views on consumer behaviour in respect of energy efficiency?

IA Question 14: What percentage reduction in consumption would you expect customers to make when an illegal electricity supply is detected? To what extent do you consider that this would result from a response to increased costs and/or an increased propensity to invest in energy efficiency measures?

CHAPTER: Six

IA Question 15: Do you consider the proposed incentive measures would have any direct or indirect impacts on health and safety others than the areas discussed in this draft IA?

IA Question 16: What incentive measure (or combination of incentive measures) do you consider would have the greatest impact on health and safety?

CHAPTER: Seven

IA Question 17: Do you consider there are other risks or unintended consequences of the proposed policy measures not discussed in this draft IA? What alternative policy measures do you consider could address these risks?

CHAPTER: Eight

IA Question 18: Do you consider that the implementation timescale for our proposals is realistic and achievable? If not, what do you consider to be a realistic timeframe? What additional measures, if any, do you consider should be undertaken to secure implementation within a reasonable timeframe?

IA Question 19: Do you consider that our approach to enhancing obligations on DNOs would provide more focussed action on tackling theft in conveyance? If not, what do you consider to be an alternative approach?

Appendix 2 – Theft modelling

1.1. This appendix sets out our approach to modelling the proposed incentive mechanisms and provides further details of the analysis summarised in Chapters 3 and 4 of this document.

1.2. Our modelling assumptions are based on the best information available to us. Moreover, our estimates are based on current industry arrangements. Were the current market arrangements to change materially, our results could not be relied upon without verifying the impact of any such changes.

1.3. The structure of this appendix is as follows:

- Key modelling assumptions. These assumptions are consistent throughout both strands of our analysis (net industry impacts and the impact on consumers)
- Description of the analytical framework developed to describe the incentive problem discussed in Chapter 2 of the consultation document
- Discussion of the impact of the proposed incentive measures in tackling theft

Key modelling assumptions

1.4. We set out are key modelling assumptions in Table 1 below. They are consistent throughout all the proposed incentive options.

Table 1 - Summary of assumptions

Input data item	Source and details	Value used in the model
Aggregate number of domestic customers (MPANs)	Total number of domestic MPANs taken from all DNO CDCM models for 2013/2014 The number includes all types of DNO and IDNO connected domestic MPANs	27,392,045
Aggregate number of commercial customers (MPANs)	Total number of non-domestic MPANs taken from all DNO CDCM models for 2013/2014 The number includes all types of DNO and IDNO connected non-domestic HH and NHH metered MPANs	2,387,975
Individual supplier market share used in the	A single market share	15 per cent

model (in MPANs)	assumption is used for domestic and non-domestic markets	
Retail price of a unit of electricity (£/kWh)	The value is an approximation based on suppliers' published price lists	£0.15
Wholesale, network and balancing costs of a unit entered into settlement (£/kWh)	The value is calculated as the sum of: DUoS charges (2.6p/kWh): Average domestic unit rate from all DNO CDCM models for 2013/2014 TNUoS/BSUoS (0.75p/kWh): From National Grid charging statement from 2013/2014 Cash out average "System Buy Price 2012" (5.3p/kWh) - Ofgem analysis	£0.0865
Wholesale cost of electricity (£/kWh)	This is based on the cash out average "System Buy Price" for 2012 - Ofgem analysis	£0.053
Supplier gross margin on each unit supplied and paid for (£/kWh)	This is based on the supplier gross margin for April 2013 reported in the Ofgem "supply market indicators" publication	£0.03
Average monthly consumption by domestic site (kWh/month)	This is estimated as the average forecast consumption per domestic MPAN per month using data from all DNOs CDCM models 2013/2014	333 kWh/month
Average monthly consumption by a commercial site (kWh/month)	This is estimated as the average forecast consumption per non-domestic MPAN per month using data from all DNOs CDCM models 2013/2014 (only small non-domestic unrestricted and two rate MPANs were included)	1,195 kWh/month
Average monthly consumption by a cannabis farm (kWh/month)	No reliable estimates are available. Our number is an estimate based on evidence from a range of sources (anecdotal evidence, supplier	9,000 kWh/month

	and DNO questionnaire responses)	
Total annual cost of the TRAS (£)	Exact cost is currently unknown, to be decided through industry governance arrangements. Based on gas TRAS assumptions	£700,000
Total annual industry cost of operating a detection-based incentive scheme (£)	Exact cost is currently unknown, to be decided through industry governance arrangements. Estimates are based on SETS and enhanced SETS costs as per the Gas Theft industry proposal	£100,000
Total annual industry cost of operating a volume-based incentive scheme (£)	Exact cost is currently unknown, to be decided through industry governance arrangements. Estimates are based on SETS and enhanced SETS costs as per the Gas Theft industry proposal	£100,000
Total annual industry cost of operating a settlement cost sharing scheme (£)	Exact cost is currently unknown, to be decided through industry governance arrangements. The BSC Issue 39 report from Elexon contains some indicative information, but these would need to be refined in light of more concrete proposals	£300,000
Total number of investigations by suppliers	This is an estimate based on responses to the Ofgem 2011 questionnaire	Domestic: 41,670 Commercial: 4,744 Cannabis: 1,683
Total number of detections by suppliers	This is an estimate based on responses to the Ofgem 2011 questionnaire	Domestic: 15,956 Commercial: 750 Cannabis: 1,683

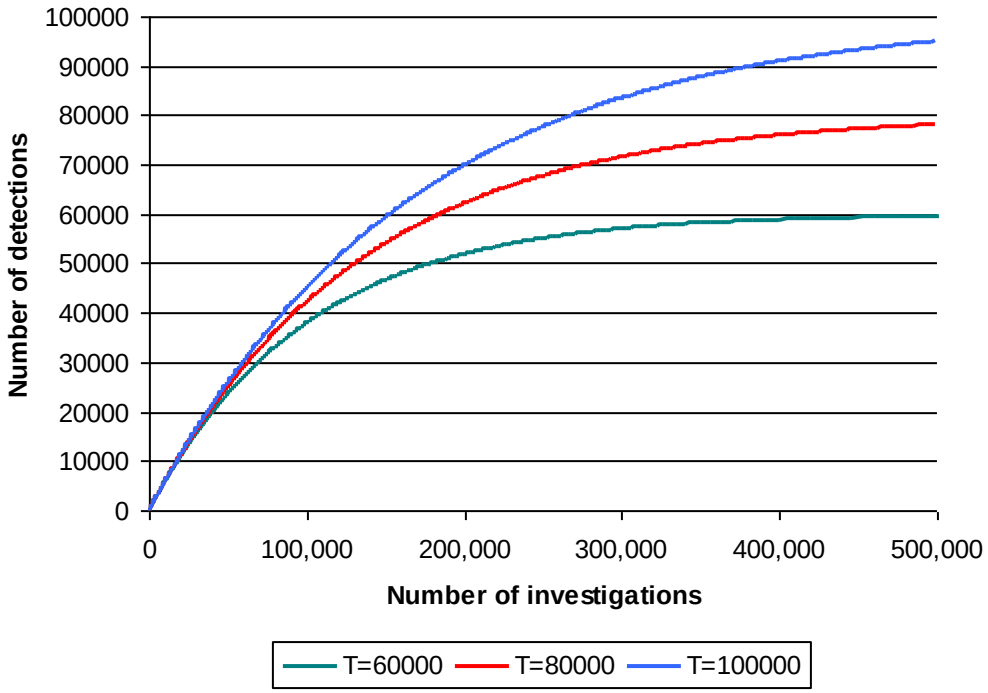
1.5. We have tried to make our assumptions on input data as representative as possible. In doing so, we have drawn on information provided by electricity suppliers and DNOs in response to a questionnaire circulated by Ofgem in January 2011. We have met with several suppliers and DNOs earlier this year to check that the data in these responses are still valid, and to reduce the risk that we misinterpret the data provided. Although some suppliers have confirmed that data are still valid, we note

that there may be the risk that data used in the model do not accurately reflect circumstances that every supplier faces.

1.6. An important aspect of the model is the detection rate per investigation. The model contains an equation for the detection rate which means that, as the number of investigations increases, the detection rate falls. This equation is consistent with a situation in which a supplier is able to identify the most likely cases of electricity theft and investigate these first, thereafter facing diminishing marginal returns as it increases the number of investigations he carries out. The starting rate (ie the rate at a very low number of detections) and the estimated total number of theft cases (detected and undetected) are input data to the model. The specification of diminishing marginal returns to investigations, combined with the costs from carrying out investigations, means that there is an optimal number of investigations that maximises the net benefit from carrying out investigations (ie maximise total benefit from investigations minus total costs).

1.7. This relationship is shown graphically in the Figure 1 below. It shows the relationship between the number of investigations and number of detections, for different assumptions about the total cases of theft currently occurring (detected and undetected). Three values are shown for the total number of cases of detections (60,000, 80,000 and 100,000).

Figure 1 - Relationship between number of investigation and detections



1.8. The model does not seek to take into account the impact of licence conditions and other legal obligations on suppliers' behaviour. The hypothetical suppliers within

the model take decisions to maximise their profits in light of a specified set of costs and benefits.

1.9. The model focuses on notional theft investigations that yield detections in a predictable way. It does not cover any other activities that electricity suppliers might take to tackle theft, such as publicity and other consumer engagement to deter theft. It also does not cover measures such as installing meters and other equipment that are designed in a way that makes electricity theft more difficult.

1.10. The model does not take into account the impacts of detecting theft by one consumer on the amount of illegal electricity consumption by other consumers.

1.11. There is no concept of time in the model. To avoid unnecessary complexity, there is no account of the time profile over which the various costs and benefits may arise (eg a series of subsequent periods in which revenue is raised from lawful consumption following theft detection) and costs and benefits are not discounted according to any view on discount rates or the cost of capital.

1.12. Also, the model does not take into account the impact of detection activity on the amount of electricity theft that occurs in the future. The supplier makes a one-off decision on how many investigations to carry out at a point in time; it does not take decisions between how much investigation activity to carry out today and how much to carry out in future periods.

Analytical framework

Overview of the model

1.13. The purpose of the model it is to illustrate the incentive problem relating to undetected electricity theft and to help explore how potential regulatory incentive schemes or cost-sharing arrangements can help reduce this problem. It is not to provide an estimate of the optimal number of investigations for GB electricity suppliers.

1.14. The Excel model does two different things:

a) For a given set of input data, it calculates the number of electricity theft investigations that a hypothetical electricity supplier would do if it were seeking to maximise its own profits in light of the marginal financial impacts it faces from carrying out a larger or smaller number of investigations. It then calculates the financial impact on the industry as a whole from an industry made up of identical hypothetical suppliers, each carrying out the number of investigations that maximises its own profit. The model also allows for the inclusion of possible incentive schemes or cost-sharing arrangements which can affect the marginal financial impacts faced by the hypothetical supplier and, in turn, the number of investigations it carries out and the financial impact of those investigations on the industry as a whole.

b) For a given set of assumptions about marginal financial impacts, it calculates the financial impact on the industry of carrying out a specified number of investigations into cases of electricity theft. This number is approximate and is based on current levels of theft investigation and detection activity in the industry, based on information provided to us by suppliers.

1.15. Some of the calculations used for (a) overlap with those for (b). The description and discussion below is limited to (a) as we have discussed (b) in Chapter 3 when assessing the impact of incentive measures on consumers and there is nothing further to add to that information.

1.16. The model is focused on the activities by an electricity supplier to investigate and detect potential cases of electricity theft amongst its customers. It does not consider actions that an electricity supplier might take to prevent cases of theft arising in the first place. For the purposes of simplification, theft investigation activity is treated as a homogenous activity, with the supplier simply deciding how many investigations to do. It abstracts from the various different methods which an electricity supplier might use to detect cases of electricity theft and the differences between them in terms of costs and benefits.

1.17. The model takes input data on a range of factors that affect the costs and benefits to the supplier, and to the wider industry, of the supplier investigating cases of electricity theft. These include the costs of carrying out each investigation, the average duration of illegal consumption in each case of detected electricity theft and the market price for electricity supplies to consumers.

1.18. Whilst the model can calculate the financial impacts from a specified number of investigations of cases of electricity theft, these results must be seen in the context of a hypothetical electricity supplier whose features are defined by the input data in the model and by the simplified relationships between theft investigations and financial impacts defined by the calculations underpinning the model. For this reason the model does not provide an estimate of the optimal number of investigations for any actual supplier in the GB electricity industry.

Sensitivity of results to input data

1.19. The results from the model are dependent on the input data used. To help explore this property of the model, we produced a version of the model in the statistical software package Stata. The software allows the same set of calculations to be performed for a very large number of different permutations of input data.

1.20. We created a large dataset of hypothetical input data. For most of the input data items, we identified plausible numbers for "low", "medium" and "high" values for that item. For example, the model requires input data on the marginal cost of each investigation and we used the values £200, £300 and £400 for investigation. It also requires input data on the average number of months of illegal consumption that have taken place before each detection of a case of electricity theft and we used the values of 12, 24 and 36 months. We sought to choose plausible input data in light of available information from research and discussions with industry

participants. We produced a dataset that included every combination of these input data items. Finally, we excluded a small proportion of the resultant combinations which seemed implausible because they would imply a situation in which market prices for electricity were below cost. The final dataset included 118,098 observations.

1.21. We have then modelled results for each of these observations or possible "scenarios". We used such results to assess the extent of any incentive problem in each scenario and the potential impacts of the proposed incentive schemes.

1.22. When assessing the results, it is important to bear in mind that the dataset is not representative of the current performance of the GB electricity industry. Instead, we applied this specific methodology to mitigate the risk to rely on not-verifiable assumptions when drawing conclusions on the potential impact of different incentive schemes.

1.23. Our contention is simply that looking at results from the model across 118,098 observations renders any inferences from the model less likely to be misleading than any of the following approaches:

- Limiting the analysis to results based on a single set of input data
- A sensitivity analysis that considers a handful of different scenarios
- A sensitivity analysis that takes a limited number of input data items in turn and examines how changes to this item affects results whilst holding all other input data constant

1.24. Figure 2, Figure 3 and Figure 4 provide an example of the sensitivity of the model results to input data. One of the results provided by the model is a calculation of the optimal number of investigations that would be carried out by a hypothetical monopoly supplier that supplies all customers across the industry. The hypothetical monopoly supplier would not suffer from the incentive problems discussed in Chapter 2 of the consultation document and this estimate provides a measure of the optimal number of investigations for the industry as a whole.

1.25. The assumption of a hypothetical monopoly is solely to show how the industry, through different incentive measures, can improve its performance to the level achievable if the incentive problem were addressed. This does not mean that we are suggesting that a monopoly could serve the market more efficiently. Whilst such a monopoly would not suffer from the specific incentive problem, there are many ways in which it could be to the detriment of consumers. For instance, it might not pass through any benefits from theft detection activities to consumers. In addition, if a monopoly supplier were subject to some form of price control regulation, this could distort its behaviour in relation to theft detection and other aspects of its electricity supply functions. Nevertheless, the comparison with the hypothetical monopoly is useful to assess what would be the number of investigations that can deliver most benefits to both suppliers and consumers.

1.26. Figure 2, Figure 3 and Figure 4 provide histograms of this measure, taking results for each of the observations in the dataset.

- Figure 2, shows that in the majority of cases, the optimal number of domestic detections is 20,000 or more
- Figure 3 shows that the optimal number of commercial theft detections lies between 1,500 and 2,000 in all cases
- Figure 4 shows that the optimal number of cannabis farm theft detections lies between 1,500 and 3,800 in all cases

Figure 2 - Optimal domestic detections for hypothetical monopoly supplier

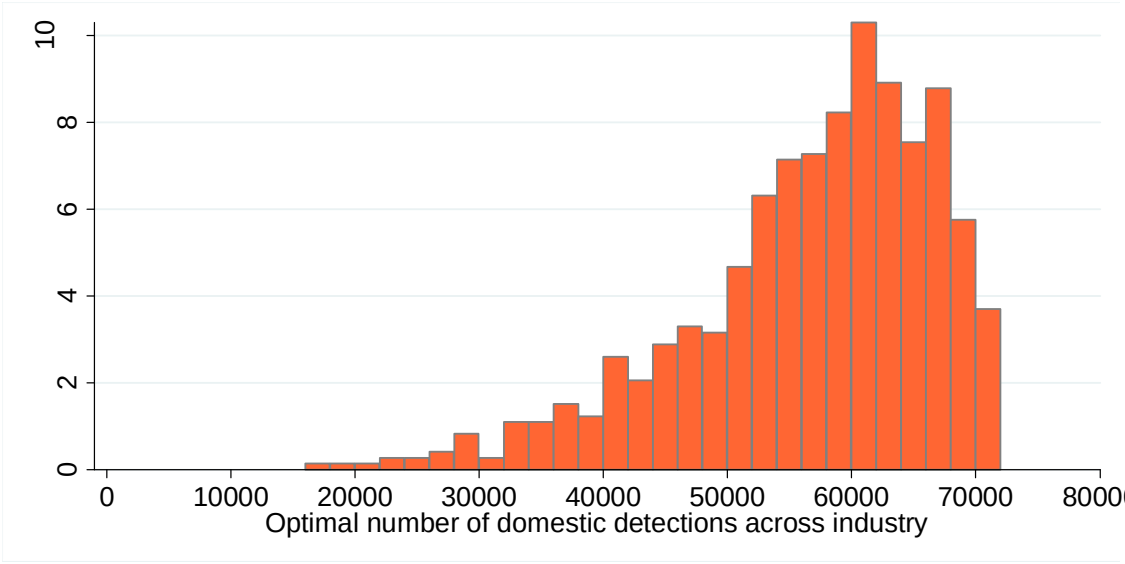


Figure 3 - Optimal non-domestic detections for hypothetical monopoly supplier

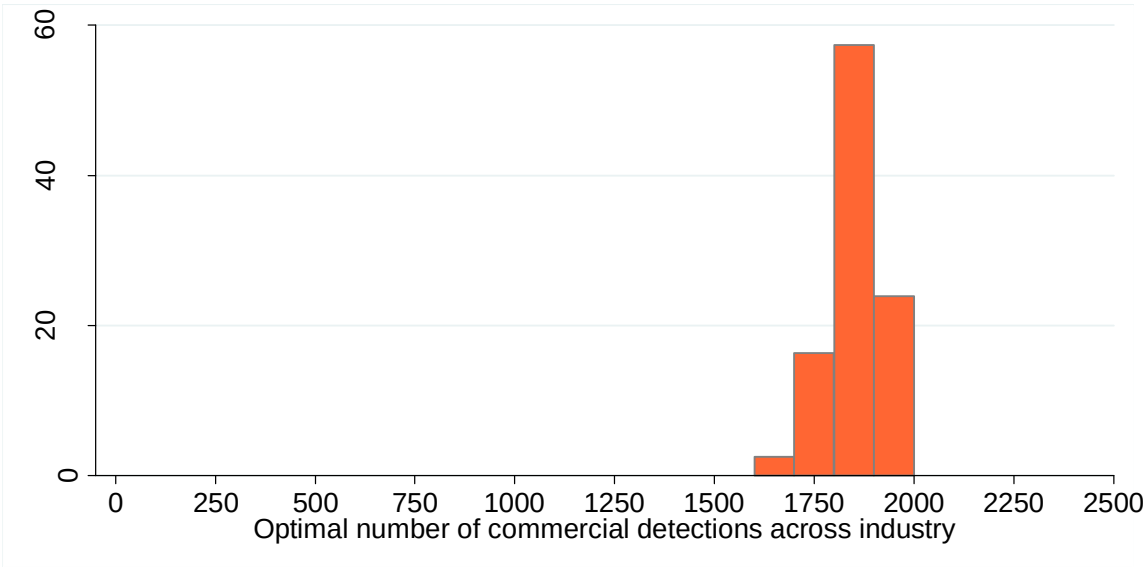
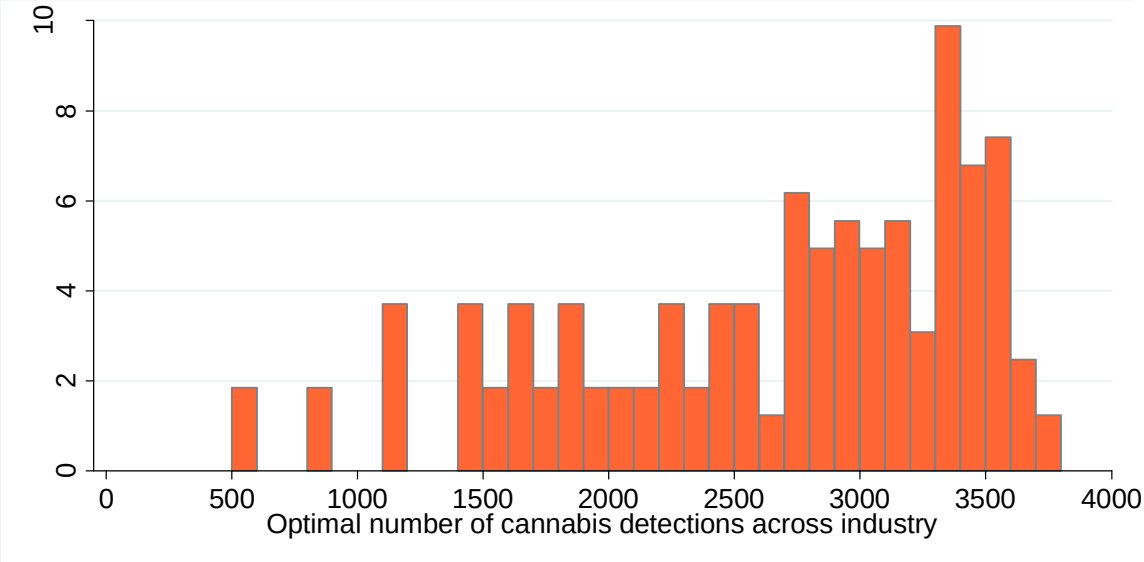


Figure 4 - Optimal cannabis detections for hypothetical monopoly supplier



1.27. We then compared these results with results obtained for a hypothetical supplier operating in a competitive market. These are discussed in the next paragraphs when presenting the incentive problem and how calibrated incentive measures can help addressing it.

Analytical representation of the incentive problems for suppliers

1.28. As discussed in Chapter 2 of the consultation document, we have identified two different incentive problems for electricity suppliers. The first problem, characterised as the pass-through of the costs of undetected theft, is the focus of the model. The second problem, relating to problems with the entry of stolen units into the settlement system, is not captured by the model. Our treatment of the settlement problem, and potential solutions to it, is restricted to qualitative analysis.

1.29. The theory behind the first problem is that, under current industry arrangements, the pass-through of the costs of undetected theft means that when a supplier does detect theft by its customers the net benefit it receives from the detection is lower than the net benefit to the industry as a whole. From an industry or consumer perspective, this may lead it to carry out too few investigations, or the wrong type of investigative work.

1.30. The model calculates the optimal number of investigations for a hypothetical supplier with a specified market share (15 per cent) within a competitive electricity supply market. It does this by calculating the number of investigations that will maximise the supplier's profit taking into account both the costs to the supplier of additional investigations (eg the costs per detection and the costs associated with remedial work upon detection) and the benefits (eg expected revenue recovered

following detection in respect of the value of electricity stolen, and expected future profit from subsequent legal consumption by the customer). The net benefits to the supplier differ to those to the industry as a whole, for the reasons discussed in Chapter 2 of the Consultation document.

1.31. The model then calculates the number of investigations that would be expected across the whole industry if all suppliers in the industry acted in the same way as this hypothetical competitive supplier. To do so, it scales up the supplier-level result to an industry-level result according to the hypothetical supplier's market share.

1.32. Figure 5, Figure 6 and Figure 7 provide a histogram for the total number of investigations from the optimisation across hypothetical competitive suppliers. For the vast majority (over 99 per cent) of the 118,098 observations, which represent different permutations of plausible input data, domestic detections are not profitable for the supplier. We can contrast this figure with Figure 2, which shows the optimal number of domestic theft detections for a hypothetical monopoly supplier across the industry that does not suffer from the incentive problem relating to pass-through of the costs of undetected theft: as the only supplier in the industry it is exposed to the costs of undetected theft and, as a consequence, it is exposed to the full benefits of its own actions to investigate and reduce theft. It is always profitable for the hypothetical monopoly supplier to detect some cases. Furthermore, for a substantial number of observations, the optimal number of detections for the hypothetical monopoly supplier is over 20,000.

1.33. Similar inferences may be drawn from Figure 6 and Figure 7, relating to non-domestic and cannabis farm theft detections respectively.

Figure 5 - Expected number of domestic detections in hypothetical competitive supply industry

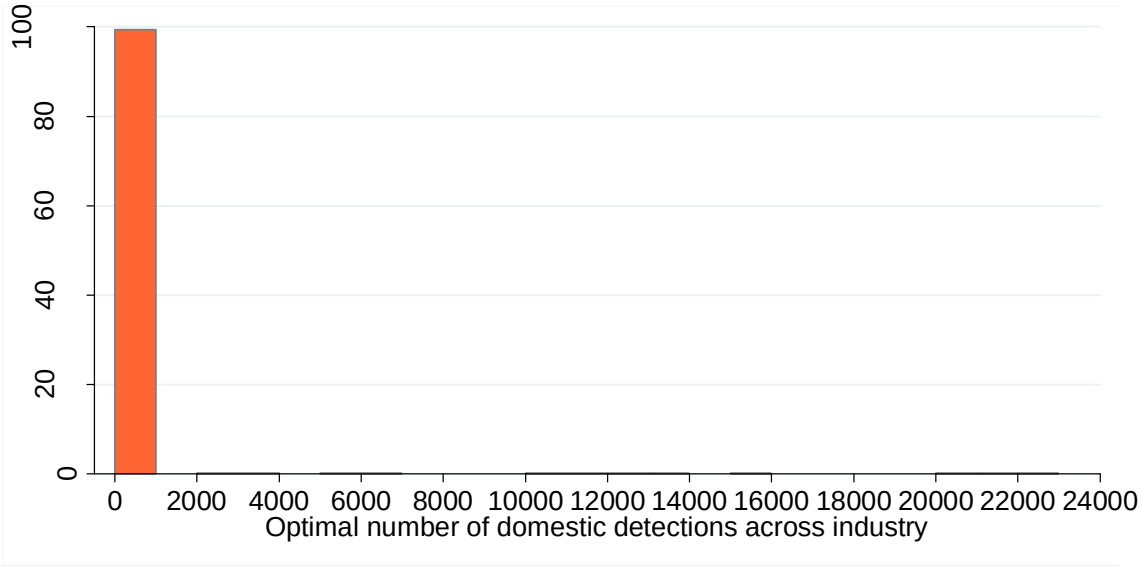


Figure 6 - Expected number of non-domestic detections in hypothetical competitive supply industry

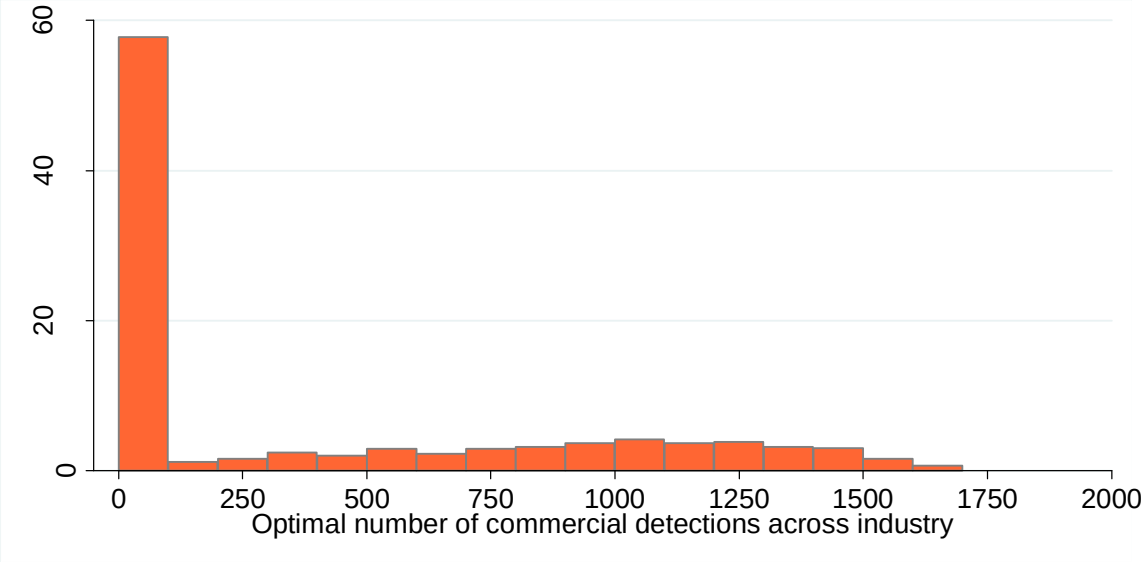
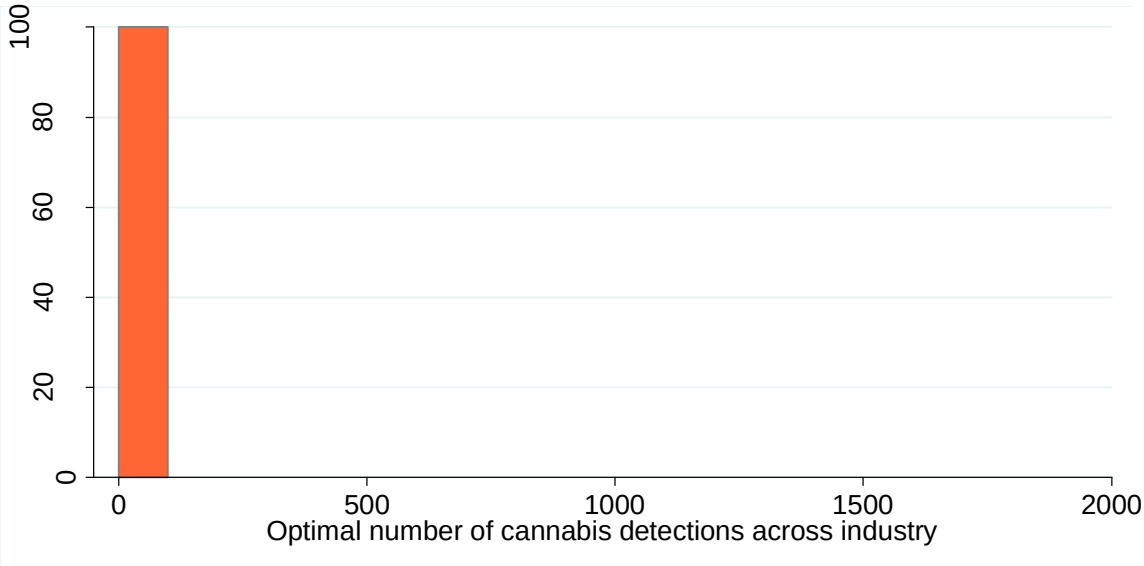


Figure 7 - Expected number of cannabis detections in hypothetical competitive supply industry

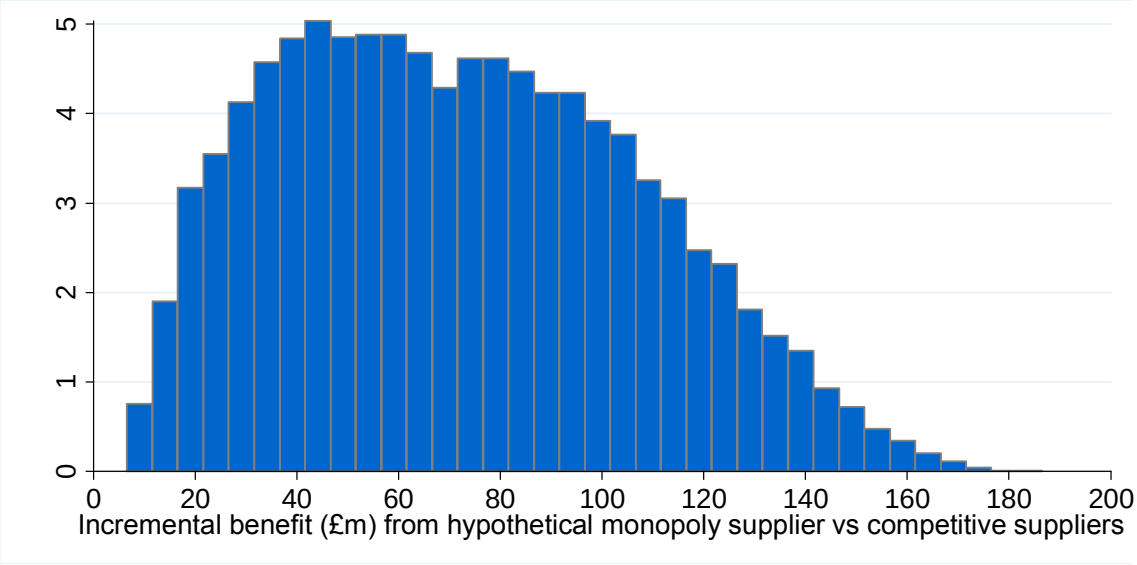


1.34. Another way to look at the impact of the incentive problem in the model is to calculate the net benefit to the industry as a whole from the industry carrying out a given number of detections (compared to there being zero detections).

1.35. We have calculated the difference between the net benefit that would arise from the industry doing the optimal number of detections (ie the number that the

hypothetical monopoly supplier would do) and the net benefit that would arise from the industry doing the number of detections expected from the market of hypothetical competitive suppliers each maximising its own profit. A positive number means that the level of theft detection carried out by a hypothetical monopoly supplier would bring greater benefit to the industry through theft detection activities than the hypothetical competitive industry. We can see this as the incremental benefit, arising from theft detection, from the hypothetical monopoly supplier operating across the industry (and avoiding the incentive problem related to pass-through of undetected theft) compared to the hypothetical competitive suppliers operating in the industry. Figure 8 provides a histogram of this incremental benefit measure across the 118,098 observations in the dataset.

Figure 8 - Incremental benefit from hypothetical monopoly supplier carrying out optimal number of detections compared to benefit to industry from the detections carried out in a hypothetical competitive supply industry (analysis includes domestic, commercial and cannabis farm detections)



1.36. There are no observations for which the incremental benefit from the hypothetical monopoly supplier is negative. This means that for no permutation of input data captured in the dataset is the expected outcome from the hypothetical competitive suppliers better than under the hypothetical monopoly supplier. For a large proportion of observations, the outcome under the hypothetical monopoly supplier is significantly better. The extent to which the hypothetical monopoly supplier outcome improves on the hypothetical competitive outcome — and hence the scale of the adverse impact of the incentive problem faced by hypothetical competitive suppliers — varies to a large degree across the different observations in the dataset.

1.37. The use of a hypothetical monopoly supplier is a useful analytical tool because the impacts of electricity theft — and theft detection activity — on the hypothetical monopoly are the same as the impacts on the industry as a whole. This allows a comparison of the outcomes in a hypothetical competitive supply market against a

theoretical ideal in which no incentive problem arises from the pass-through of the costs of undetected electricity theft.

Impact of incentive measures on industry performance in tackling theft

1.38. We have emphasised above that the model is a model of hypothetical electricity suppliers. It does not predict the quantitative impacts of potential incentive measures on the specific suppliers in the current GB electricity industry or the industry as a whole. The model can help identify and explore possible incentive measures that could affect the incentive problem relating to the pass-through of the costs of undetected electricity theft which is captured, in simplified form, in the model. It can illustrate how potential measures could bring improvements compared to a specified counterfactual. It can also highlight some potential effects and interactions that might be missed from a qualitative analysis alone.

1.39. We now look at the following possible incentive packages in turn:

- Enhanced audit of settlement implemented without other incentive measures
- Settlement cost-sharing combined with enhanced audit of settlement
- Detection incentive schemes combined with enhanced audit of settlement
- Detection incentive schemes combined with cost sharing and enhanced audit of settlement
- Volume incentive schemes combined with settlement cost sharing and enhanced audit of settlement

1.40. In addition, the model could be used for analysis to help calibrate possible incentive schemes and cost-sharing arrangements to increase the likelihood that these bring overall benefits to consumers. Upon publication of our final IA we will make the model available to the industry to be used to inform future discussions on the technical features of the incentive scheme.

Enhanced audit of settlement implemented without other incentive measures

1.41. One of the incentive options we have identified is enhanced audit of settlement arrangements. This could help tackle the problems relating to the current settlement arrangements which may otherwise limit suppliers' financial exposure to electricity theft by their customers and, in turn, limit the extent to which suppliers take action to prevent electricity theft in the first place or to detect it quickly.

1.42. However, on its own, enhanced audit of settlement arrangements could have an adverse impact on suppliers' activities to investigate and detect electricity theft. In short, if a supplier's financial exposure to electricity theft by its customers increases it may be less inclined to investigate and reveal that theft.

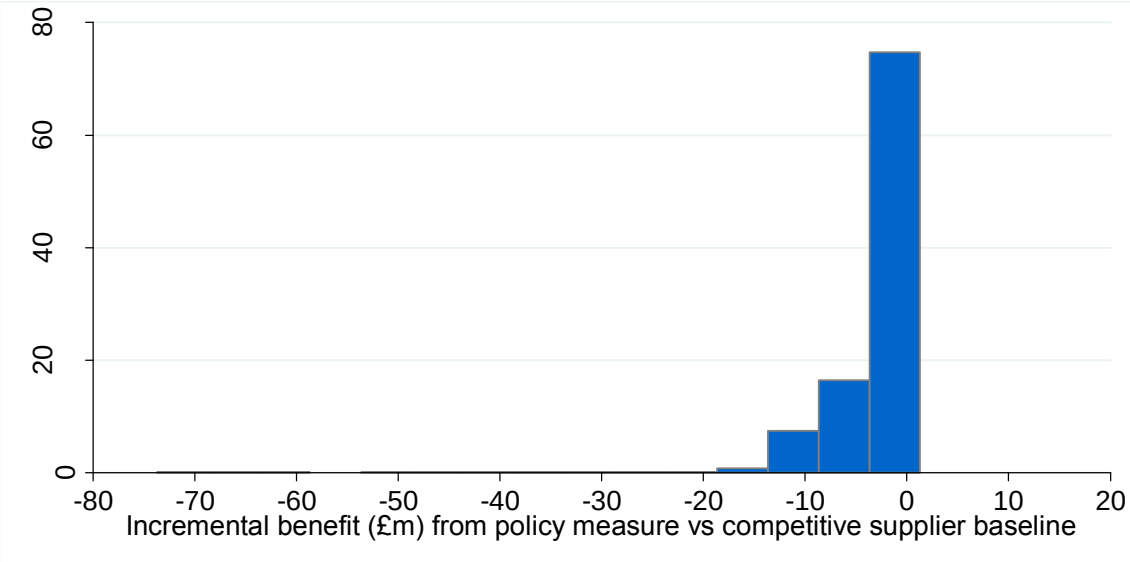
1.43. We can use the model to illustrate this issue. Our dataset of 118,098 observations reflects different plausible values across a range of different input data items. One of the input data items represents the proportion of the actual volume of electricity that has been consumed illegally that the supplier enters to the settlement system following detection. If the settlement system was entirely accurate, the value would be 100 per cent. To create the dataset of 118,098 observations, we used values of 50 per cent, 75 per cent and 100 per cent. The dataset therefore includes scenarios in which the settlement system is accurate and also scenarios in which the volume of illegal consumption entered to settlement following detection is lower than the actual volume of illegal consumption. This may happen because no estimate of illegal consumption is made in some cases or because the volumes entered tend to be an underestimate of actual illegal consumption at the premises.

1.44. We have looked at a hypothetical incentive of enhanced audit of settlement arrangements which would mean that, in all cases, 100 per cent of the volume of illegal consumption would be entered to settlement following detection. The figure of 100 per cent is a simplification; any actual incentive might have a somewhat lower success rate. We have used the model to calculate, for each of the 118,098 observations:

- The number of detections a profit-maximising supplier would do under a condition that it always enters 100 per cent of the volume of illegal consumption to the settlement system following detection of a case of electricity theft (for a third of observations, this condition does not have an effect because in a third of observations the input data for the proportion entered to settlement is already 100 per cent)
- The number of detections across the whole industry that would apply if all suppliers were to act in this way and the net benefit to the industry from this volume of theft detections being carried out (compared to a counterfactual of zero detections)
- The number of theft detections that would arise in a hypothetical competitive supply industry without the restriction that suppliers always enter 100 per cent of the volume of illegal consumption to the settlement system following detection (we call this the "competitive supply baseline") and the net benefit to the industry from this volume of theft detections being carried out (compared to a counterfactual of zero detections)
- A measure of the incremental benefit of the incentive of enhanced audit of settlement, which is defined as the difference in the net benefits from two cases above

1.45. Figure 9 provides a histogram of model results, across the 118,098 observations, for the measure of the net benefit of the enhanced audit of settlement. In the majority of cases (over 60 per cent), there is zero impact. In the remaining cases the net benefit is negative. This fits with the theory that enhanced audit of settlement could reduce theft detection activity as it can increase the costs that a supplier faces when it detects theft.

Figure 9 - Incremental benefit from theft detections under enhanced audit of settlement incentive compared to benefit under competitive supply baseline (analysis includes domestic, commercial and cannabis farm detections)



1.46. The model helps us to see that, on its own, an incentive measure of enhanced audit of settlement might make things worse in terms of the amount of work to investigate and detect cases of electricity theft that suppliers carry out.

1.47. The risk of making things worse by deterring detection is a concern for incentive development, even if there is an argument that such an incentive would simply be making the current settlement system work as intended, rather than changing the rules of the system. As shown below, one way to reduce this concern is to seek to combine enhanced audit of settlement with regulatory incentive schemes for detecting theft or settlement cost-sharing arrangements.

Settlement cost-sharing combined with enhanced audit of settlement

1.48. Another type of incentive measure that we have identified is settlement cost-sharing. When an electricity supplier enters an estimate of the volume of electricity consumed illegally, following detection, it becomes liable for charges on that volume of consumption which relate to electricity generation, network and balancing costs. A settlement cost-sharing arrangement would, in the specific case of units of consumption estimated to have been consumed illegally before detection, reduce the supplier's exposure to these liabilities by spreading a proportion of the charges across all suppliers.

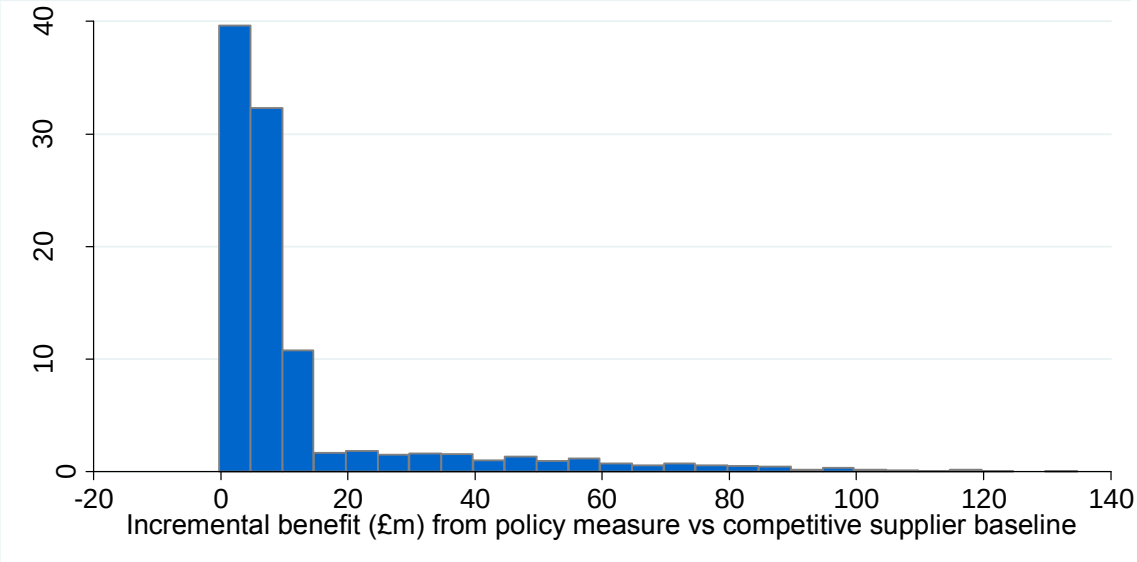
1.49. Such an arrangement could reduce the risk highlighted above that a policy of enhanced audit of settlement could, at least in some cases, have an adverse impact on the amount of theft detection activity that suppliers carry out (even if it has a positive impact on the steps they take to prevent theft arising in the first place).

1.50. In any event, if settlement cost-sharing were to be introduced, it seems important to combine this with enhanced audit of settlement.

1.51. We can use the model to illustrate the potential benefits of a policy package that combines enhanced audit of settlement with settlement cost-sharing. For the purposes of illustration we consider a cost-sharing arrangement in which 80 per cent of the liabilities arising from the entry of unrecorded units to settlement are passed on to the wider industry. We take the approach used above and calculate, for each observation, a measure of the incremental benefit of this policy measure compared to a competitive supply baseline in the absence of the policy. The policy measure comprises (i) a rule that 80 per cent of the liabilities from entry of unrecorded unit to settlement are passed through to the industry; and (ii) an enhanced audit of settlement which means, that in all cases, 100 per cent of the volume of illegal consumption would be entered to settlement following detection.

1.52. Figure 10 shows a histogram of model results, across the 118,098 observations, for the measure of the incremental benefit of the policy of 80 per cent settlement cost-sharing and enhanced audit of settlement.

Figure 10 - Incremental benefit from theft detections under enhanced audit of settlement plus 80 per cent settlement cost-sharing, compared to benefit under the competitive supply baseline (analysis includes domestic, commercial and cannabis farm detections)



1.53. Figure 10 above shows that, for the dataset we used, the policy of 80 per cent settlement cost-sharing and enhanced audit of settlement can bring net benefits from changes to theft detection activity across the industry for almost every observation (over 99.8 per cent) in the dataset. However, this net positive benefit is relatively small for the majority of observations: in these cases, the input data is such that, on its own, an 80 per cent settlement cost-sharing policy is not sufficient

to tackle the incentive problem relating to pass-through of the costs of undetected electricity theft.

1.54. In a small number of cases in Figure 10 (around 0.2 per cent), the net benefit is negative (equal to the assumed operating cost of the settlement cost sharing scheme). This occurs when the optimal outcome for suppliers is to carry out zero theft detections with or without the policy measure.

Incentive schemes combined with enhanced audit of settlement

1.55. Another type of policy measure that could help reduce the incentive problem relating to pass-through of the costs of undetected electricity theft is to provide a financial reward for each detected case of electricity theft. The reward could be structured as a payment (£) per detection, which we call a detection-based incentive scheme. Alternatively, it could be structured as a payment per unit of estimated stolen electricity entered to settlement following a detection, which would provide a higher reward for detecting larger-scale or long-running cases of theft; we call this a settlement volume-based incentive scheme. Or it could combine a payment per detection with a volume-based payment. It would also be possible to combine such payments with settlement-cost sharing. In either case, it is important that the incentive scheme is implemented together with enhanced audit of settlement arrangements.

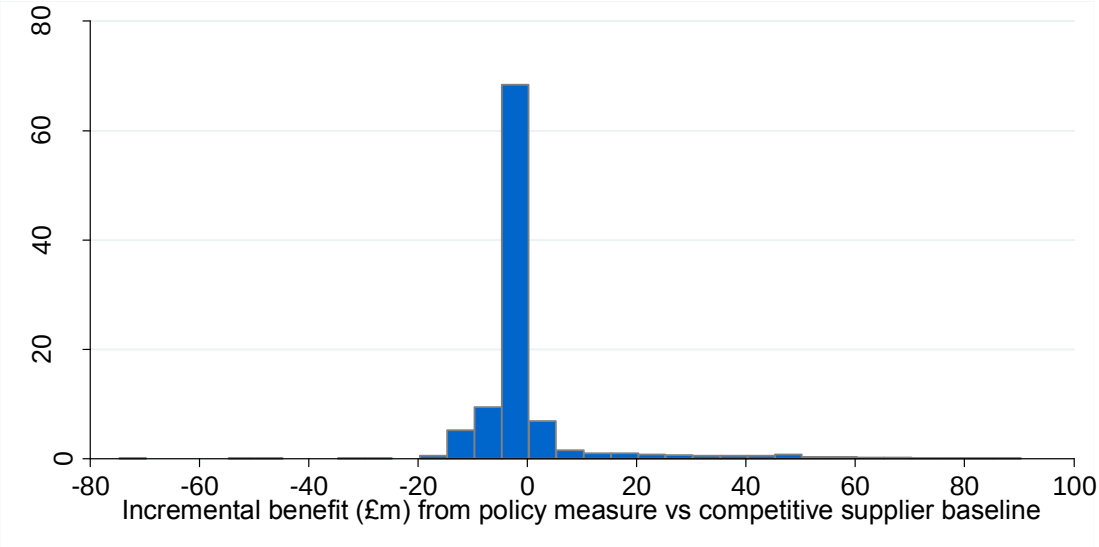
1.56. For the purpose of our analysis we have assumed a fixed payment per detection (either as £/detection or £/kWh per stolen unit entered into settlement).

1.57. We can use the model to illustrate the potential benefits of a detection incentive scheme. For the purposes of illustration, we first consider a policy measure that has the following elements: (a) a per detection incentive of £400; and (b) an enhanced audit of settlement which means that, in all cases, 100 per cent of the volume of illegal consumption would be entered to settlement following detection.

1.58. We take the approach used above and calculate, for each observation, a measure of the incremental benefit of this policy measure compared to a competitive supply baseline in the absence of the policy.

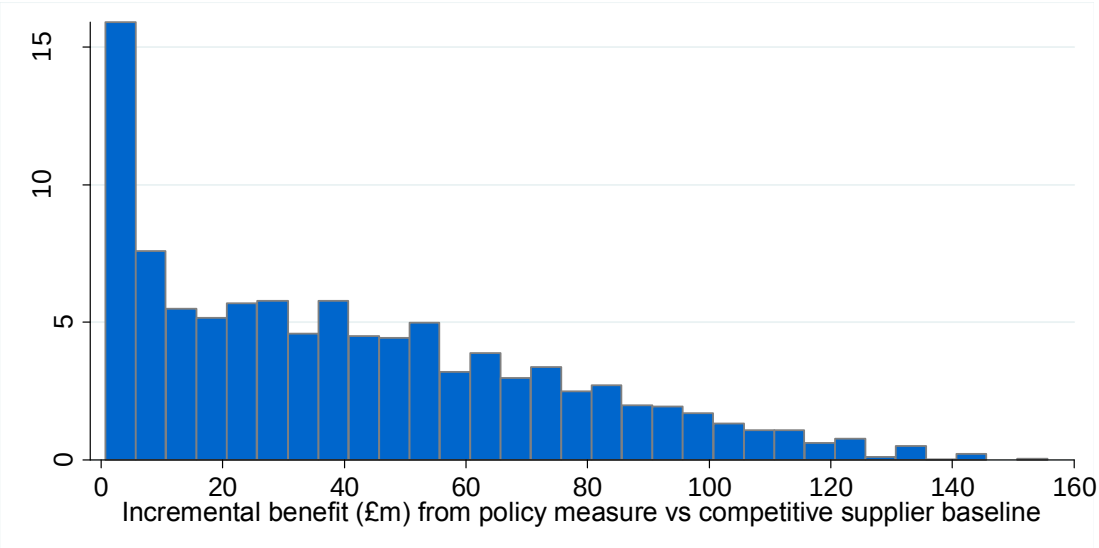
1.59. Figure 11 below shows a histogram of model results, across the 118,098 observations, for the incremental benefit of the policy measure. It shows that the detection incentive scheme, on its own, cannot provide net benefits in the majority of observations. In fact, the net benefit is negative in many cases because with the enhanced audit, the additional cost of entering units into settlement would still be high compared to the detection-based incentive.

Figure 11 - Incremental benefit from theft detections under enhanced audit of settlement plus £400 per detection incentive, compared to benefit under competitive supply baseline (analysis includes domestic, commercial and cannabis farm detections)



1.60. It would be possible to combine a per detection incentive with a settlement cost-sharing scheme to make things better. Figure 12 below shows the histogram of incremental benefits for a policy that combines the following elements: (a) a per detection incentive of £400; (b) settlement cost-sharing of 80 per cent; and (c) an enhanced audit of settlement which means that, in all cases, 100 per cent of the volume of illegal consumption would be entered to settlement following detection.

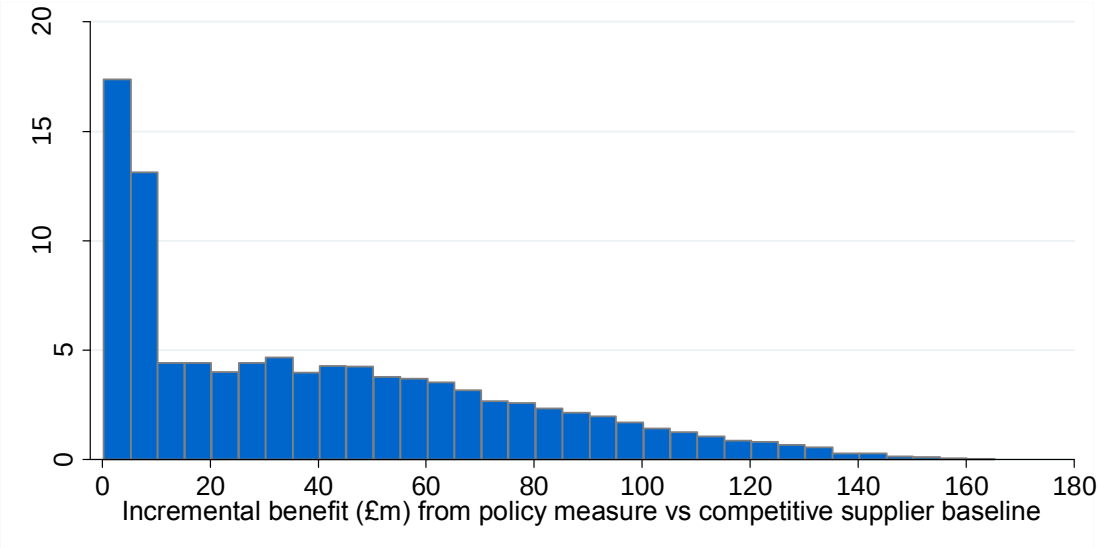
Figure 12 - Incremental benefit from theft detections under enhanced audit of settlement plus £400 per detection incentive plus 80 per cent settlement cost-sharing, compared to benefit under competitive supply baseline (analysis includes domestic, commercial and cannabis farm detections)



1.61. The potential benefits are greater than those available under either the 80 per cent settlement-cost sharing scheme or the £400 detection incentive applied on their own. In every observation, this combination of measures provides a positive net benefit compared to the competitive supply baseline

1.62. Figure 13 shows the histogram of incremental benefits used above for an alternative policy that combines (a) a per unit volume incentive of 3p/kWh; (b) settlement cost-sharing of 100 per cent; and (c) an enhanced audit of settlement which means that, in all cases, 100 per cent of the volume of illegal consumption would be entered to settlement following detection. The potential benefits are similar to those available under the 80 per cent settlement-cost sharing scheme plus the £400 detection incentive. For this set of policy measures, the net benefits compared to the competitive baseline is positive in all the cases. The volume-based incentive, however, carries with it risks of perverse incentives which we have examined further in Chapter 7 of this document.

Figure 13 - Incremental benefit from theft detections under enhanced audit of settlement plus 3p/kWh per unit volume incentive plus 100 per cent settlement cost-sharing, compared to benefit under competitive supply baseline (analysis includes domestic, commercial and cannabis farm detections)



1.63. The performance of any incentive scheme or cost-sharing arrangement will depend on its calibration.

1.64. We will support the industry in developing a well-calibrated incentive package that has the potential to address the incentive problem while delivering most benefits to consumers.

Appendix 3 - Glossary

B

BSC
Balancing and Settlement Code

D

DCUSA
Distribution Connection and Use of System Agreement

DNO
Distribution Network Operator

DPCR
Distribution Price Control Review

DTN
Industry data transfer network

E

ENA
Energy Networks Association

ERA
Energy Retail Association

ESQCR
Electricity Safety, Quality and Continuity Regulations

G

GSP
Grid Supply Point

H

HHDC
Half-hourly Data Collectors

HSE
Health and Safety Executive

M

MPAN

Meter Point Administration Number

N

NHH
Non-half hourly

NHHDC
Non half-hourly Data Collectors

R

RIIO-ED1
Revenue=Incentives + Innovation + Outputs

RP
Revenue Protection

S

SLC
Standard Licence Condition

T

TRAS
Theft Risk Assessment Service
.

Appendix 4 - Feedback Questionnaire

1.1. Ofgem considers that consultation is at the heart of good policy development. We are keen to consider any comments or complaints about the manner in which this consultation has been conducted. In any case we would be keen to get your answers to the following questions:

- Do you have any comments about the overall process, which was adopted for this consultation?
- Do you have any comments about the overall tone and content of the report?
- Was the report easy to read and understand, could it have been better written?
- To what extent did the report's conclusions provide a balanced view?
- To what extent did the report make reasoned recommendations for improvement?
- Please add any further comments

1.2. Please send your comments to:

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