

Energy Theft Reduction Expert Group

31 January 2023



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Welcome and Introductions

Minutes of the Previous Meeting

The ETREG is invited to approve the minutes of the previous meeting.

Action Updates

Rosalind Timperley

ETREG Action Updates

Reference	Action	Owner	Target Date	Update
ETREG_07_02	Electralink to present the proposed process for the theft investigations as part of the trial to ETREG members via the meeting	ElectraLink	Mar 2024 (Provisional)	On hold until March 2024
ETREG_08_01	Consider the new SME definitions being developed by DESNZ and assess the feasibility of identifying such consumers within REC systems, to better facilitate REC Parties discharging applicable licence obligations.	RECCo	Feb 2024	On going
ETREG_08_02	Investigate the UNC theft detection reasonable endeavors scheme and the potential to revamp it.	RECCo	Feb 2024	REC CP to be raised. To be closed
ETREG_08_04	Work with RECCo on establishing what types of marketing content Distributors and Transporters would find valuable to promote reporting of network theft.	ETTOS Service Provider	Jan 2024	Engagement underway
ETREG_09_01	In regard to incorrect rejection of Scottish warrants, ETREG members to flag if they have experienced this, so that this information can be collated. In addition, put forward suggestions as to how the issue could be addressed.	ETREG Members	Feb 2024	Raising party has had no issues over the last month

ETREG Action Updates

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ETREG_09_02	In regard to incorrect rejection of Scottish warrants, ETREG members to flag if they have experienced this, so that this information can be collated. In addition, put forward suggestions as to how the issue could be addressed.	ETREG Members	Feb 2024	
ETREG_09_03	In regards to where ETREG members would like to see movement in 2024 on energy theft, review the Miro board and add comments and feedback	ETREG Members	Feb 2024	One member has added feedback
ETREG_09_04	In regard to a theft amnesty trial, ETREG members to use the Miro board to share what questions would need to be answered in order for their organisation to fully understand how the amnesty would work in practice.	ETREG Members	Feb 2024	
ETREG_09_05	Organise face-to-face meetings with a morning start for the March, June, September and December ETREG meetings.	Technical Secretary	Feb 2024	Numbers to be confirmed for March room booking
ETREG_09_06	In regard to the next Energy Theft Forum, ETREG members to use the Miro board to share suggested agenda topics.	ETREG Members	Feb 2024	

Review of ETREG Miro Updates

Lynne Fallon

Theft Target Methodology 2024/25

Nirav Vyas

Theft Target Methodology 2024/25

Item	Summary of Change
Incentive Pots Split	Gas/Electricity Domestic customer segment to be split further by Smart and Non-Smart meter types.
Theft Detection Value	Adjusted for inflation using December 2023 CPI figure published by the Office for National Statistics with a further 20% escalator mechanism increase applied as outlined in RECCo's covering letter to the change proposal
Theft Targets	Addition of Smart and Non-Smart meter type targets within Domestic customer segment, with weighting applied to focus target on traditional metering. Overall target levels maintained to preserve scheme value.
Attribution Methodology	Addition of EES and GES data used to split pots between Smart/Non-Smart incentive pots.



TDIS Improvements

Jon Dixon

TDIS Issues Group

Given range of potential proposals to change the current TDIS scheme, including from RECCo and ICoSS, a dedicated Issues Group will be set up to consider all change to improve or potentially replace the existing incentive scheme. Those which are shorter terms or complementary rather than mutually exclusive to the TDIS will be progressed separately (see later slides).

Short term changes not required to be picked up by Issues Group:

Data Collection too complex: Simplification of reporting requirements progressed as part of Change Proposal R0154: ' Performance Assurance Report Catalogue v5.1'. Agreed by PAB 28 Feb, implementation 28 March
RECCo finance team do not issue credit notes: Progressing as part of administrative improvements – looking to implement either for 2024/25 scheme year or Q1 if change to reporting year accepted

Feedback to be considered by the Issues Group and addressed as part of any solution:

Improvements to TDIS – target 2025/26	Longer term – potential to complement or replace TDIS
Complex methodology	Targets not met
Unpredictable outcomes for stakeholders	Does not match the scale of theft
Value per theft varies dependent on overall market performance	Value may not be sufficient to match actions required to address theft
Participants can "buy-out" of scheme – fix of introducing requirement to investigate theft within the REC to clearly enable additional Performance Assurance activity	Does not consider the energy value of energy of theft instances
Only rewards confirmed theft	Participants can "buy-out" of scheme – fix of considering this within calculations of scheme
Assumes theft evenly distributed	Does not consider where instances of theft are a result of consumer vulnerability as opposed to more premeditated crime
Scheme pot is never fully distributed	Assumes "average" investigation cost
Skews results for smaller Parties	Does not foster industry collaboration
Results depend on all other Suppliers	It doesn't target the "sparkies"

Update on REC Theft CPs

Jon Dixon

REC Change Proposals

TDIS Reporting

- Change raised (awaiting #) to change from annual to quarterly reporting
- Requested expedited timeline – potential to implement as part of June release, allowing early reconciliation of Apr-Jun

Reasonable Endeavours

- Suggested at Dec ETREG and subsequently investigated, and floated as part of 15 January consultation letter
- Engaged with Xoserve on operation of historic scheme – agreed on compatibility

Mandating ETTOS follow up

- Seeking to place a minimum performance assurance standard on those leads generated from ETTOS
- Could be useful in determining efficacy and VFM of ETTOS, but also ensure no absolute option to buy out theft obligations with no action

Creation of Energy Theft Detection & Resolution Body

- ICoSS proposal that RECCo procure and manager a “Theft Detection and Resolution Body”;
- This may be consistent with one of the options presented in Spring 2021 Theft Workshop

All four proposals to be raised and progressed shortly, though they will follow independent timelines.

Detecting Energy Theft Using Benford's Law

Rosalind Timperley

recco

Benford's Law and Stackelberg Game Theory

Benford's Law

In data sets that obey Benford's Law, lower numbers appear as the leading digits more frequently than higher numbers. It has been shown that this law applies to a wide variety of data sets, including:

- Electricity consumption/bills
- Building heights
- River levels
- House prices
- Social media 'likes'

Leading Digit	Percentage Appearance
1	30.10%
2	17.60%
3	12.50%
4	9.70%
5	7.90%
6	6.70%
7	5.80%
8	5.10%
9	4.60%

Stackelberg Game Theory

This theory suggests that sequential decision-making process where a leader's actions influence a follower's decisions. In the case of energy theft, the "leader" would be the energy company aiming to detect theft and the thieves would be the "followers" deciding how much electricity to steal while minimising the risk of being caught.

Using the Method to Identify Energy Theft

- A study has been shared with ETREG members which used Benford's Law to identify anomalies that could indicate energy theft, and subsequently analyses these using Stackelberg Game Theory.

- It uses data from an electricity provider in Florida, covering 103 smart meters. It is noted that the sample was used to demonstrate the feasibility of the proposed framework alone and the number of meters would need be scaled to validate the framework against real-world test cases.

- The method in the paper provides a mathematical approach to maximize theft detection probability with minimum false positives.

- In terms of results, the paper states: "*For each smart meter, the successful detection rate is achieved more than 95% and the false alarm is controlled beyond 10%, if the electricity is stolen in 50%"*

Testing the Theory on GB Energy Theft

- A "point of view" paper has been shared with ETREG on how this theory might be applied to a sample of GB Energy Theft to test its effectiveness.

- The paper sets out suggested data sets for use in testing the theory. Namely a minimum of:
  - 5,000 domestic MPANs per fuel type (gas/electricity) over a two-year time period, including a minimum within this pot of 10% where theft was found during the time period
  - The Theft Detection Incentive Scheme (TDIS) files
  - Open source geo-graphical and demographic data

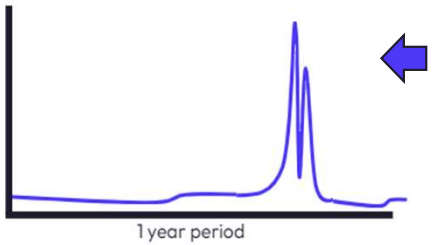
- It is noted that this is a novel approach which comes with some risks, including:
  - If the quality of the collected data is incomplete or unreliable, it would impact the effectiveness of the method.
  - There is a risk that customers who engage in theft would not use smart meters. This can create limitations and challenges for the theft detection approach based solely on smart meter data analysis.
  - There will be data privacy considerations since customer-level data would be required to perform the modelling and statistical analysis.

Additional Hypotheses

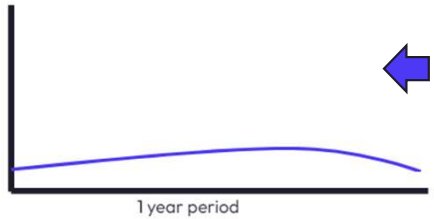
It is noted that in obtaining HH data to trial Benford's Law, there is potential to also create other theft hypotheses and then test using the same data set. For example:

HYPOTHESIS 1: ANNUAL PROFILE FLATTENING

Fuel poor customer with gas heating that goes on to have a partial gas meter bypass installed



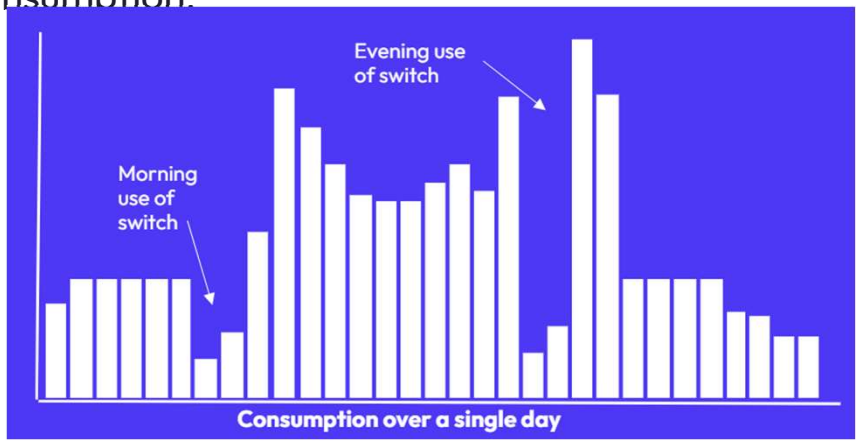
Gas consumption in fuel poor household pre-theft: The household is uses very little gas for the majority of the year (e.g., 20 mins of hot water a day). In the winter, the gas heating is rarely on except for occasional peaks that coincide with the coldest days of the year.



Post Meter Tampering: the overall energy consumed is lower over the course of the year (based on the tampered meter readings). The household is more comfortable using heating and hot water throughout the year as the full volume consumed is not being recorded, thus their profile changes from having significant cold weather linked peaks to a more even annual profile.

HYPOTHESIS 2: "MISSING" ENERGY

Customer has a switch that allows them to consume energy without it being recorded. User is cautious of detection, so avoids using the switch in a way that would create full 30-minute periods with zero consumption.



Sudden jumps between settlement periods that suggest energy is “missing” from the consumption pattern

ETREG Feedback

ETREG members views are sought on:

- Are ETREG members aware of Benford's analysis being undertaken previously on GB energy theft?
- Would ETREG be supportive of RECCo exploring the potential to trial the methodology?

If ETREG is supportive:

- Would ETREG be supportive of additional theft hypothesis being tested using the same data set?
- If RECCo were to seek data for the trial from ETREG members, what information would members require in order for their business to consider the data request (e.g., clear list of data points; confirmation of how the data will be securely transferred and stored; the period after which it will be deleted, etc...)

ETREG are asked to comment on the above points.

Theft Monitoring Service - Information Requirements to Enable an Investigation

Rebecca Lowe

Forward agenda

All

Forward Agenda

March

- Theft Monitoring Service (six month results)
- Theft Amnesty Update
- Network Engagement Management Service (Crimestoppers)
- ElectraLink Network Trial
- Finalise Forum Agenda
- Police Partnership & Engagement

April

N/A - replaced with Forum

May

- Energy Savings Trust Theft Calculator (potential forum topic)
- Theft Portal Feedback
- ETTOS Service Feedback

June

July

We welcome suggestions for further forward agenda items

AOB

Appendix A – Meeting Schedule

2024 Meeting Schedule

- Calendar invitations have been issued for 2024 ETREG meetings
- All fall on the last Wednesday of the month, except December which has been brought forward two weeks due to Christmas.

Month	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Type	ETREG	ETREG	**Forum**	ETREG	ETREG	ETREG	ETREG	ETREG	**Forum**	ETREG	ETREG
Location	Remote	Face to Face	Remote	Remote	Face to Face	Remote	Remote	Face to Face	TBC	Remote	Face to face
Notes			Poll to be held on whether subsequent forum should be face to face		UKRPA conference in June				Location subject to poll results		