Non-Technical Loss Identification

The following problem statement has been developed by the innovation teams within the UK's Gas and Electricity Networks for the 2024 Energy Innovation Basecamp.

Theme: Maximising Use of Existing Infrastructure

Network Areas: Electricity Distribution

What is the problem?

Non-technical losses impact our ability to understand the capacity of our networks and plan effectively for the future. Non-technical losses can include illegal abstraction and in addition to the number of illegal cannabis farms increasing over time, the cost-of-living crisis is expected to result in an increase in attempts to avoid paying for electricity consumed. Where meters or networks are tampered with, this can result in unsafe conditions, potentially leading to explosions or electrocutions. A report from the Retail Energy Code Company in December 2022 suggested that theft of gas and electricity cost consumers up to £1.4 billion a year, adding £50 to an average consumer's bill.

At the same time, networks are increasing the visibility of their networks by installing larger volumes of monitoring equipment at distribution substations. Power quality monitoring equipment is being installed at primary substations and smart meters are making new data available.   Similarly, work to understand energy efficiency has provided archetypes of homes with expected ranges of energy consumption, and there may be other relevant datasets that are newly available.

This poses the question; are there new methods we can use to identify non-technical losses?

What are we looking for?

We are looking for a solution that can be replicated across the UK. This can include completely novel solutions or those that build on existing techniques. If proposals include machine learning and AI, please include an explanation of how training data will be obtained, and results validated.

What are the constraints?

The solution must provide an evaluation of confidence so that where confidence is high this can be passed to revenue protection teams. Too many false positives would result in lack of confidence in the outputs and the information not being used. The solution must also be low cost to operate to ensure that there are net benefits to network customers.

Who are the key players?

Key stakeholders are;

- Electricity Suppliers who operate the revenue protection teams
- The UK Revenue Protection Association – a trade body for revenue protection organisations
- Local police forces.

The expectation is that the solution would provide actionable insights to be used by revenue protection teams who would then refer cases to the local police.

The main beneficiaries of the solution would be revenue protection teams, electricity supply companies, distribution networks, neighbours of affected dwellings and ultimately the wider customer base through lower bills.

Does this problem statement build on existing or anticipated infrastructure, policy decisions, or previous innovation projects?

A literature review was carried out by Newcastle University on electrical losses in 2019
https://cms.npproductionadmin.net/asset/0/document/4797.pdf

Northern Powergrid are planning an NIA project which may provide estimates of non-technical losses

What else do you need to know?

N/A

Innovator submissions to this problem statement will be open here during March and April, but we encourage you to submit your response as early as possible, as networks will be able to review submissions as soon as they come in.

You can also use the virtual Q&A on the Smarter Networks Portal to ask for more information about this problem statement. Questions may be answered online or at the ENA Problem Statement Launch in March 2024. More information on last year's Basecamp programme can be found here.