

D14 Reconstructing Energy Data From Faulty Electric Energy Meters: Mission Impossible?

Alessandro M. Ferrero, MSc, Politecnico di Milano, DEIB, Milano 20133, ITALY; Veronica Scotti, JD, Politecnico di Milano - DEIB, Milano 20133, ITALY*

Learning Overview: After attending this presentation, attendees will have better insight on several issues and variables that make the reconstruction of electric energy consumption from faulty energy meters a complex and inaccurate task.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by reporting on cases of reconstruction performed by the utility company and shamelessly biased in its favor and by showing how a careful analysis of all available data may yield a more accurate and fairer reconstruction.

Failures and faults on energy meters are quite common, especially in countries, such as Italy, where periodicity of legal verifications on energy meters is set, by law, to every 15 years. Indeed, the most common faults are related more to the current transformers and their connections than to actual faults on the meters themselves.

This presentation covers two cases that led to a partially wrong reconstruction of the energy consumption. The first case is related to an incorrect programming of the Current Transformer (CT) constant inside the meter that measured half of the energy flowing through the metering section. The case was apparently trivial, if not for the case that the incorrect constant masked the fact that the installed power increased to a level that exceeded the CT maximum current, causing an additional error in energy metering. The case could have been set by considering that the supplied customer's production process needed electricity and gas, and the two consumptions were somehow correlated through other relevant process variables, that allowed, by statistical processing, providing a better estimate of the actual consumed energy. Unfortunately, in this case, the implied statistical data processing was too advanced for the judge and the appointed technical expert to understand in the limited time allowed to conclude the technical analysis, and the reconstruction estimated by the utility was considered correct.

The second case is related to an intermittent connection between one phase of the CT and the corresponding terminal of the meter. In this case, a drop in the energy consumption, five years before the inspection that detected the fault, caused by a sudden change in the operations of the customer was considered by the utility company as being caused by the fault, and the customer was charged by a 2M€ bill for the non-metered energy, despite two inspections during this five-year period, that gave evidence that the meter was working correctly, and the fault occurred much closer in time to the last inspection.

Luckily, in this case, the judge and the appointed technical expert understood the reasons opposed by the customer and consequently reduced the utility bill.

By analyzing these two typical cases, this presentation will provide technical experts guidelines on how to consider all available data and sets of information, not only sudden variations in the metered energy values, that may shed a better light on failure inception, how they could affect the measured data, and how to make the consequent reconstruction fairer to the customer.

Electric Energy Consumption, Electric Energy Meters, Failures on Electric Energy Meters