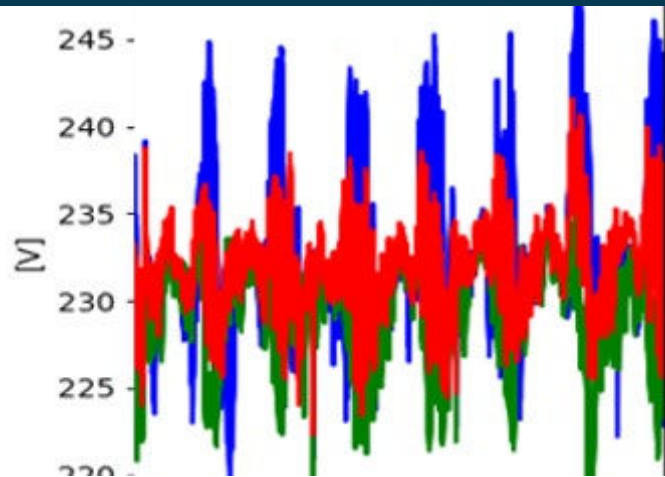


SUCCESS CASE 13.2026

Rebalance LV

USING SMART METER DATA TO DETECT IMBALANCES IN THE LV GRID AND FIND A LOW-EFFORT REBALANCING SOLUTION



THE CHALLENGE

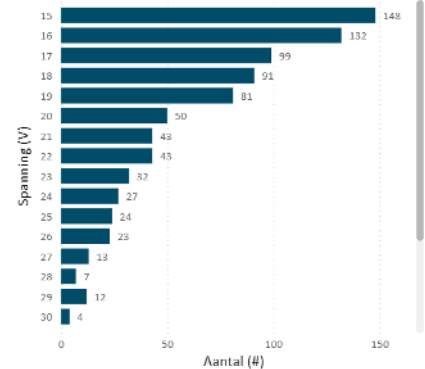
We were surprised to find out that 3.3% of our LV-feeders have more than 15V unbalance.

Not really knowing what to expect, we checked the imbalance in our LV-feeders using smart meter voltage data.

In 10-day measurement samples, we observed that 3.3% of the feeders had timesteps with more than 15V delta between the phases.

We even measured unbalances of up to 45V.

Traditionally, rebalancing a feeder in the field is difficult. Thus, we built a solution based on smart meter data that technicians can easily execute.



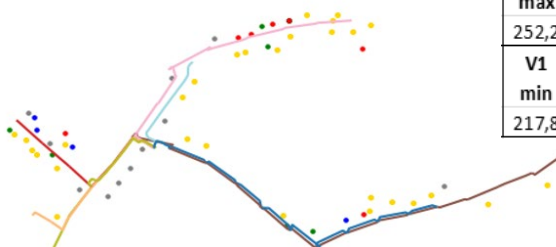
THE SOLUTION

STEP 1 – DETECTION

The first challenge is to cluster all the meters on the correct phase & determine unbalance.

As explained in our success case of 2025, we developed an algorithm together with Orion Grid Technologies that clusters the phases of the meters in groups by feeder & phase to determine the connectivity to the exact feeder. (Piri tool – commercialised by Orion)

Using the Piri-tool we could easily measure how much unbalance there was on an LV-feeder and visualise the phase the house is connected to.



V1	V2	V3	V1-V2	V1-V3	V2-V3
max	max	max	max	max	max
252,2	243,6	230,6	8,6	21,5	13
V1	V2	V3	V1-V2	V1-V3	V2-V3
min	min	min	Min	Min	min
217,8	220,6	222,1	3,4	4,2	1,7

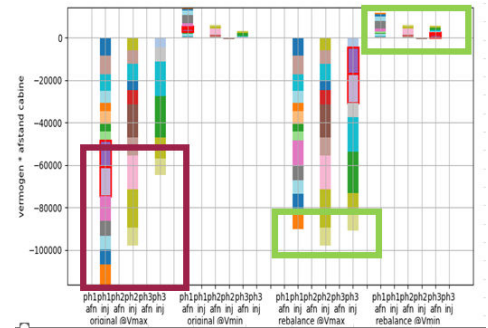
THE SOLUTION

STEP 2 – REBALANCING

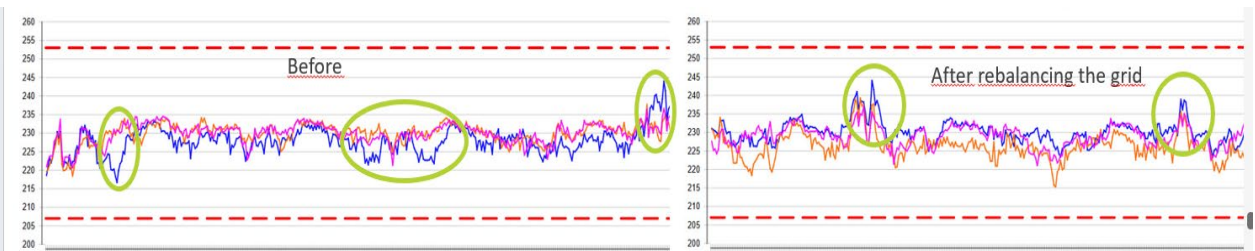
The second challenge is to find a low-effort rebalancing solution for technicians.

To analyse the imbalance, we require 10-days of 15-minutes average consumption/injection measurements, as well as the distance from the customers to the secondary substation. The algorithm developed (Libra tool - commercialised by Orion Grid Technologies) looks for a solution reducing imbalance to less than 10V and involving as few houses and customers as possible.

- Both consumption & injection situations are considered, using the average of the 10 worst timesteps for each.
- The phase impact of each meter is quantified, as visualized for an example case in the graph using the coloured boxes. The red rectangle highlights a large injection unbalance.
- The algorithm calculates how to optimally improve the balance, altering as few meters as possible.
- The green rectangles on the right show the result after adapting the meter phases. For both injection and consumption, the balance is improved.



The final result is a printable A4 report with easy instructions for the field technician.



MAIN ACHIEVEMENTS

- An almost impossible task for a technician was solved using digital meter data
- The report clearly states the intervention addresses and how to switch the phases
- The Fluvius technicians are very positive about this solution
- Running a case takes 2 days (1. getting the meter data – 2. running the algorithms & report)

KEY SUCCESS FACTORS

- Collaboration between Fluvius and Orion Grid Technologies. Testing and validation using more than 20 real Fluvius field cases.
- The visualisation of both problem and solution, using graphs and grid plots, resulted in a strong acceptance among the technicians.

WAY FORWARD

In 2026 Fluvius is screening its 220,000 LV Circuits in 12 groups to identify all feeders with more than 15V unbalance. When a customer complains about inverter problems caused by overvoltage, the Libra tool is launched for that specific secondary substation. Technicians can go into the field to rebalance the grid within 14 days. In many cases this provides a quick first fix for the overvoltage.