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# Finding Lost Gas and Water

*Unaccounted-for gas, overdue leaks, bursts, and leaking water districts, read from the network data a utility already has.*

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| **PRODUCT** | Grid Data Enhanced Analytics |
| **AUDIENCE** | Gas and water operations managers, integrity and compliance teams, loss and non-revenue water programs, pressure management teams, network engineers |

## The product that never reaches a customer

Every gas and water utility loses some of what it buys, treats, or moves before it reaches a customer's meter. In gas, the gap between what enters the system and what is delivered is called unaccounted-for gas. In water, it is non-revenue water. Part of each loss is physical: leaking mains, service lines, and fittings. Part is on paper: meter error, billing timing, theft, and data that does not line up.

A gas leak is a safety hazard and a source of methane emissions, and repairs run to deadlines set by regulators. A water leak can run underground for months without surfacing, wasting treated water and pumping energy and slowly undermining streets. Either way, customers pay for the loss and regulators scrutinize it.

Most utilities already have the data to find these losses. It just rarely gets looked at together.

## Why it is hard

**The data is scattered.** Gate and regulator station readings come in through SCADA. Customer consumption comes from AMI. The network's shape lives in GIS. Leak surveys and repair status sit in a work management system, or in a spreadsheet someone maintains by hand.

**A single number hides where and when.** A system-wide loss figure does not tell a crew where to dig, or say whether things are getting better or worse. Loss has to be measured per area, over aligned periods, and followed over months.

**The network itself stores product.** Gas is compressible, so the amount held in the pipes (line pack) rises and falls with pressure. A daily balance that ignores line pack can show a loss one day and a gain the next, when nothing was lost at all.

**Equipment degrades quietly.** A gas regulator rarely fails all at once. It droops as demand rises, or it stops closing tight when demand falls away, and outlet pressure creeps up. A water pressure-reducing valve can stick open, hunt back and forth, or drift off its setting. Often nobody notices until the coldest morning of the year, or until mains in an over-pressured zone start breaking.

**Integrity is about proof.** Gas must be odorized so people can smell a leak, and pressures must stay within their limits. A falling odorant tank shows odorant is being used. It does not show whether enough went into the gas that actually flowed.

**Bursts and deadlines are easy to miss.** A burst main shows up in district flow before the first customer calls. Gas leaks are graded by hazard, and each grade carries a repair deadline. When the leak register is a spreadsheet, "which leak is past due?" depends on someone remembering to sort it.

## Principles of a good approach

1. **Balance by area, and follow the trend.** Loss becomes actionable when it is tied to a place a crew can go, and useful to managers when it comes with a plain verdict: steady, growing, or shrinking.
2. **Account for the network's own storage** before calling anything lost, and say so when that correction cannot be made.
3. **Judge equipment by its behavior over time,** not only by alarms. That includes what a regulator does when its load goes away, not just when demand peaks.
4. **Measure integrity against what flowed.** Judge odorant per unit of gas delivered, check pressure against its limits, and name gaps in the evidence as gaps.
5. **Put deadlines first.** A leak register should lead with what is overdue, then what is due next.
6. **Use the quietest hours for water.** This is minimum night flow, a standard industry technique. In the small hours, legitimate use in a residential district falls near its lowest, so most of what still flows into a district metered area is leakage. When night flow climbs while daytime demand looks normal, a new leak is the likely explanation.
7. **Treat pressure as a leakage lever.** Leakage rises with pressure. A pressure-reducing valve that has failed open or drifted high costs water every hour and adds to future bursts.
8. **Report, then hand off.** Analytics should find and rank the problem. The utility dispatches field work through its own process, with a clear record of what was found and what nobody has been sent to yet.

## What it looks like in practice

Grid Data Enhanced Analytics joins the utility's GIS network model, SCADA telemetry, and AMI meter data into one picture across electricity, gas, and water, and models how gas and water move through the network as it is actually built. Its gas and water analytics answer a few plain questions.

**For gas: where is the gas going, and is it getting worse?** GDEA balances unaccounted-for gas and follows its share over months, with a plain verdict: steady, growing, or shrinking. It corrects a day's balance for the change in line pack, so gas stored in the pipes is not mistaken for gas lost. When the data needed for that correction is missing, it says so and why, rather than guessing. Odorant is judged per unit of gas delivered, not only by tank level. Regulators are checked for droop under load, for whether they lock up when the load goes away, and for creep. A station without enough evidence to judge is reported as not judged, not as healthy. The leak register is graded, with due dates, so overdue leaks rise to the top.

**For water: is this district leaking, and did something just break?** GDEA tracks minimum night flow for each district metered area, and the leakage trend in each district over months, so operators can see which districts are getting worse, not only which are high. It watches district inflow for signs of a burst, so a broken main is

flagged before the first customer calls. It checks each pressure-reducing valve for failing open, hunting, and drifting, so pressure management keeps doing its job.

Every finding is linked to the live map, and an area without adequate metering is reported as not measured, not as clean. The platform is monitoring-only: it never operates field equipment, including the valves and regulators it checks. Through service order integration, it shows the work already open on each asset, highlights findings no one has been sent to, and can raise a request for work from that gap. The request comes from GDEA; the dispatch always comes from the utility.

> **ILLUSTRATIVE EXAMPLE (HYPOTHETICAL)**
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> A water operator starts the morning in GDEA. One district's inflow was flagged overnight as a likely burst, so a crew goes there first. Another district's leakage is marked as worsening over recent months while its neighbors hold steady, so it jumps the fixed leak survey rotation. A pressure-reducing valve feeding a third district is flagged as failed open, and the pressure team is asked to inspect it.
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> On the gas side, the unaccounted-for share is marked as growing. One recent spike turns out to be mostly gas stored in the pipes during a cold snap, but the growth holds without it. The leak register shows a graded leak whose repair date has passed, with no service order open against it. GDEA flags the gap and raises a request for work. The utility's own dispatchers schedule the repair.

## Questions to ask any vendor

When evaluating gas and water loss analytics, ask:

- Can it balance gas and water by area and period, and say whether loss is growing?
- Does the gas balance account for line pack, and say when it cannot?
- Is odorant judged per unit of gas delivered, or only by tank level?
- Does it check regulators for droop, lock-up, and creep, or only raise alarms?
- Does the leak register show grades and due dates, and lead with overdue leaks?
- Does it track minimum night flow and the leakage trend per district metered area?
- Can it spot a burst from district inflow before customers call?
- Does it check pressure-reducing valves for failing open, hunting, and drifting?
- Does it connect findings to open work, and show what no one has been sent to?
- Does it ever act on field equipment, or only report?

## Where to go from here

Lost gas and lost water are old problems, and most of the data needed to shrink them already exists. The work is joining it, measuring it by area and over time, and putting the growing loss, the burst, the failing valve, and the overdue leak in front of the people who can fix them.

Learn more about Grid Data Enhanced Analytics, or talk to our team about your gas and water loss programs.

**ABOUT PERINIMBLE**

PeriNimble builds mission-critical grid data software for energy and utility companies. Founded in 2022 and headquartered in Bloomington, Minnesota, we support more than 15 million meters and over 1 billion interval reads per day in production.

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