

CHALLENGE 4: Non-acoustic leak detection techniques

1. Aim

The specific goal is to seek out techniques that allow on-site technicians to accurately locate a leak. These techniques do not make use of acoustic technology, but of other kinds, such as temperature differences, presence of water in the soil, odour, etc. These may be accepted if improved functioning can be demonstrated. For instance the integration of AI into the analysis of sound waves – something that several start-ups are attempting to integrate into their algorithms (e.g. fido-tech, UK)

2. Current approach and limitations

The present working method mainly uses acoustic techniques. Someone looking for a leak will examine a particular area on the premises for leaks. Acoustic techniques used:

- Listening stick
- Sound loggers measured at night
- Correlator
- Soil clock
- Hydrophones

The acoustic techniques still have the potential to improve, but also have some fundamental limitations in certain situations: when there is a lot of ambient noise or with materials that are poor conductors of sound, such as PVC. Given that PVC is commonly used for new piping, the future drinking water network will largely consist of PVC. A high-performing non-acoustic technique for localising leaks is therefore desirable.

3. Desired solution

The technique needs to be user-friendly and require little technical knowledge on the part of the technician. It should also be possible to use it in as wide a range of circumstances (weather conditions, time of day, pipe materials) as possible. How labour-intensive it is and how much it costs also play a major role. It must be possible to use the technique while the pipe network remains in service. The technique must also aim for the greatest possible efficiency (i.e. minimum number of false positives), potentially self-improving by learning from the past.

The technicians from the drinking water company's leak detection department will begin using the technique, once the necessary equipment has been purchased or hired and they have been trained.

Another possibility is a service from an external company that can be used on-demand, whereby an area is designated by the drinking water company and the company provides the locations of the leaks. It is necessary here for the work (e.g. supplying information about the network) for the drinking water company to remain very limited and the service can be engaged very rapidly (on the order of within 24 hours).

Concrete KPIs still need to be drawn up for the determination of requirements so as to be able to compare the solutions offered objectively.

4. Specific preconditions

Open to innovative approaches within the legal limits.

5. Knowledge and solutions already available on the market

- Heat camera on drone
- Hand-held heat camera
- Gas injection with helium gas or forming gas
- Ground-penetrating radar
- Satellite technology based on radar

6. Why do the existing (partial) solutions not fully meet our needs?

See point 2.