

Pipeline Infrastructure in the Netherlands

Summary



Subsidence can cause gas and water pipelines to break right where they enter houses. In the Netherlands, satellite data are used to monitor gas pipelines at affordable costs.

Satellite images show hot spots where ground movement is taking place. It thus allows a targeted replacement programme: the maintenance strategy has now become focused on areas of higher risk. Instead of replacing pipes and connections in a single district pipes serving individual houses or streets can be replaced.

Background

The Case Study of pipeline infrastructure in the Netherlands has been published in May 2016. This report is the last of a series of three cases in the frame of the study "Assessing the detailed economic benefits derived from Copernicus Earth Observation (EO) data within selected value chains", undertaken by EARSC under an assignment from the European Space Agency (ESA).

Issues & Needs

Ground subsidence is a particular problem in the area around Rotterdam. It can be so severe that soil levels can change by as much as 1m within a few years. This causes problems for underground pipelines making up the infrastructure of the area to deliver gas, water and steam to local citizens and businesses. The problem is most acute where pipelines cross over each other and where they connect to the consumers' premises where a fracture risks a severe accident.

How to know where the risk lies? Older connections are more at risk than modern ones due to use of rigid metal rather than flexible plastic combined with the modern practise of installing a loop to absorb movement. Clearly the risk is greater where the ground is subsiding faster. In this case, the stress created on the household gas connection or on the water mains in the street can cause a failure with consequent leaks. In the case of water, this can cause severe disruption to traffic or, as we heard in one case, the flooding of a hospital basement; in the case of gas, the impact can be much worse if gas builds up in the space under a house when it may even explode.

Solution

In the past, companies like [Stedin](#) and [Oasen](#) have planned replacement programmes starting in areas where leaks have been previously reported and found to be due to subsidence. But a more targeted approach is possible using satellite images which show hot spots where movement is taking place. Satelliteborne Synthetic Aperture Radar (SAR) from the Sentinel-1 mission (part of the [Copernicus programme](#)) is used to identify where the ground is subsiding and TerraSAR-X (a commercial mission) is used to further pinpoint the movement more precisely which allows the maintenance strategy to become focused on areas of higher risk. Instead of replacing pipes and connections in a single district no matter the age or the actual risk of failure, a much more focused approach becomes possible where pipes which are at risk and serving individual houses or streets can be replaced.

Results & Perspectives

The result is better investment of resources by the pipeline operators and less risk to consumers from gas leaks or disruption from major water leaks. Overall, we calculate an economic benefit coming from the use of this product by 2 infrastructure operators in the Netherlands to be €6.6- €7.9m per annum; extrapolated to all the operators over the whole country leads us to conclude a total potential benefit of €15.2m – €18.3m each and every year.

Related Info

The report is available [online](#).