



# MONITORING SOLUTIONS FOR LNG AND LPG

Liquefied natural gas (LNG) is natural gas that has been chilled to liquid form for ease and safety of transportation and storage, without the need to subject it to excessive high pressure. This rapidly growing segment presents many unique logistical challenges for those responsible with managing and monitoring the product.

Firstly, LNG is still highly pressurised and so is volatile and explosive. Any equipment used must be safe for use in hazardous area. To achieve a liquified state, LNG is chilled to incredibly low temperatures - close to cryogenic temperatures.

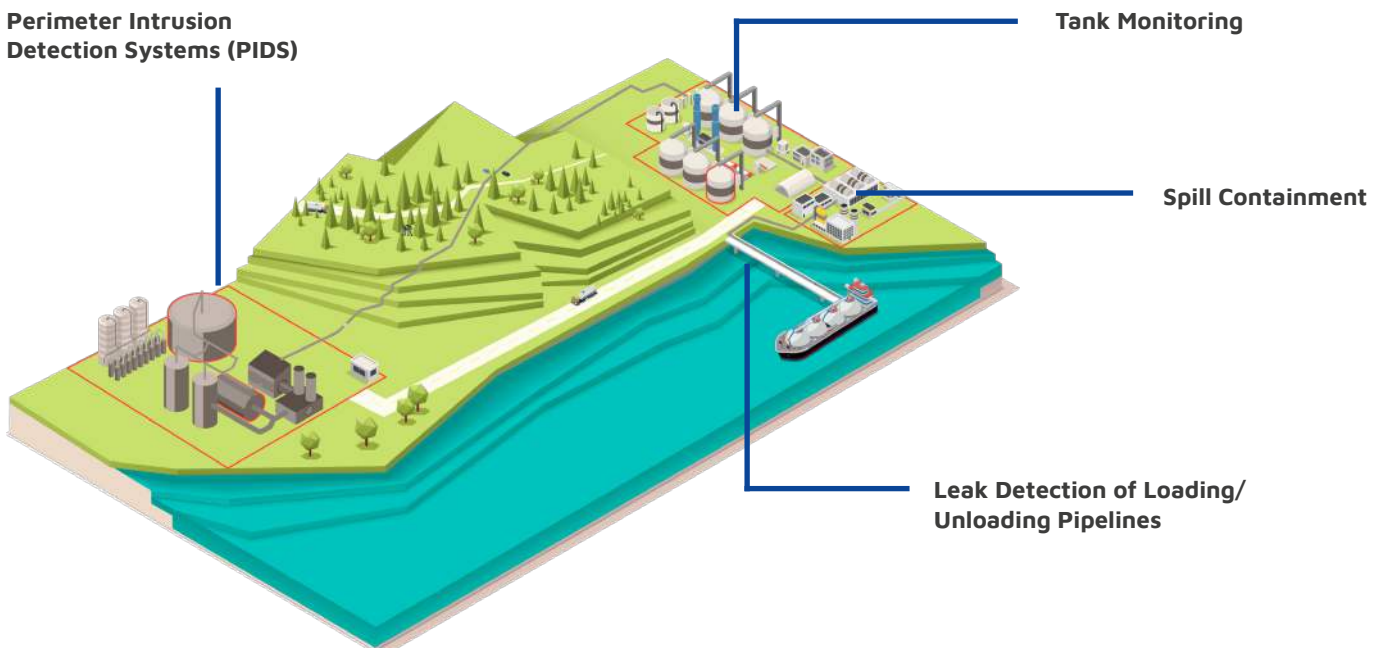
These factors mean that LNG has unique transportation and storage requirements that must be monitoring carefully.

## What are the benefits of using fiber optics?

- > The fiber is intrinsically safe
- > Materials are non-corrosive with no moving parts
- > Fiber is not vulnerable to electromagnetic interference
- > Location of event can be pinpointed to within 1m
- > Temperature and vibration information is also available

## Solutions

### Perimeter Intrusion Detection Systems (PIDS)

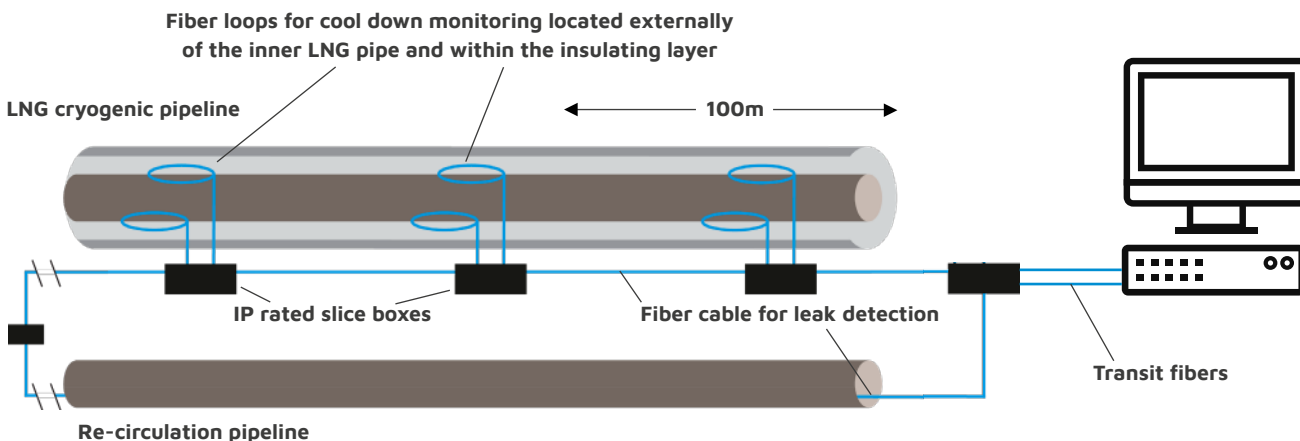


# PIPELINE LEAK DETECTION

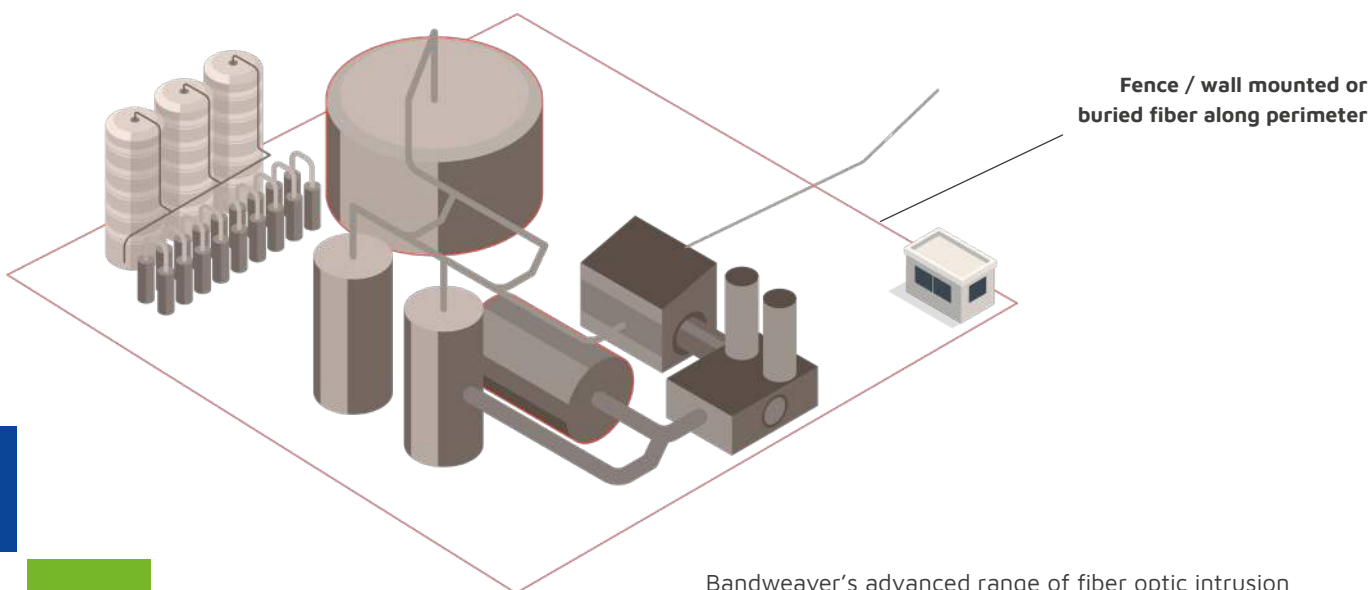
Bandweaver's Leak Detection Solutions (LDS) are suitable for gas and liquid pipelines and can quickly and accurately identify the location of a leak utilising Distributed Acoustic Sensing (DAS) solutions to identify when there is a significant temperature drop.

With market leading location accuracy of within 1m, operators can quickly respond to a pipeline leak, avoiding costly environmental, financial and reputational damage.

This aspect of LNG monitoring is particularly important on the loading and unloading lines.



# PERIMETER INTRUSION DETECTION



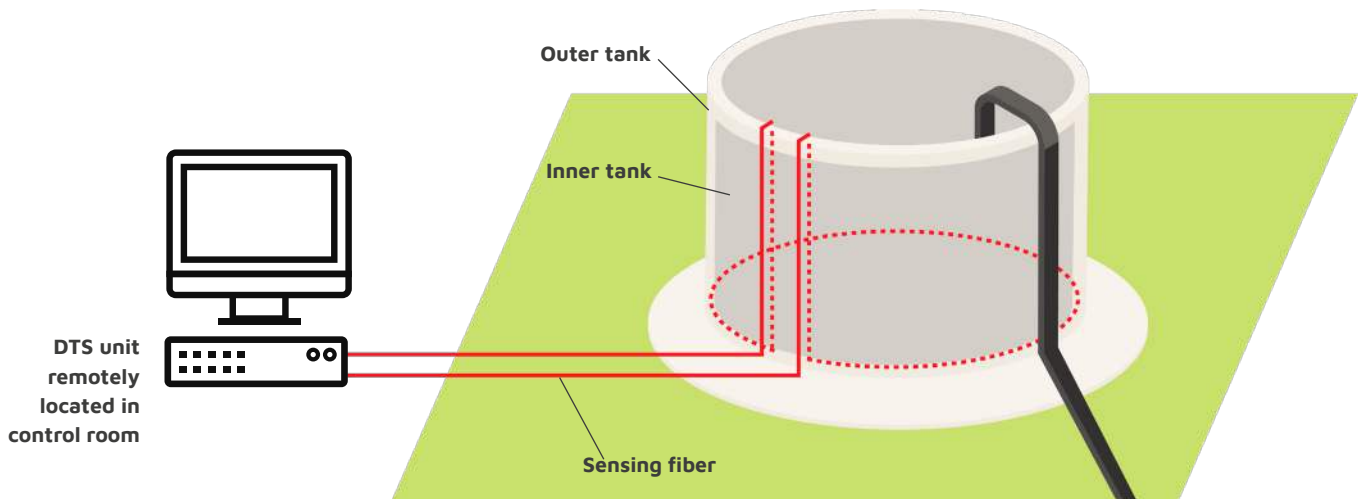
Bandweaver's advanced range of fiber optic intrusion detection solutions provide both covert buried and fence or wall mounted detection capabilities from a single detection unit.

There is no requirement for power in the field and optical fiber cabling is unaffected by electromagnetic interference. The cabling itself is intrinsically safe so is suitable for sites that are at risk from fire or explosion.

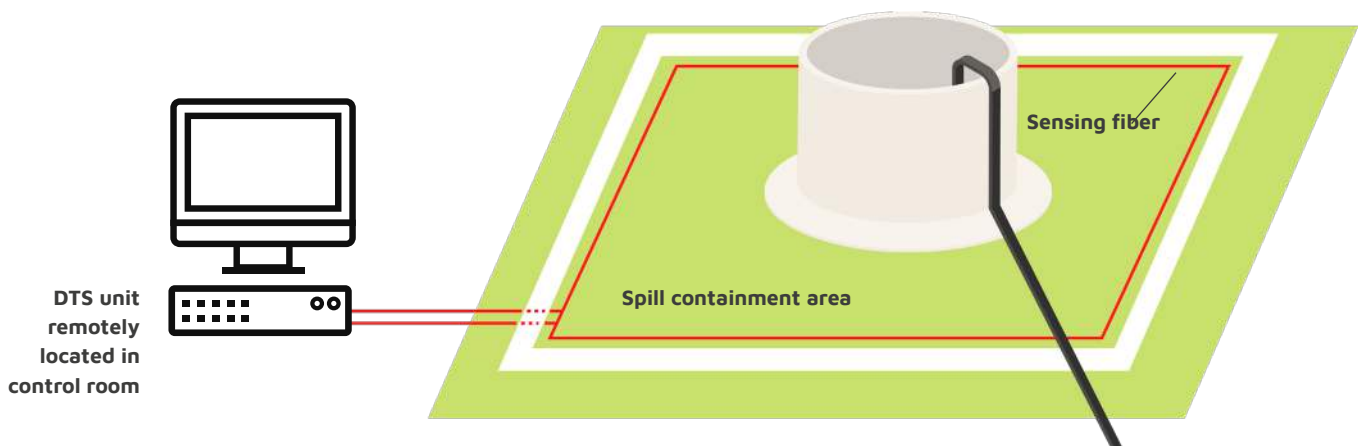
## TANK MONITORING

Bandweaver can also provide solutions for monitoring static tanks. The sensing fiber is deployed in the annulus between the two tank walls during construction.

In the event of a leak, the distributed temperature sensing (DTS) system alerts operators to a rapid drop in temperature at its precise location, enabling prompt action to be taken to prevent widespread damage.



## SPILL CONTAINMENT



Where there is a spill containment area surrounding the tank, the DTS sensor cable installed along the perimeter.

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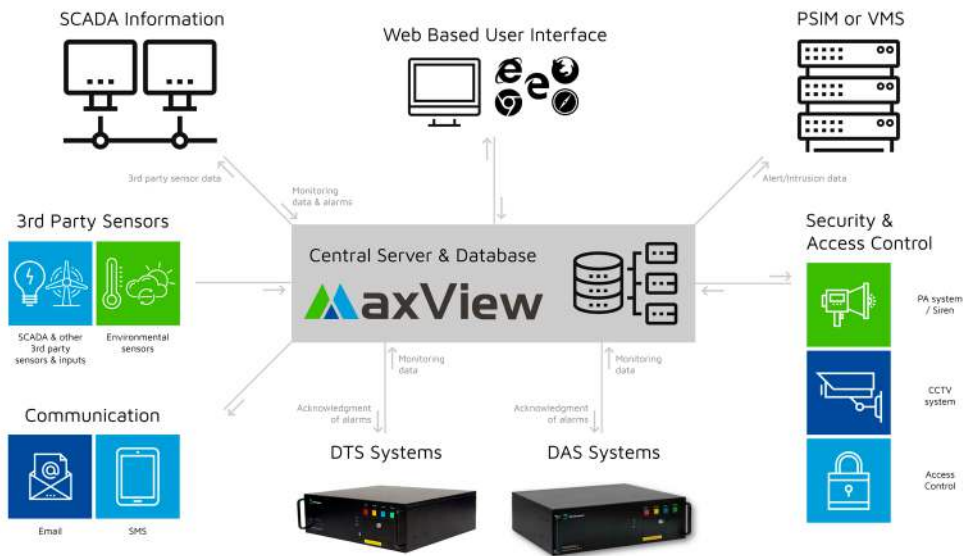
# SYSTEM INTEGRATION

Bandweaver's detection units have extremely flexible system architecture enabling multiple units to be networked together and integrated with Bandweaver's MaxView software or other 3rd party systems.

With the loose coupling architecture of Bandweaver's MaxView it can integrate multiple systems across multiple sites with one coherent, customisable, easy to install user friendly interface.

MaxView's architecture provides a complete solution which allows operators to integrate numerous subsystems across multiple sites ensuring a fast and appropriate response with mapping functionality to show the location of any events to within 1m.

Alarms can be added via either dry electrical relay contacts (in safe control room) or according to standard SCADA protocols (MODBUS over TCP/IP).



## BANDWEAVER EXPERIENCE AND ACCREDITATION

Bandweaver has been providing advanced fiber optic monitoring sensors and integrated technologies for our customers since 2002, with over 60,000km of cable installed across 8,000+ systems.

Bandweaver is ISO 9001 certified and undergoes a rigorous continuous improvement program and tests all of its products to leading international standards.

As well as extensive in-house environmental testing facilities, Bandweaver also utilizes leading 3rd party testing houses for independent verification and approvals.

Our systems are SIL2 certified and use Atex rated sensing cables.

