Data from one or more Picarro mobile systems is collected in the Picarro cloud and combined with other sets of data including pipeline GIS information, leak history, leak type and locations, weather, data on building locations, roads and other infrastructure and utility customer information such as locations of gas odor call-ins. These datasets are analyzed by specific Picarro analytics modules to produce interactive dashboards and data outputs that can be pushed into utility data systems such as SAP and ESRI to be combined with existing gas utility workflows for leak survey, risk management, pipeline management, pipeline replacement & construction, emissions monitoring and emissions reduction, etc. Picarro also has a mobile application for leak survey that leak investigation and repair crews can use in the field to visualize Picarro's leak indications, enter leak information, upload pictures from the field, GPS-locate leaks, and pinpoint leaks for repair.
Picarro’s solution is much more than a methane sensor in a car. Data collection vehicles equipped with Picarro’s methane/ethane sensors, wind sensors and GPS equipment travel through a natural gas network, taking data 4 times per second and transmitting it to Picarro’s cloud. The data is later processed by Picarro’s software and analytics and users can view dashboards and run reports, producing specific outputs that are used in the overall management of the entire natural gas network infrastructure.
Traditional foot-based and vehicle-based sensors must be very near the leak to detect it (since they only can detect methane at a level of a few parts-per-million (PPM). Picarro has a parts-per-billion (PPB) sensor and so can detect leaks much farther away – depending on the leak emissions rate, up to several hundred meters away (for example, a 0.3 liters per minute leak can be detected 150m from the vehicle in ideal wind conditions). Natural gas at 100% concentration coming from a crack in a street is diluted to ppm concentrations only a few meters away, and to ppb concentrations at distances of 10’s to 100’s of meters depending on wind conditions.
As the Picarro vehicle drives, wind brings any leak plumes to the vehicle for detection. The blue Field of View coverage area shows where the vehicle has effectively surveyed any gas assets (mains pipelines, service pipelines, meters, etc.). Driving on different nights takes advantage of changing wind directions so both sides of a street are eventually covered by the Field of View. Driving is just data collection – the driver does not stop to investigate leak indications – rather, all the data from multiple drives over 2-3 nights is combined and leak indications are produced at that time for investigation by foot-based crews.
This shows how Picarro’s data collection process works. Here is a map showing gas mains and services. The blue line shows the vehicle path, and two passes are driven on each street. The blue swath shows the Picarro Field of View (FOV) coverage, which is the area that has been effectively surveyed. In the first drive, the wind is mainly from the upper left, so that any leak plumes in the blue area would be brought by the wind to the car. Once methane is detected, a leak indication is triggered, and a Leak Indication Search Area is computed from the wind direction and variability – this is the yellow area. The ethane reading is also used to determine the confidence level of the gas being from a natural gas leak or not. This process is repeated three times, on at least two different nights. After all three drives are complete, Picarro’s analytics combines the data, removing non-natural gas indications, combining coincident leak indications, and aggregating the FOV. This produces actionable results for field crews to go on foot to pinpoint exact leak locations and to conduct walking survey on any gaps in the FOV coverage, thereby fully completing leak survey on an area. Driving is done at night to maximize FOV coverage due to more stable atmospheric conditions at night (as well as to avoid vehicle traffic).
The Picarro hardware and software enable much more comprehensive and reliable detection of leaks. Because of its sensitivity it “sees” nearly all leaks within its Field of View coverage area and this coverage area is not dependent on the exact location of the vehicle, in contrast to walking methods and low-sensitivity (PPM) mobile detection methods which must pass directly over leaks to detect them. For this reason, operator error is not an issue for the Picarro system. Picarro’s system can be driven at traffic speeds, in rain or snow, and eliminates “false” indications from sources of methane that don’t come from pipeline leaks (such as sewer gas). In field tests, Picarro routinely is shown to detect 3x or more hazardous leaks than any other methods or technologies.
These aggregate results of independently verified, double-blind Field Trials consistently show that the Picarro technology, process and protocols produce better leak survey results than any other technologies or methods, finding 3x more hazardous leaks in half the amount of time. Picarro also has a digital record of where the Field of View coverage area overlaps the gas network – the concept of “digital coverage” does not exist for traditional tools and so there is no automatically created, verifiable record of coverage.
Deployment Summary

- 17 natural gas operators in 7 countries use the Picarro solution (as of 11/2019)
  - U.S., Canada, Australia, Italy, France, Switzerland, Japan
  - 11 LDCs are using it for compliance leak survey
  - 6 LDCs are U.S. based
- Picarro used for U.S. DOT Compliance Leak Survey in 8 states
  - CA, TX, AR, MN, LA, OK, MS, AL
  - by 3 major U.S. utilities (Centerpoint, PG&E, Atmos)
  - Centerpoint & PG&E used Picarro for ~100% of their 2018 compliance survey
- Picarro solution has been tested & validated in 53 double-blind, Directed Field Trials with 33 gas operators across North America, Europe, Asia and Australia since 2011, several involving independent, third-party validation including GTI, NYSEARCH, PRCI and others
- Further evaluated in 20 additional field demonstrations by 14 additional gas operators worldwide
Our customers are using our solution as an overall gas asset management tool, both on the downstream and upstream side.

Our customers are able to use our mobile methane detection technology to collect methane data at a speed and scale not previously possible.

Advances in our “Big Data” Analytics and machine learning allow better-informed conclusions to be drawn from that data.

And enable operators to more cost effectively manage their networks in a way that has never been possible, with the combination of methane datasets produced by our solution and other datasets such as their pipeline GIS data and public datasets.

Our customers have collected a huge dataset of almost 4 million leak indications, associated with several hundred thousand graded leaks (with multiple indications per leak) at utilities all across the world. This dataset is allowing our machine learning to actually predict the likely hazard of leaks and to quantify the emissions of individual leaks or it can aggregate emissions over an area, a pipe segment or a network.

We are helping our customers use this data for applications beyond – and more impactful – than leak survey; they’re using our analytics on the data they collect for holistic asset management: everything from informing pipe replacement decisions to augmenting risk and forecasting models to targeted emissions reduction to risk-based leak survey scheduling. The beauty is that data collected once can be leveraged across these multiple use cases.
This shows a typical map-based output for field crews. The GIS pipeline assets (mains, services, meters, etc.) are shown in purple, the vehicle trail in blue, and the FOV as a blue shaded region. To fully complete a regulatory compliance leak survey in an area, any small parts of the gas network not covered (red highlight) must be walked using traditional tools, and any parts of the network that are associated with a Picarro leak indication (yellow highlight) must be searched with handheld detectors to locate the exact location of leaks so they can be classified and repaired if necessary. The entire Picarro process, including all driving, foot based gap survey and leak investigation/pinpointing is generally at least 2x faster than survey with traditional methods.
Leak survey is only one of many applications where customers use the Picarro system. There are analytical models and dashboards that help gas operators manage all aspects of their system, including improving their risk models, reducing emissions, forecasting repair work, and improving decisions about pipeline replacement.
The Picarro system uses multiple measurements of individual leak plumes to build up a statistical classification of each leak indication – is it likely to be above-ground or below-ground? How big is the leak? Where exactly is the leak located and is it likely to be hazardous (below-ground leaks near a building for example). With this data, decisions can be improved about what sections of pipeline to replace rather than repair (because Picarro determines they have a high density of leaks). This data also allows gas operators to map potential high-risk areas and prioritize construction in those areas. The data can also be used to accelerate risk reduction (and emissions reduction) in a network.
We are starting to see customers collect data across their entire networks annually, such as what PG&E has done in their campaign to identify and fix the highest emitting leaks. This is an example of last year’s campaign where they were able to use our analytics to identify the top 210 highest emitting leaks and prioritize them for repair to get the emissions reduction benefit. Identifying and repairing these leaks results in a 32% reduction in their overall distribution system emissions, as quantified by our measurements.

We are seeing a number of other utilities like PSE&G, CPS and others use the data to improve and validate emissions reduction.

From our huge set of data, we see that the EPA emissions factors for various pipe types are often much higher than what the reality is. However, not every mile of steel pipe in a pipe replacement program is the same, so pipes that are being replaced are very likely to exceed the EPA emissions factor. This means utilities are not getting enough credit for the amount of emissions they are actually remediating through pipe replacement. We are able to accurately quantify the true emissions reduction through both leak repair and pipe replacement. And we are able to quantify the actual emissions across an entire gas network in a way that is far more accurate and credible than relying on emissions factors that are known to be incorrect.
The Picarro system can quickly determine number of leaks (and amount of emissions) of entire sections of pipeline so that data can be combined with existing risk and pipeline replacement models and so that better decisions can be made about which pipelines to replace (replacing those that have the highest density of leaks). When Picarro data is combined with these existing models, it has been shown that utilities can increase the number of leaks they remove by pipe replacement by 2-3x. This means they are removing leaks before they are found by leak survey – if they were found by leak survey, they would require repair, costing O&M expense.
The application our customers are most excited about is the use of the data to better-inform pipe replacement programs. We have demonstrated at a number of utilities that we can combine methane data with existing DIMP models used for pipe replacement prioritization and improve those decisions such that they are able to remove twice as many (or more) leaks through pipe replacement. This results in a significant reduction in O&M expense since leaks removed by pipe replacement are never found by leak survey and don’t incur repair cost. It also has huge benefits in risk reduction and emissions reduction. AND we can accurately quantify the number of leaks removed AND the associated reduction in emissions from each pipe segment replaced.