PICARRO

Natural Gas Asset Management Solution

Fugitive Emissions: Quantification & Reduction

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Picarro Natural Gas Asset Management

Picarro Natural Gas Asset Management solution proposes a new set of methane data for distribution network operators.

UNIQUE DATA COLLECTION at SPEED and SCALE to optimize:

- Safety enhancement
- **Emissions mitigation**
- Pipeline replacement plan

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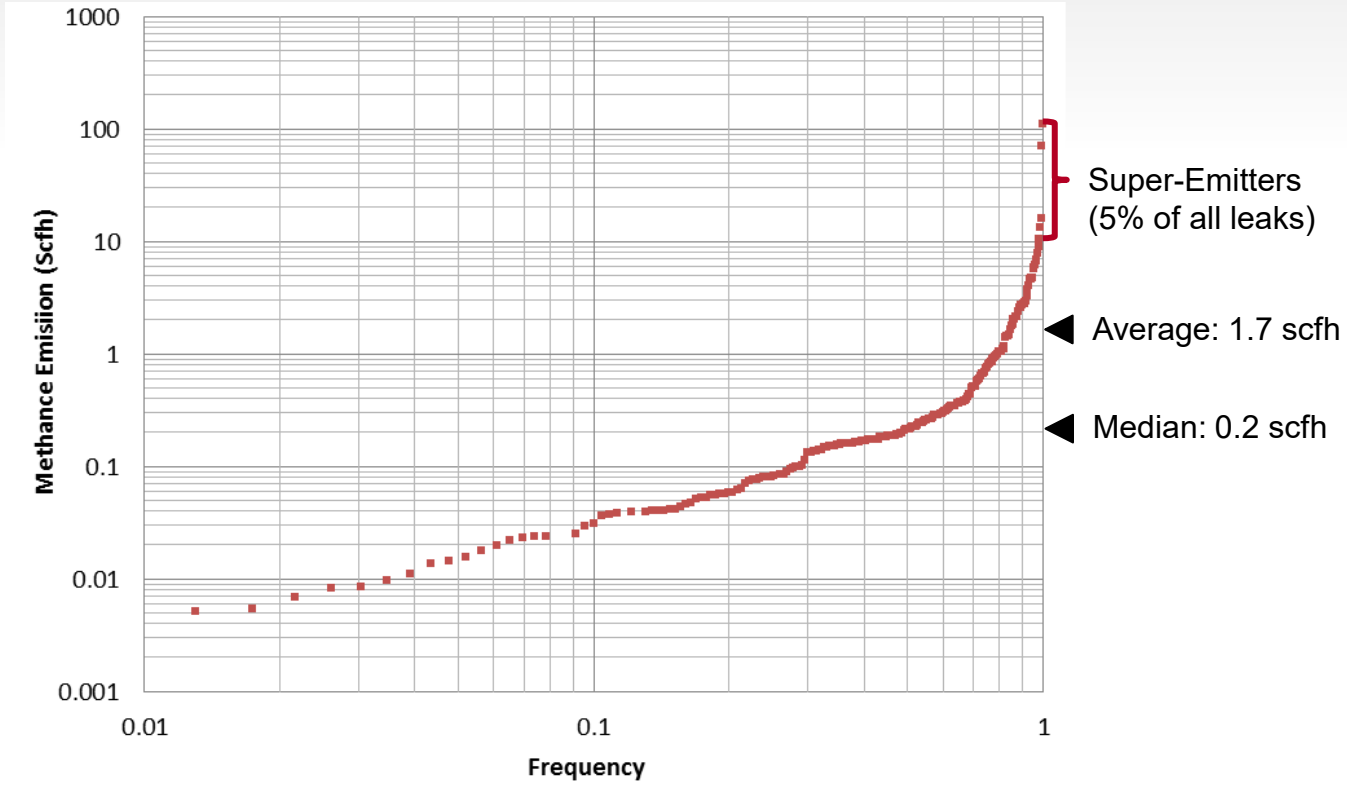
Distribution of methane emitters within the natural gas infrastructure

Methane Emitters from DSOs

- Methane emissions in a distribution network are driven by a relatively small number of leaks, named “super emitters”
- Fugitive emissions range over 5 orders of magnitude. **The largest 5% of leaks are over 30% - 50% of total fugitive emissions**
- Opportunity for significant abatement through accelerated repair of the largest leaks (Super Emitters).



Data source: Washington state university

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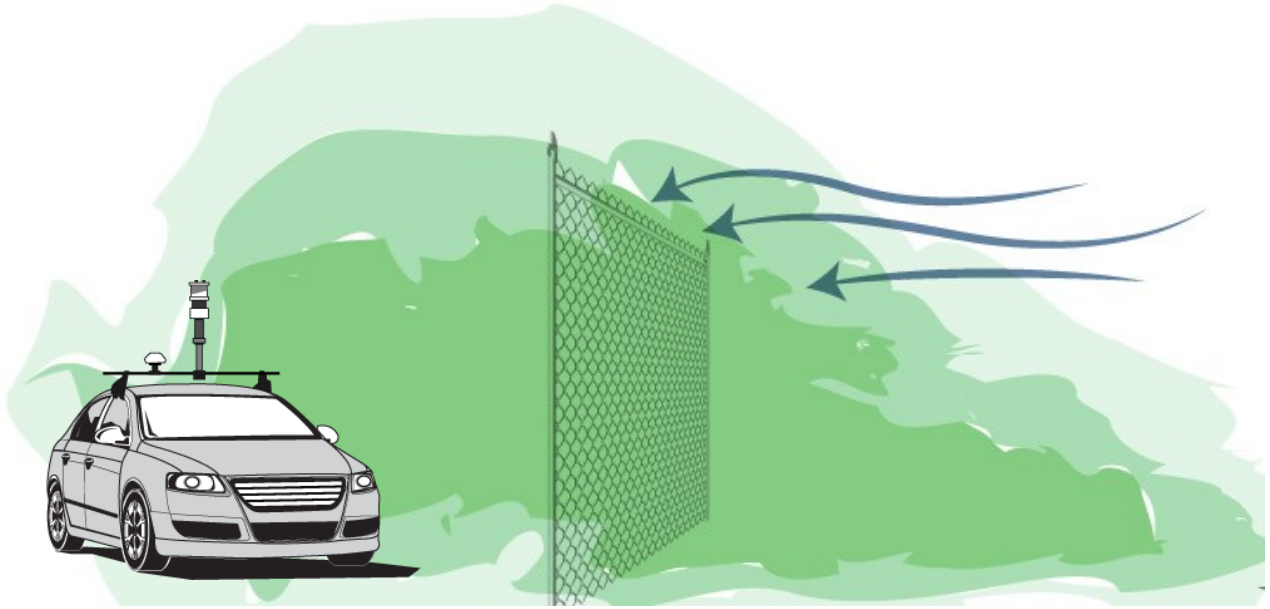
Picarro Methane Emission measurement - Principle

- Picarro measures natural gas leaks by analyzing their plumes as they propagate in the atmosphere
- The vehicle drives downwind of the methane source and captures emissions along the vehicle's path
- The system measures spatiotemporal natural gas concentration, plume characteristics, shape signatures patterns, GPS, wind-speed and direction
- **Emissions from biogenic sources and other false positive signals are filtered** by analyzing the Ethane/Methane ratio of the plume and by means of artificial intelligence



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Picarro Emission Quantification (EQ) method

1 vehicle

↓

3 months data collection

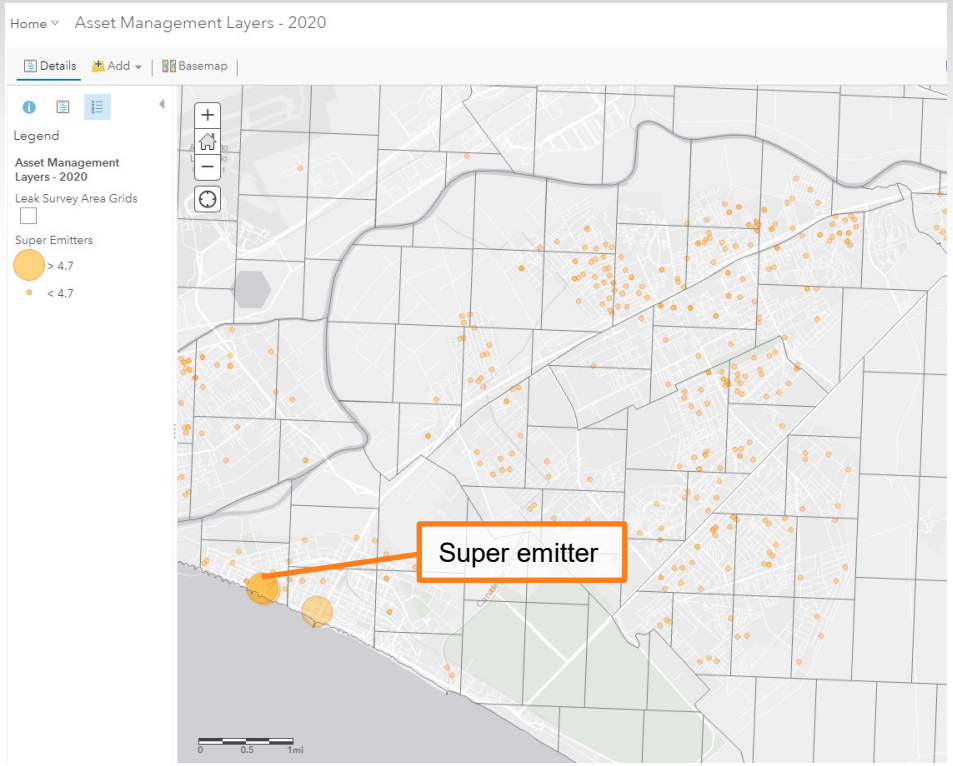
↓

~1’200KM network covered

↓

~1’000 Emissions sources geolocalized and emission rates provided

Impossible with other technologies (e.g. high-flow samplers)



KEY BENEFITS:

- Large scale with high granularity
- Emission rates provided prior to leak source localization (both AG and BG)
- Method externally validated by controlled-release experiments
- Precision on the sum of multiple leaks increases compared to an individual leak → comparable to high-flow samplers

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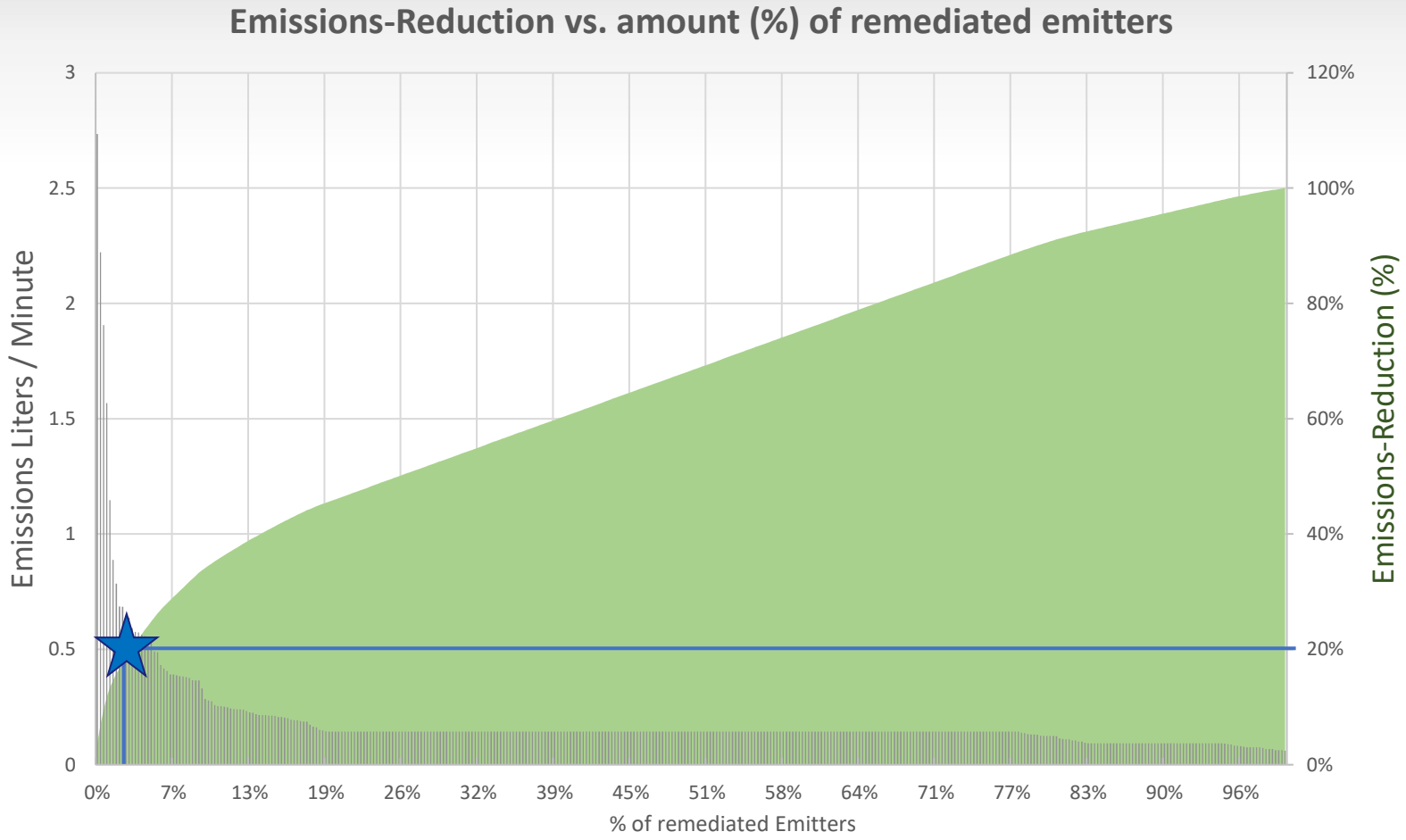
Methane Emission Reduction – Targeting Super Emitters

- Immediate repair of a 3% of large emitters reduces network fugitive emissions by 20%
- Repairing super emitters is the most cost-efficient way to mitigate methane emissions at the scale of a DSO
- The repair cost for the remediation of few super emitters is offset by reducing the loss of commodity (sell the gas instead of losing it to the Atmosphere)



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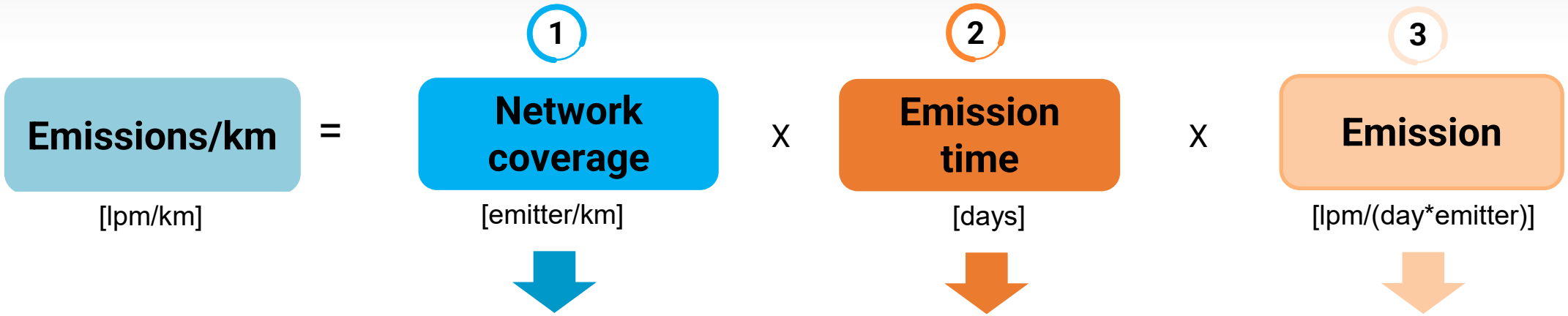
Emission quantification factors

- Emissions calculation can be split into 3 factors:



The more km of a network are measured, the more emissions can be abated

Find largest emitters and fix them in priority to reduce their impact over time

Get the most reliable statistical representation of your emission rate at source or network level

- **Picarro provides measurements-based emission factors (EF) which we believe in agreement with new EU regulations**

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Conclusions

- Fugitive emissions from DSOs span over 4 orders of magnitude and only 5% of leaks constitute for 50% of total emissions

- **PICARRO provides a measurement-based emissions quantification method in agreement with OGMP level 4 and 5**

- PICARRO solution allows to:
  - measure emissions from a single source up to an entire distribution network
  - quickly geolocalize the most important emitters over the entire network and therefore reduce efficiently fugitive emissions

- **Targeting Super Emitters is the only way to maximize fugitive emissions abatement**


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