OGMP 2.0
LEAK DETECTION
AND REPAIR

Slides ownership:
Angelica Riccietti
OGMP 2.0
leak detection and repair

01 ITALGAS & OGMP

02 CRDS technology adoption
Lessons learned and results achieved

03 Reporting OGMP
Methane emission reduction
ITALGAS & OGMP

ITALGAS is the largest natural gas DSO in Italy and the 3rd largest player in Europe. Italgas is committed every day to fight against gas leaks for two major reasons:

1) Ensure gas network safety;
2) Reduce fugitive emissions and contribute to European environmental goals.

Highlights

- Italgas has been joining the OGMP 2.0 initiative since November 2020
- Italgas promotes a common approach to methane emissions abatement among members of GD4S and among GD4S, CEDEC, Eurogas, and GEODE.
- Italgas is also contributing to the effort to define an Italian methane strategy, led by the NGO "Friends of the Earth".

About Italgas

- 74,000 km gas network
- 8-9 bn m³/year gas despatched
- 7.7 mln End customers
- 4,200 employees
OGMP 2.0
leak detection and repair

01 ITALGAS & OGMP
02 CRDS technology adoption
  Lessons learned and results achieved
03 Reporting OGMP
  Methane emission reduction
Italgas adoption of Picarro technology

Key figures

In 2018 Italgas launched the adoption of the innovative gas leakage detection system based on cutting-edge laser technology (Picarro surveyor).

Surveyed network

<table>
<thead>
<tr>
<th>Year</th>
<th>Pilot</th>
<th>Scale-up</th>
<th>At Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>15%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2019</td>
<td>26%</td>
<td></td>
<td>100%</td>
</tr>
</tbody>
</table>

Dedicated Team

24 Surveyor - 84 Backpack

15x Investigated and Repaired Leakage Density vs 2017
CRDS technology benefits

Higher sensitivity resulting in larger detection areas and faster survey

The innovative gas leak detection system Picarro Surveyor allows DSOs to achieve **measurable improvements with respect to traditional technologies.**

<table>
<thead>
<tr>
<th>Detection area</th>
<th>TRADITIONAL gas detection</th>
<th>PICARRO gas detection</th>
</tr>
</thead>
<tbody>
<tr>
<td>only leaks on main ground</td>
<td></td>
<td>leaks on the entire networks (main, services, aerial, smart meters), including underground leaks</td>
</tr>
<tr>
<td>Leak density detection</td>
<td>~0.03 leaks/km</td>
<td>~0.8 leaks/km</td>
</tr>
<tr>
<td>Gas detection</td>
<td>Detects only CH₄</td>
<td>Discriminates natural gas from other false positive</td>
</tr>
<tr>
<td>Weather conditions</td>
<td>Sensitive</td>
<td>Not sensitive</td>
</tr>
</tbody>
</table>
CRDS Technology: Italgas’ fleet

Italgas owns the largest fleet of Picarro’s equipment worldwide:

- 24 CRDS technology equipped surveyors + 1 boat;
- 84 backpacks;
- Around 300 people trained and involved into the fight against gas leaks.
CRDS technology

Lesson learned and results achieved

Application of the CRDS gas leak detection system to Italgas’ distribution grids

New challenging approach:
- New business organization with the establishment of a new dedicated team (EMIGAS)
- Spread the innovation culture to the Italgas’ territorial units

Lesson Learned:
- Innovative LDAR program:
  - Fleet and workforce management
  - Driving surveys quality control
  - Investigations prioritisation based on emissions or risk ranking
- Fugitive emissions quantification (data measured with LDAR)
- New approach to manage pipelines maintenance (Reactive → Proactive)
- Data quality experience:
  - Reconciliation of data measured on field
- Participation in international committees (OGMP, IMEO, GD4S) and sustainability indexes (Dow Jones, CDP)
Lesson Learned

Italgas has been using this innovative CRDS system along the last **two years**, inspecting +74,000 km in more than **1,800 municipalities**.

### FROM REACTIVE TO PROACTIVE APPROACH

<table>
<thead>
<tr>
<th>10%</th>
<th>50%</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020 capex focused on the proactive maintenance</td>
<td>2021 capex focused on the proactive maintenance</td>
</tr>
</tbody>
</table>

**Abatement of Fugitive emissions**

- **45%**

Emissions avoided thanks to the repair timereduction

### FLEET & WORKFORCE MANAGEMENT

<table>
<thead>
<tr>
<th>24</th>
<th>84</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surveyor</td>
<td>Backpack</td>
</tr>
</tbody>
</table>

**Continuous Training**

- **40+** Training Sessions
- **1205+** Hours for technician’s training
- **2208+** Hours for drivers’ training

**Gold Standard**

- International committees (OGMP, IMEO, GD4S) and sustainability indexes (Dow Jones, CDP)
Towards a digital gas network

Smart Maintenance & Fugitive emissions reduction

Picarro’s approach full adoption allows Italgas to gain a huge benefit in the detection and repair of gas leaks, such as:

- Drastic reduction of investigation and repairing SLA\(^{(1)}\);
- Super Emitters early detection;
- LISAs (leak indication search area) prioritisation;
- Use of collected data for better Asset Management choices and Smart Maintenance model.

Screen from the 2020 data Asset Management platform.

The red lines indicate portions of pipe with a certain probability of emission, which may require preventive replacement actions.

Screen from the 2021 driving survey with Picarro’s car. After the replacement there are no leaks on the same portion of pipe.

1. «Service Level Agreement» → Investigation SLA = time between last driving survey and leak grading;
   Repairing SLA = time between leak grading and repair.
OGMP 2.0
leak detection and repair

01 ITALGAS & OGMP

02 CRDS technology adoption
Lessons learned and results achieved

03 Reporting OGMP
Methane emission reduction
Thanks to the use of Picarro’s **Cavity Ring-Down Spectroscopy (CRDS)** technology, Italgas positioned itself at L4/L5.

**Operated asset**

<table>
<thead>
<tr>
<th>2020</th>
<th>2021</th>
<th>2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italgas Reti</td>
<td>L4/L5</td>
<td>L4/L5</td>
</tr>
<tr>
<td>Toscana Energia</td>
<td>L4/L5</td>
<td>L4/L5</td>
</tr>
<tr>
<td>Medea</td>
<td>L3</td>
<td>L4/L5</td>
</tr>
</tbody>
</table>

**Non operated asset**

<table>
<thead>
<tr>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metano S. Angelo Lodigiano (MSA)</td>
<td>L3</td>
<td>L3</td>
<td>L4/L5</td>
<td>L4/L5</td>
</tr>
<tr>
<td>Umbria Distribuzione Gas (UDG)</td>
<td>L3</td>
<td>L3</td>
<td>L4/L5</td>
<td>L4/L5</td>
</tr>
<tr>
<td>Reti Distribuzione</td>
<td>L3</td>
<td>L3</td>
<td>L4/L5</td>
<td>L4/L5</td>
</tr>
</tbody>
</table>

**Survey Picarro**

- **2021** MSA
- **2022** MSA, UDG, Reti Distribuzione
For Italgas the main drivers for methane emission reduction are:

- **Prioritise leaks** based on their emission rate (localisation and repair of Super Emitters first);
- **Try to reduce the time** for localisation and repair, also in comparison with the standards prescribed by ARERA;
- **Use asset management and predictive maintenance** algorithms, to define CAPEX plans. In 2022, a significant number of investments are expected to be undertaken in the most emissive areas of the network.

<table>
<thead>
<tr>
<th>General Information about the target</th>
<th>Performance in the Reference or Base Year</th>
<th>Target Year</th>
<th>Reporting Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consolidation Basis (Operational Control, Equity)</td>
<td>Year in which the target was set</td>
<td>Reference / Base Year</td>
<td>Total emissions in scope of the target</td>
</tr>
<tr>
<td>Operated Asset</td>
<td>2020</td>
<td>2015</td>
<td>21.959 tCH4</td>
</tr>
</tbody>
</table>

**TARGET 2020**

**TARGET 2021**

* Values have to be defined

**NOTE:** With the support provided by Politecnico di Torino, Italgas has also estimated the emissions not measurable by Picarro such as permeation fugitive emissions, vented operational emissions/maintenance and removal installation of gas meters.
What’s next?

With the experience gained during these years, Italgas is now supporting other DSOs across Europe to meet the challenge of reducing methane emissions and contributing to the achievement of the European environmental target:

• Best practice
• Operative support
• Smart maintenance

In addition, in terms of LDAR, Italgas is setting up a test field to carry out cross-examination tests (e.g. Hi flow sampler) in collaboration with the Politecnico di Torino and is promoting test phases of new technologies such as drones and satellites.
THANKS FOR YOUR ATTENDANCE
CRDS Technology adoption

Roadmap

2018
- POC on 15% of the network
- Repaired leaks: 8 K
- Outsourcing of Driving and Backpack activity

2019
- Extension of the POC to 26% of the network
- Repaired leaks: 11 K
- First insourcing of Driving and Backpack activity

2020
- Inspected 100% of the network
- Repaired leaks: 33 K
- Insourcing of Driving and Backpack activity
- Fleet: 15 surveyors and 66 backpacks

2021
- Inspected 100% of the network
- Repaired leaks: 28 K
- Asset Management POC
- Insourcing of Driving and Backpack activity
- Fleet: 19 surveyors and 76 backpacks

2022
- Smart maintenance capex budget
- Insourcing of Driving + Backpack activity
- Fleet: 24 surveyors and 84 backpacks
- Advisory Service to other DSO
Thanks to the workflow management optimisation Italgas has applied a drastic reduction of investigation and repairing SLA\(^{(1)}\).

1. «Service Level Agreement»  
   Investigation SLA = time between last driving survey and leak grading;  
   Repairing SLA = time between leak grading and repair.

2. If leak grading is done with the first LISA investigation (only possible for above ground leaks), then the total time between these two phases is 14 days, otherwise (for below ground leaks) the two phases have different intervals (14+7 days).

3. A Super Emitter is a leak with an emission rate greater than or equal to 0,27 sm3/h (10 sft3/h).