Welcome

Pioneering the Digital Transformation: How Italgas Improves Safety and Reduces Emissions using Picarro

Paolo Gallo
Chief Executive Officer and Chief Operating Officer at Italgas

The digital and energy transition

Paolo Gallo
CEO, Italgas

March 2nd, 2022

Italgas

Key figures

3rd **European gas DSO** and largest in Italy

8.7 **Bcm** gas distributed every year

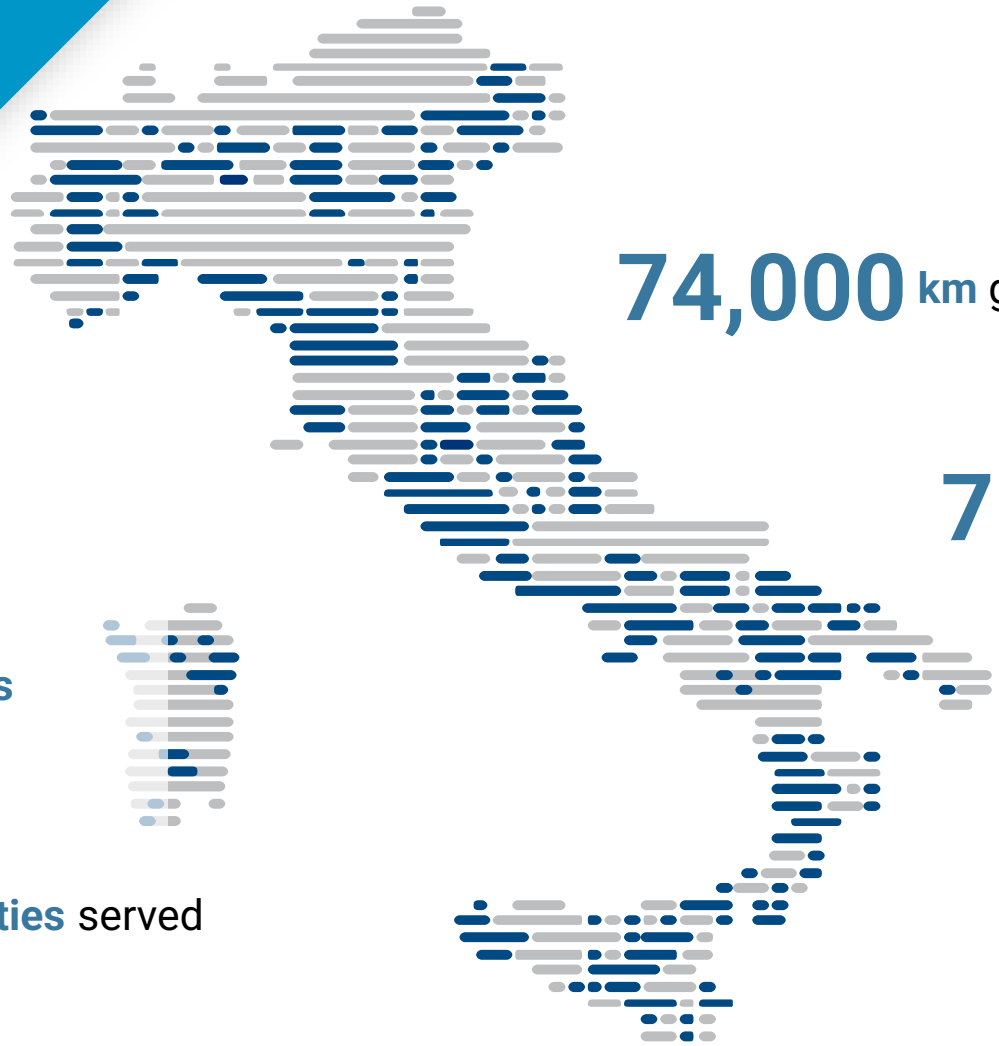
74,000 **km** gas network

7.7 **Mln** RdPs

4,000

employees

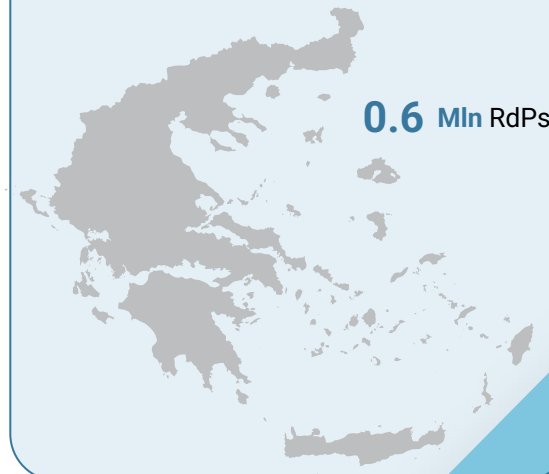
1,900 **Municipalities** served



Inclusion of **Greece network** from **2022 Q2**

7,000 **km** gas network

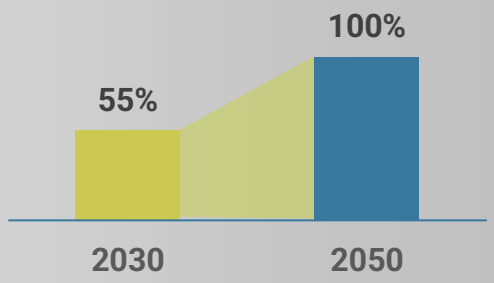
0.6 **Mln** RdPs



The EU targets for the energy transition

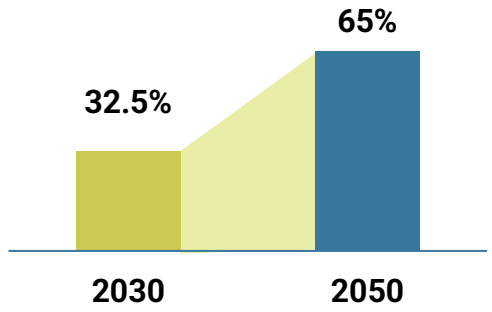
Europe set ambitious goals for the energy transitions…

CO2 emissions cut
vs 1990



The EU is preparing a package of initiatives to reduce CO2. A general revision of gas market legislation is also targeted

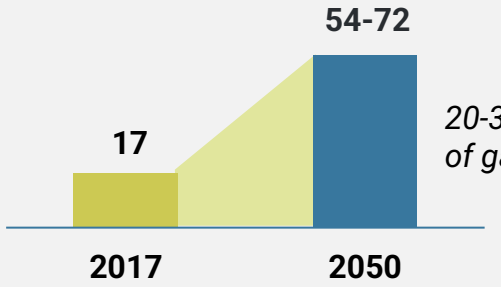
Energy Efficiency
vs 1990



Ongoing revision of the European Energy Efficiency Directive

…with a significant shift to low carbon gases demand in the next decades

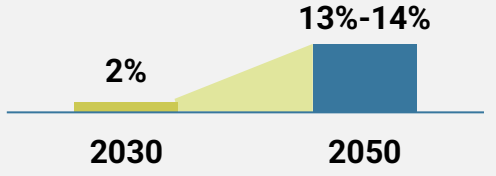
Biomethane
consumption MTOE



20-30% of gas demand

The revision of the gas market legislation includes how to facilitate the uptake of renewable gases

Hydrogen in EU energy mix
~ 500 GW electrolysis capacity by 2050



Hydrogen may be transported via repurposed natural gas pipelines and / or newly built pipelines

Source: EU Commission; Energy efficiency data on 2050 is based on IEA scenario

New challenges and opportunities for gas DSOs

DSOs need to adapt their strategies
Networks upgrade necessary to distribute new gases, to support energy efficiency and cut methane emissions

Prominent role in circular economy thanks to proximity to final users and distributed production units of green gases

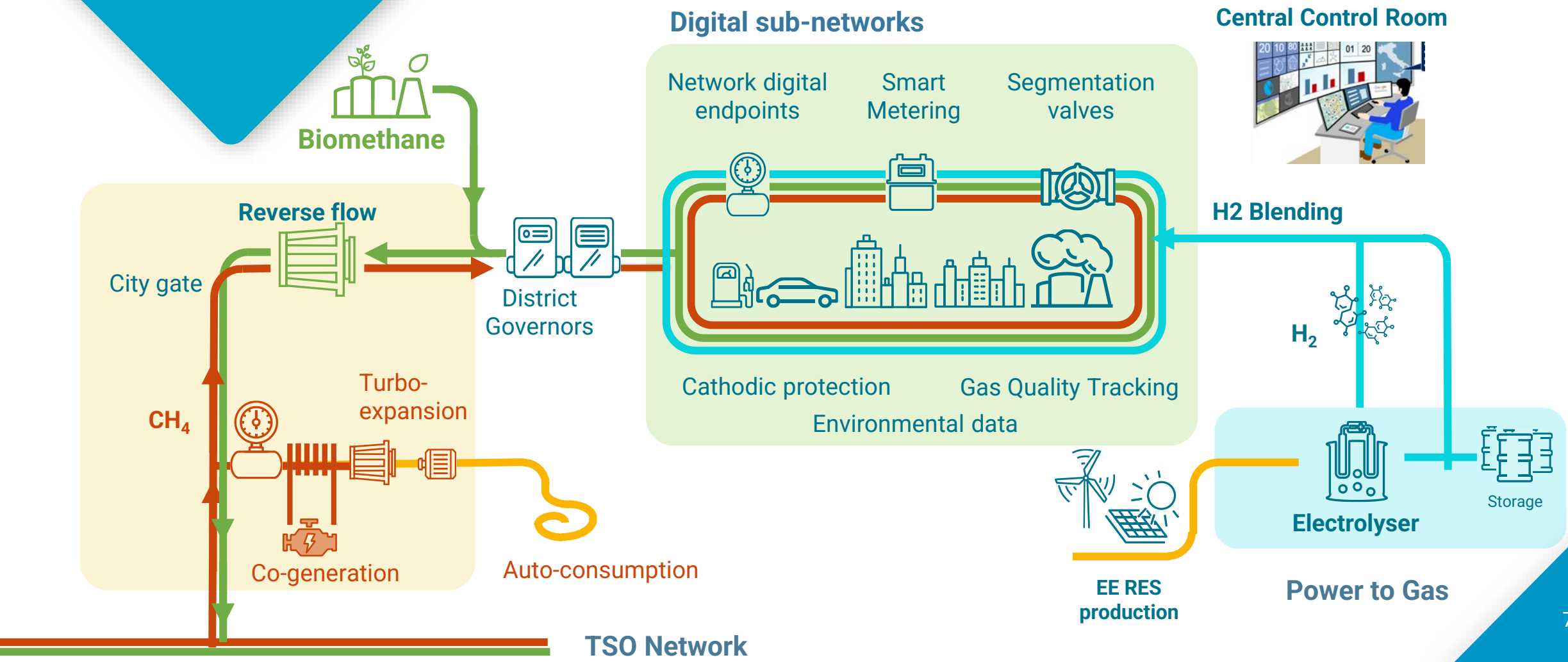
Build new infrastructure, network repurposing & retrofitting to dispatch green gases

Environmental responsibility through methane emissions management, considering an upcoming stricter regulation

Digitization of operations and smart tools implementation

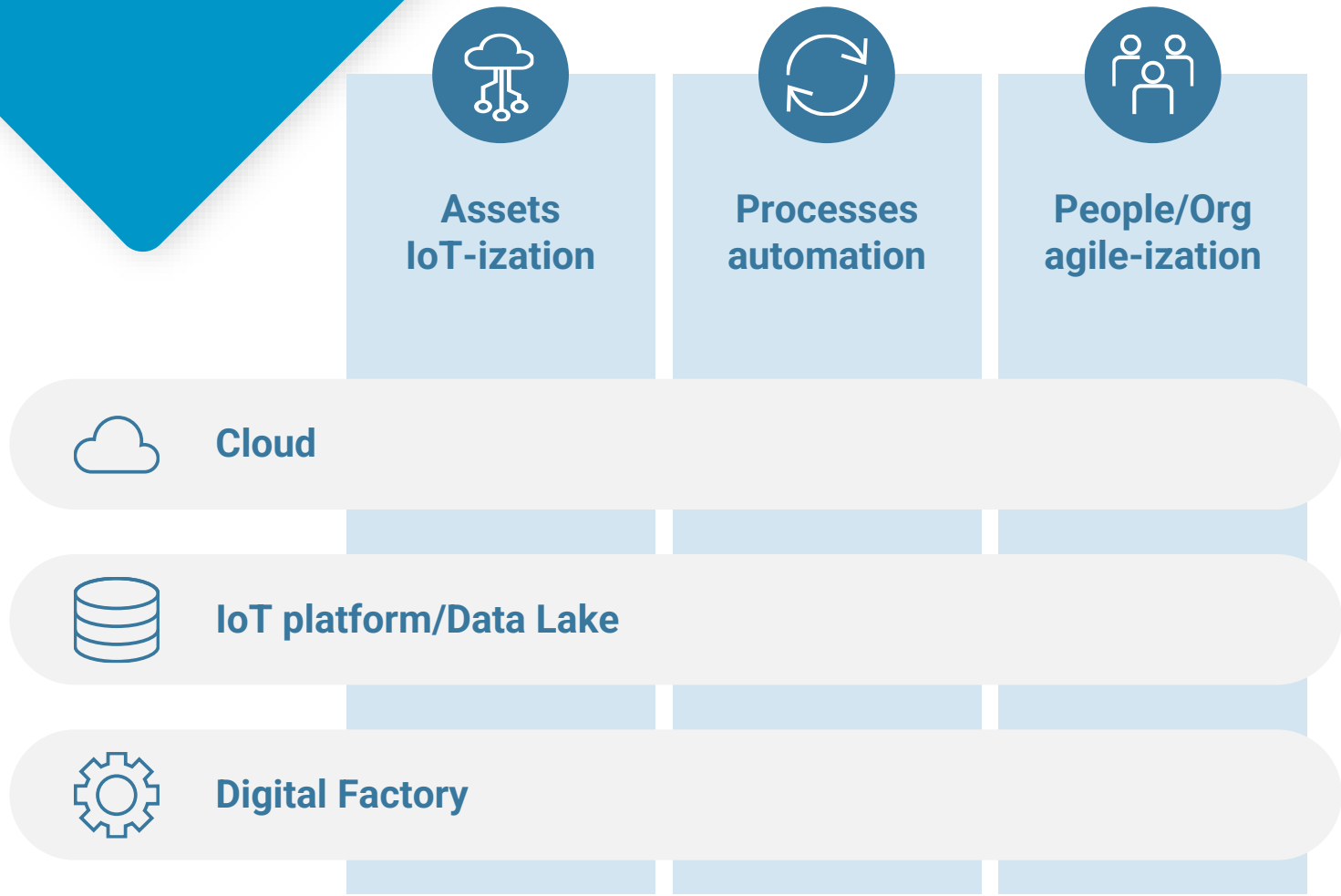
Our vision of the smart gas network

Upgrade and repurposing combined with digitalization to allow distribution/injection of green gases as well as reduce costs, increase efficiency and reliability



Digital transformation

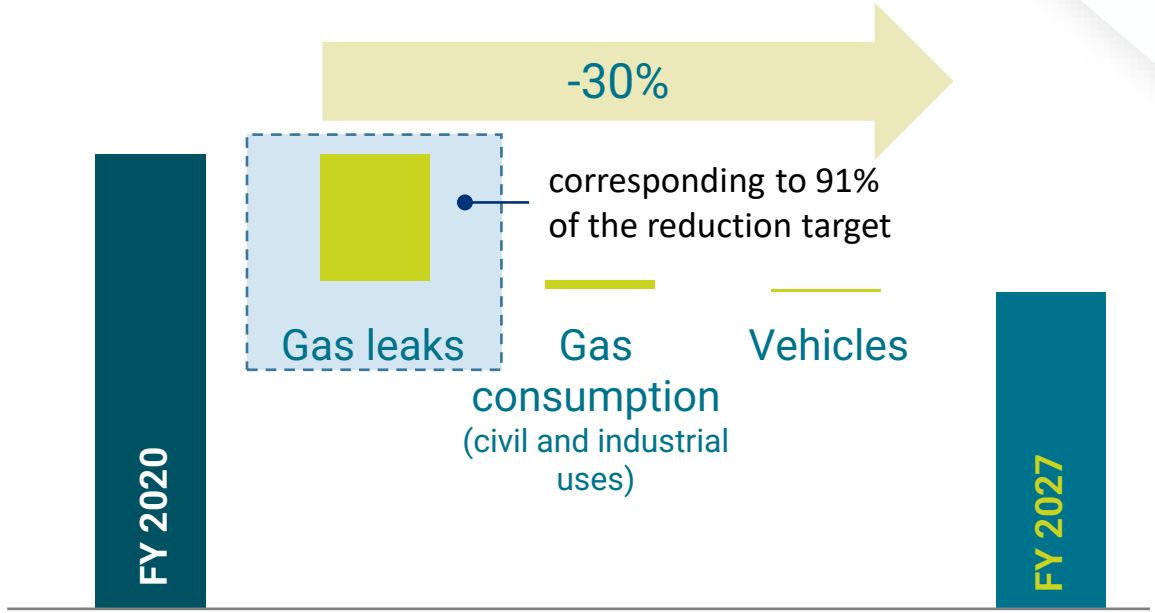
A holistic approach



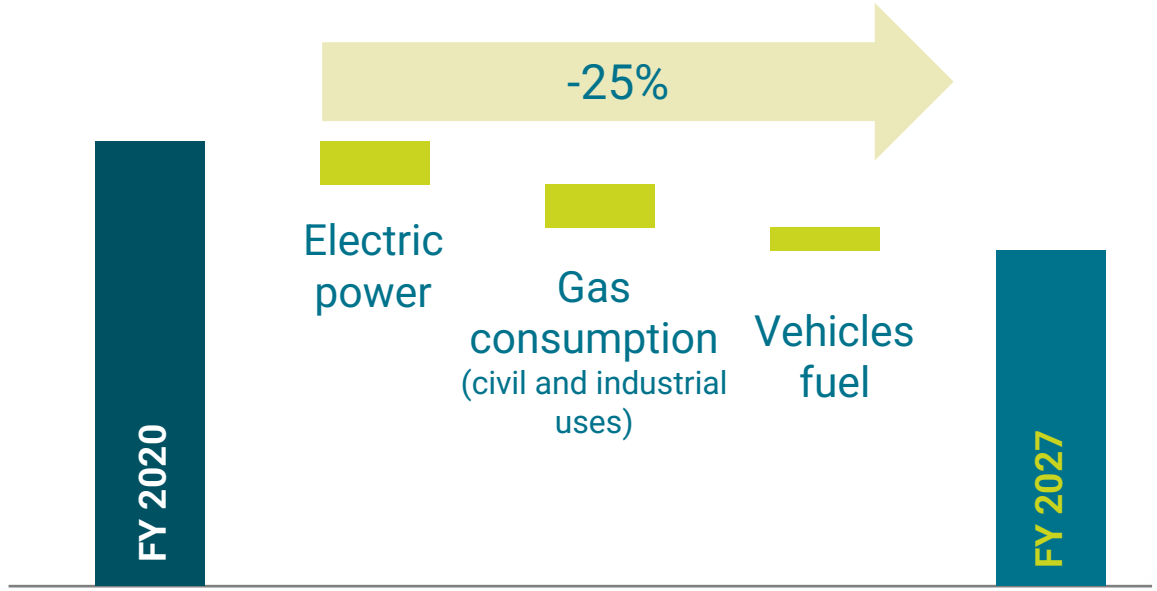
Our reduction targets

Since the Strategic Plan 2021-2027, **Italgas is publicly committed** to reduce GHG emissions and net energy consumption

Scope I and II GHG emissions reduction



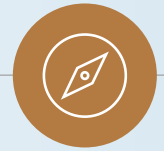
Net Energy Consumption



Our approach to reduce GHG emissions and energy consumption

«If you can't measure it, you can't change it»

Peter Drucker

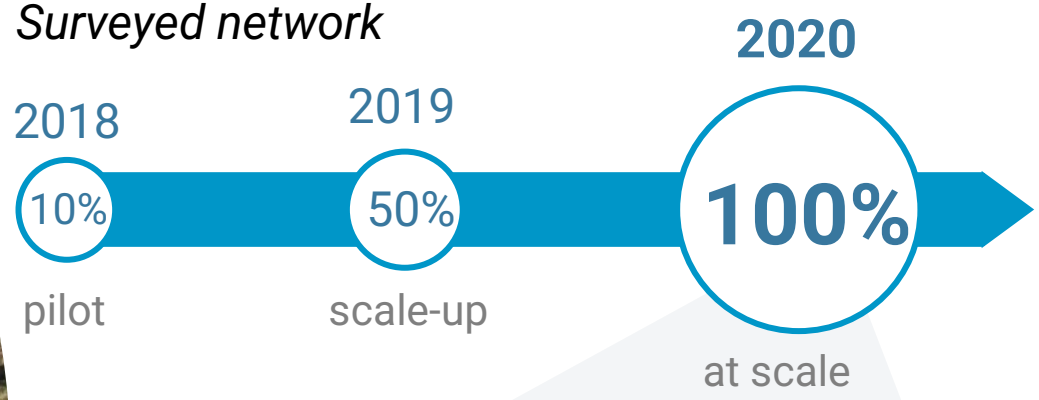
1	2	3	4	5
				
Strategic vision	**Quantitative baseline**	**Operational levers**	**Company-wide commitment**	**Implementation boost**
Definition of **strategic objectives** for **GHG emissions and energy consumption reduction**	**Diagnostic** of **Group activities and assets** to quantify **main sources of energy consumption and emissions**	**Definition of business initiatives to meet the goals**, leveraging expertise and technology	**Top management** sign-off of bottom-up targets and incentives' alignment	**Periodic reviews** and feedback loop for the design of additional initiatives

Italgas and Picarro

A successful adoption at scale

In 2018 Italgas launched the adoption
Picarro's technology on its network

Surveyed network



Dedicated Team

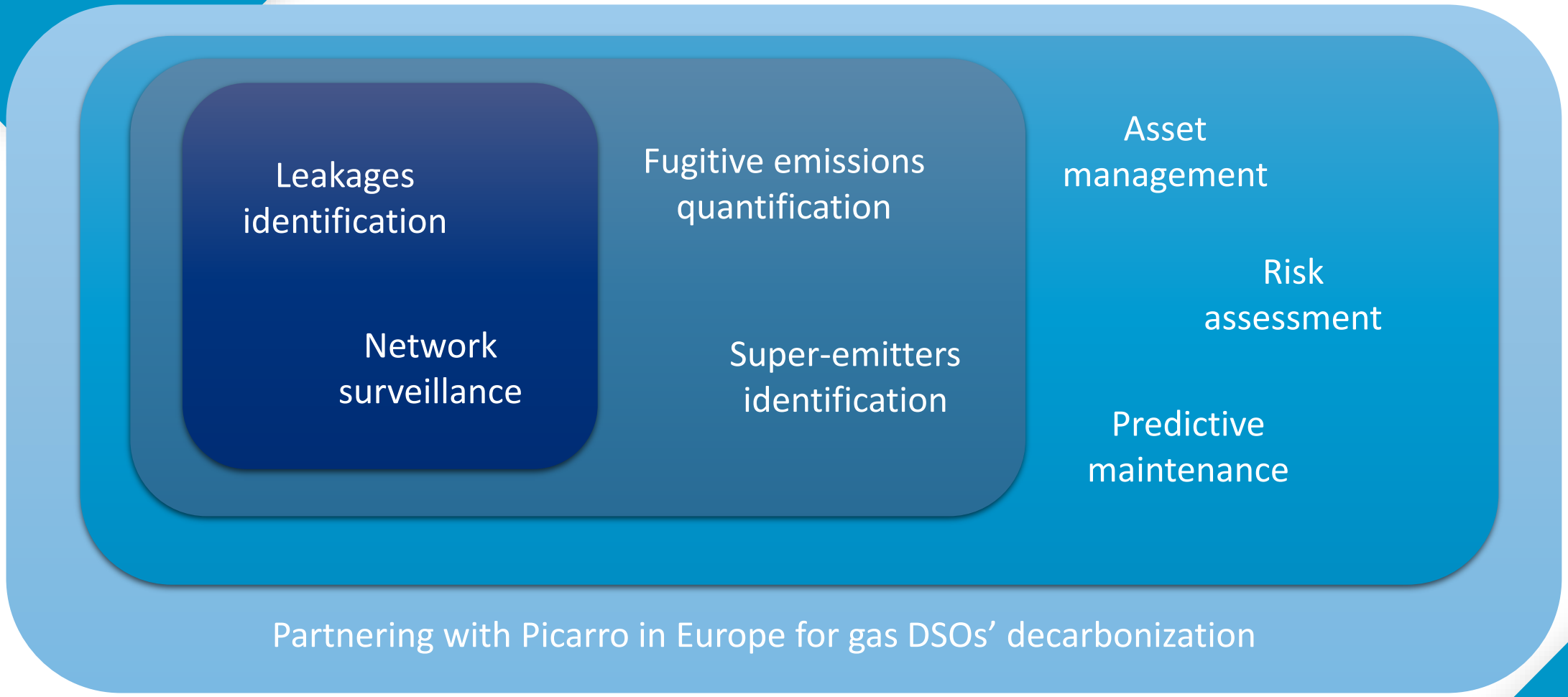
19 Surveyors **70+ Backpacks**

200+ trained drivers

15x Investigated and Repaired Leakage Density vs 2017

Italgas and Picarro

An evolving model and partnership



Italgas and Picarro

An evolving model
and partnership

Leakages identification

Fugitive emissions quantification

Asset management

Network surveillance

Super-emitters identification

Predictive maintenance

Italgas becomes **Picarro**'s shareholder
(announced today - March 2nd, 2022)

Partnering with Picarro in Europe for gas DSOs' decarbonization

Launching a Super Emitter Program – What to Expect

Launching a Super Emitter Program - What to Expect

Joe Felicicchia
Senior Director, Sales and Client Engagement at Picarro

Adam Ray
Principal Supervisor, Gas Operations at DTE Energy

Brent Shuler
Manager of Risk Assessment at NiSource

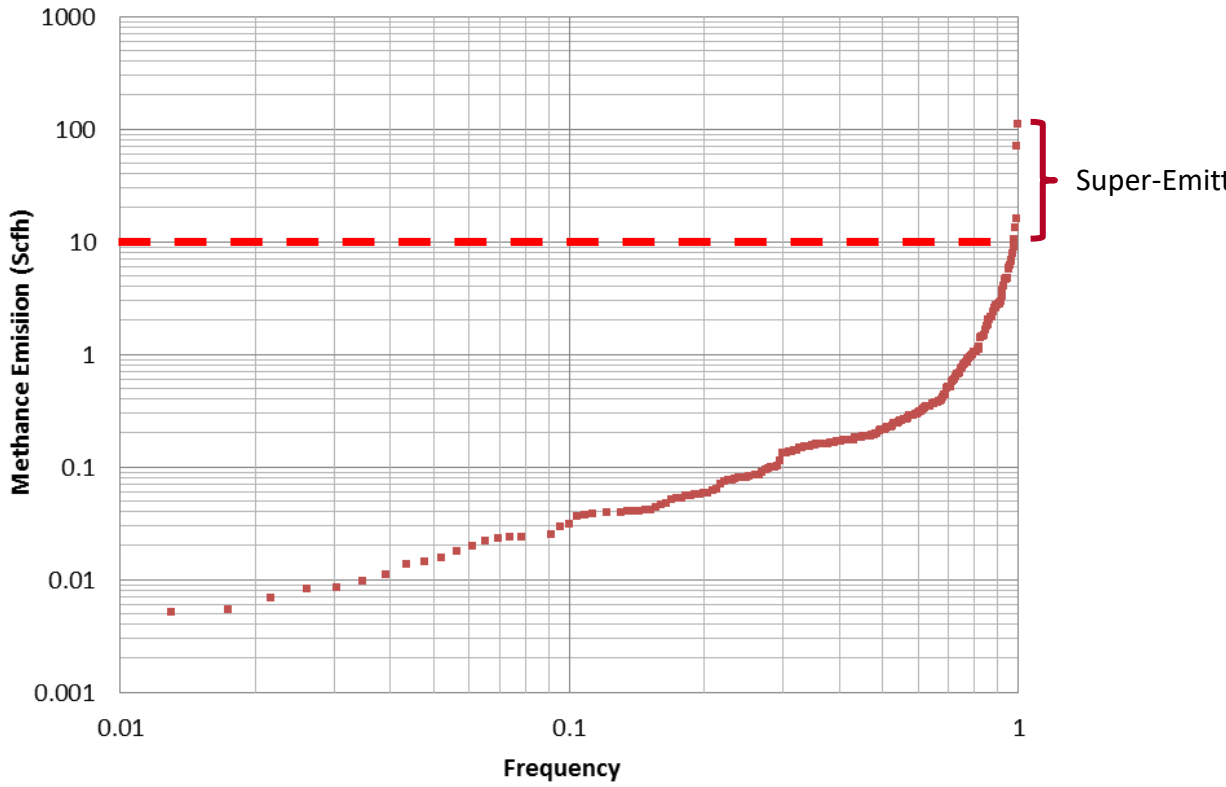
Eban Grasti
Director of Operations Support at Southern Company Gas

Super Emitter Program Background

In a typical distribution network

- Leak flow rates span > 4 orders of magnitude
- Total methane emissions in a distribution network are driven by a small number of large leaks
- Top 10% of emitters can typically contribute up to 50% of total emissions
- Targeted elimination of ”Super Emitters” is the most cost-efficient way to reduce methane emissions

Proven & scalable method to meet current and future emissions reporting and reduction targets – OGMP2.0, Pipes Act, etc.



Source: A. Brandt et al. “Methane Leaks from Natural Gas Systems Follow Extreme Distributions”
Environ. Sci. Technol., 2016, 50 (22), pp 12512–12520

Super Emitter Program Background

- Leverage leak survey drive data or independently drive system to capture data
- Measure and quantify emissions across the gas distribution system
- Identify super emitting leaks and target them for accelerated repair
- **10%** of leaks can typically contribute up to **50%** of emissions

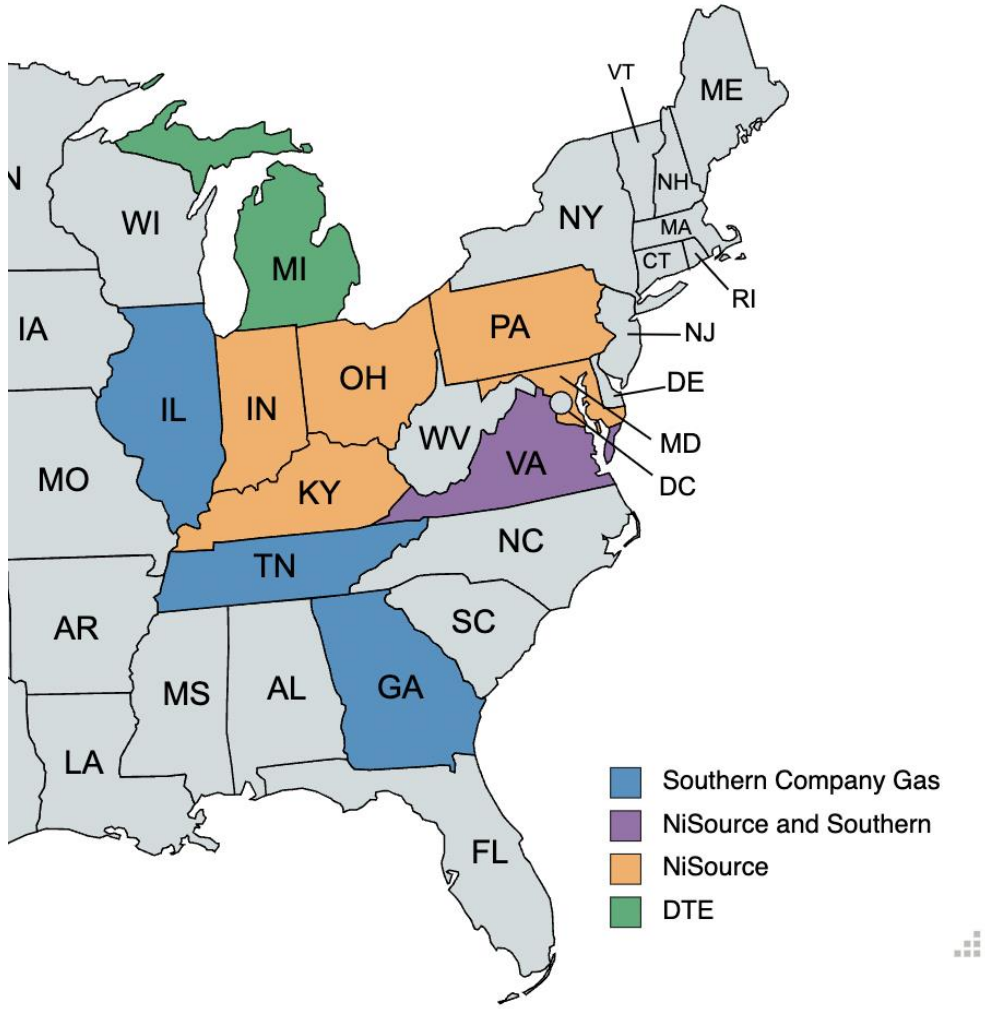
Utilities/States Represented

PICARRO

Southern Company Gas

NiSource

DTE

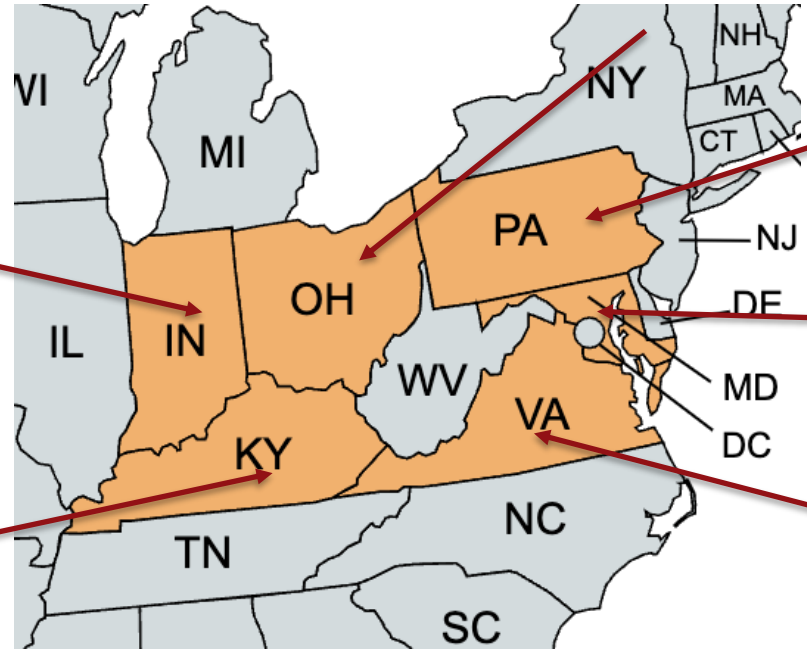


NiSource

PICARRO

[Columbia Gas of Ohio]
1.4M Customers
20,300 miles of main

[NIPSCO]
821,000 Customers
17,700 miles of main



[Columbia Gas of Pennsylvania]
440,000 Customers
7,700 miles of main

[Columbia Gas of Maryland]
33,000 Customers
660 miles of main

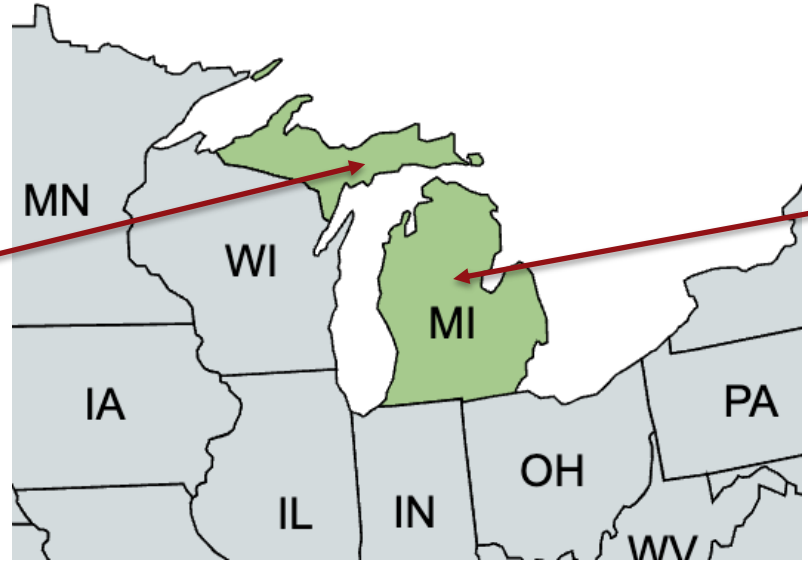
[Columbia Gas of Kentucky]
135,000 Customers
2,600 miles of main

[Columbia Gas of Virginia]
250,000 Customers
5,400 miles of main

DTE

PICARRO

Lots of Yoopers



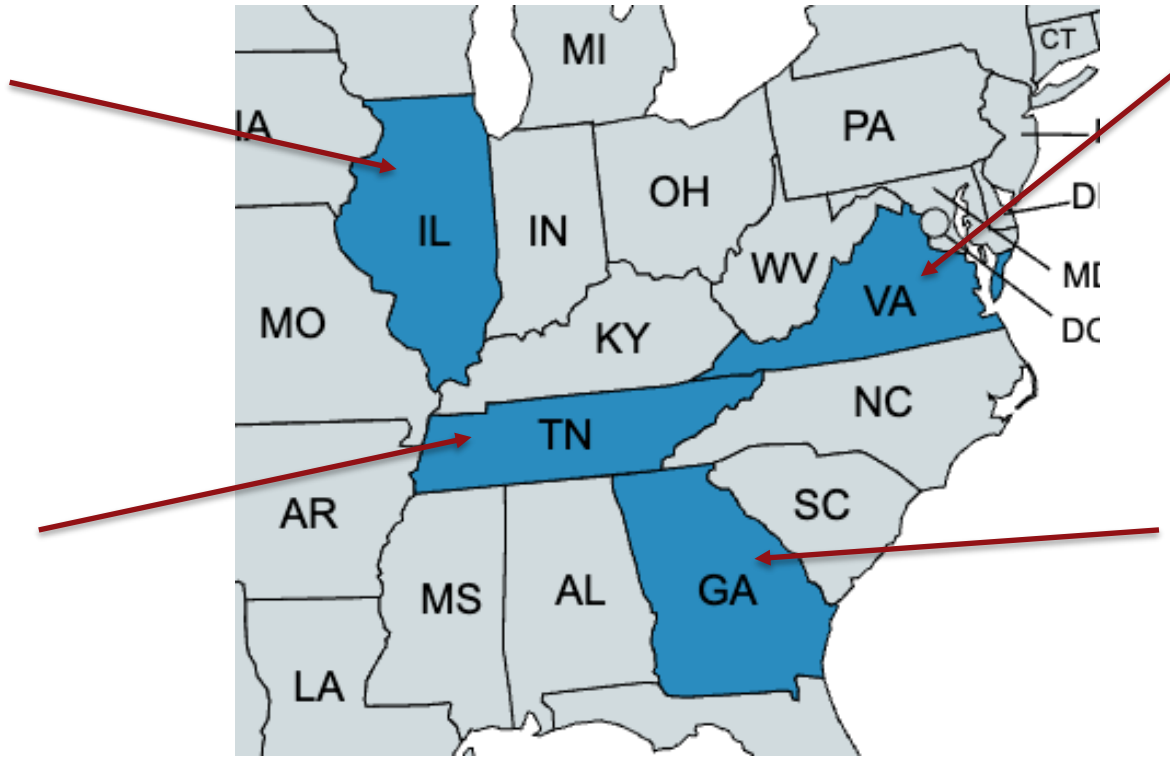
DTE
1.3M Customers
20,300 miles of main

Southern Company Gas

PICARRO

Nicor Gas
2.2M Customers
34,000 miles of min

Virginia Natural Gas
284,000 Customers
5,500 miles of main



Chattanooga Gas
63,000 Customers
1,600 miles of main

Atlanta Gas Light
1.5M Customers
32,600 miles of main

Network-Wide Emissions Quantification, Reporting and Reduction

Network-Wide Emissions Quantification, Reporting and Reduction

Julien Klein
Director, Product Management
at Picarro

Francois Xavier Rongere
Head of R&D and Innovation Team
at Pacific Gas and Electric

Sean MacMullin
Director of Data Analytics
at Picarro

Current Environment

- The current regulatory environment is changing dramatically – new and proposed rules are changing the game
- Regulations now require advanced technologies to combat fugitive methane emissions
- Gold standard of reporting calls for direct measurements, quantification, validation
- Network emissions reporting is now possible and scalable, thanks to latest advances in methane data collection and analytics solutions

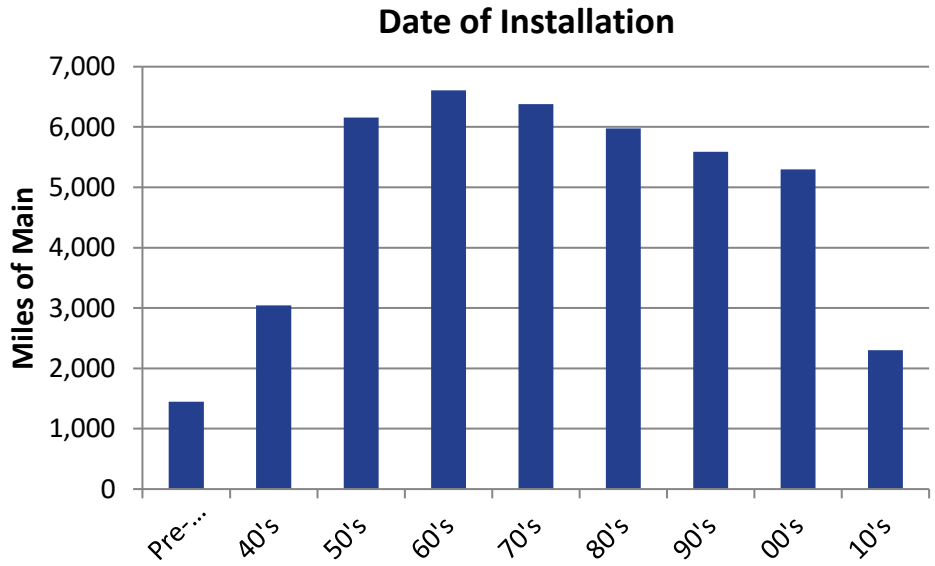
PG&E's Gas System

- Key Statistics
  - 6,553 miles of gas transmission pipeline
  - 43,509 miles of gas distribution main
  - 4.6 million natural gas customer accounts
  - Throughput of 894 BCF in 2020

PG&E's Distribution System

Material	Main (Miles)	Services (Miles)
Plastic	23,783	23,113
Protected Steel	19,461	10,753
Unprotected Steel	266	80
Copper	-	0.09
Total	43,503	33,866

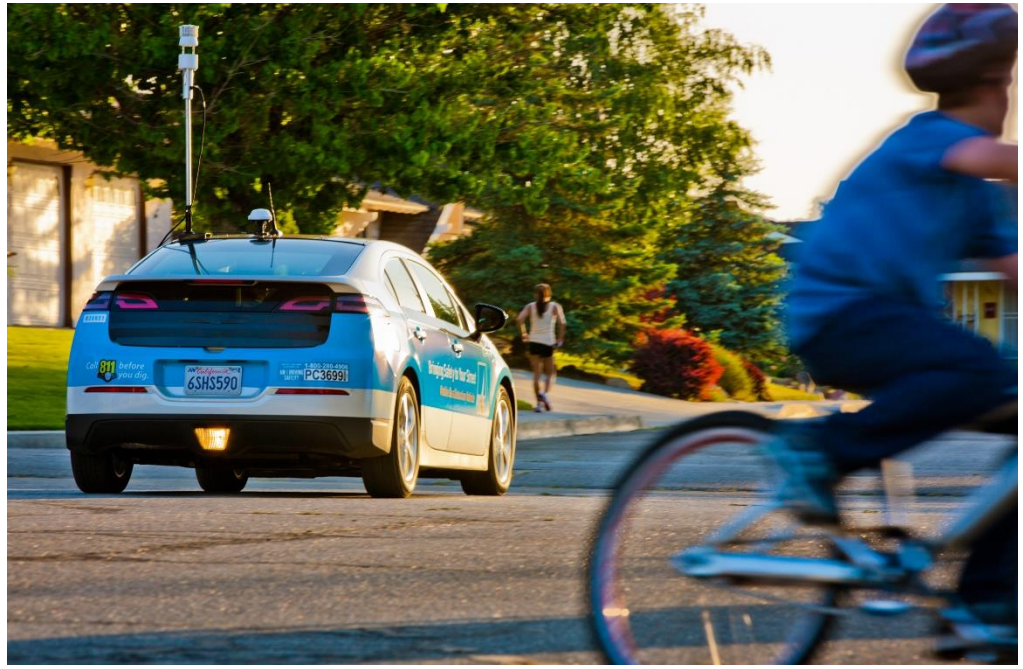
- Business Districts: 5,436 miles of main.



Compliance Leak Surveys

PG&E has used Picarro mobile system since 2014

- Drive three times, both sides of the streets
- Alternate late evening and early morning surveys to leverage wind shift
- Every detection is investigated by a foot surveyor to locate and grade leaks
- Supplemented by manual survey of immediate proximity of buildings

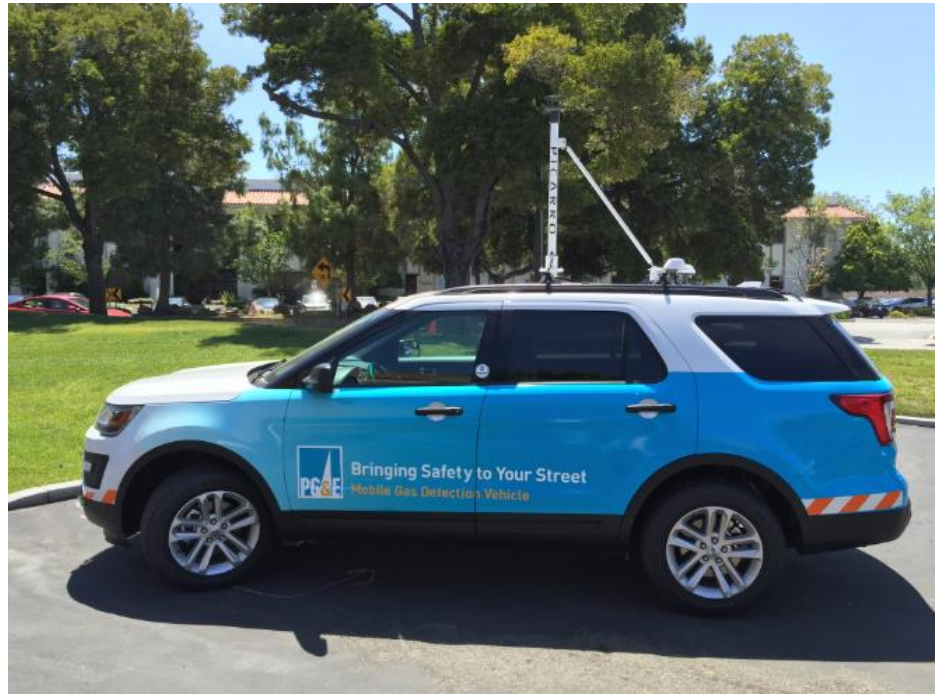


The Picarro mobile system is also used for special surveys after emergency events

Methane Emissions Abatement

PG&E has a goal to reduce its methane emissions by 20% in 2025 and 40% by 2030 compared to 2015

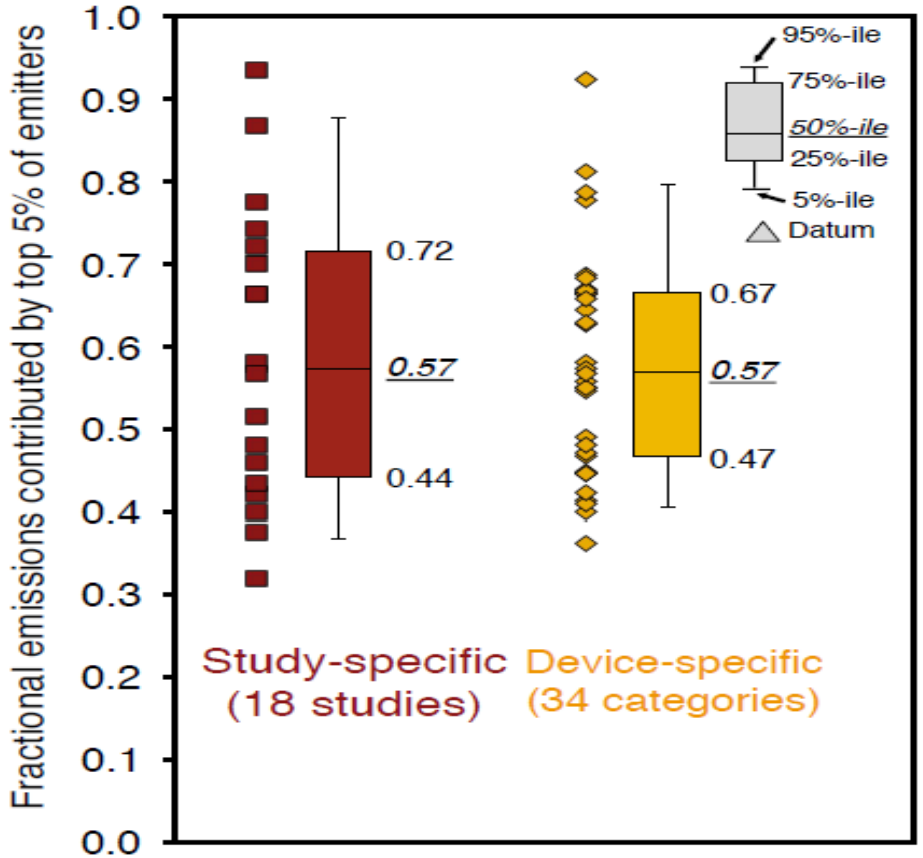
- A broad range of actions:
  - Reduce blowdowns
  - Replacement of high bleed controllers and actuators
  - Quarterly leak survey at facilities
  - 3-year leak survey of the Distribution System
  - Pipeline replacement
  - Prioritization of larger leaks for repair



Super Emitter Distribution program

Accelerate the detection and prioritize the repair of larger leaks

- Most of emissions are driven by a small number of large leaks
- The whole distribution system is driven every year
- Picarro's algorithms estimate leak size
- Only indications larger than a threshold currently set at 10 scfh are investigated
- Larger leaks are repaired in priority

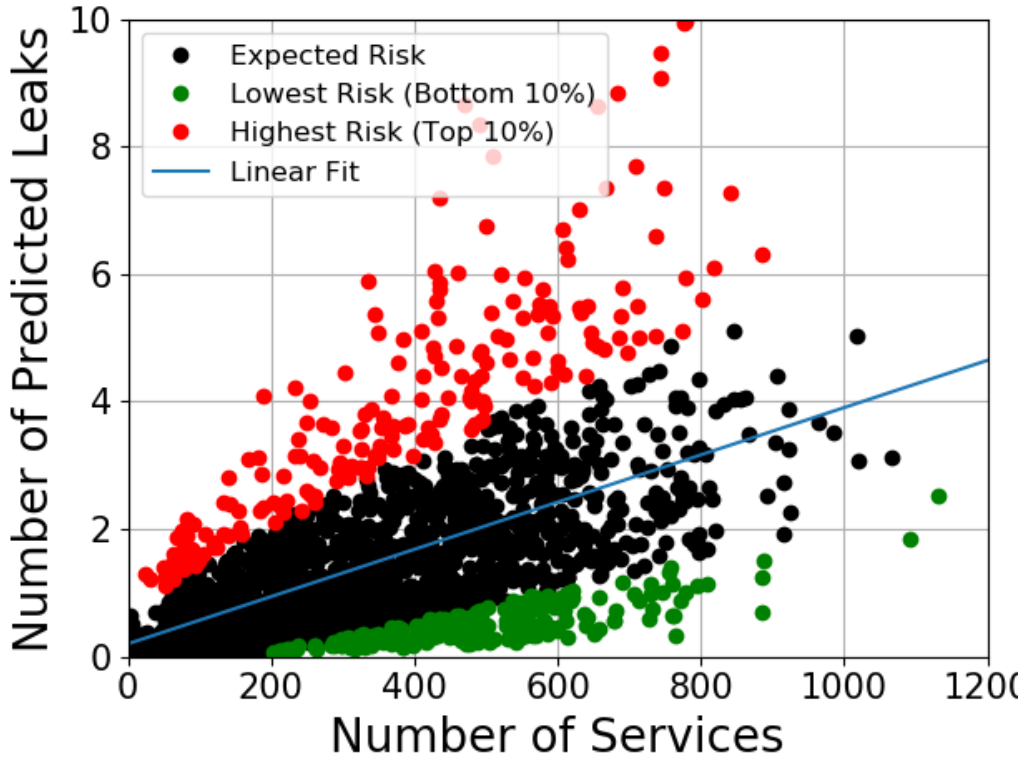


Source: A. Brandt et al. "Methane leaks from natural gas systems follow extreme distributions" Environ. Sci. Technol., 2016, 50 (22), pp 12512–12520

Predictive Modeling: the Path Forward

Data collected by the cars are merged with our DIMP model to predict leak findings of future surveys

1. Estimation of emissions for un-surveyed areas
2. Local and dynamic optimization of leak survey frequency
3. Measurement based methane emission reporting



Leveraging Real-Time Methane Data to Optimize Pipeline Replacement Projects

Leveraging Real-Time Methane Data to Optimize Pipeline Replacement Projects and Capital Expense Decisions

Julien Klein
Director, Product Management
at Picarro

Sean MacMullin
Director of Data Analytics
at Picarro

Caroline Geiger
P.E., Engineer, Distribution Integrity
Management at CenterPoint Energy

Grant Rivard
Manager of Operational Risk
Programs at Consumers Energy

Data Collection and Processing

- Identify boundaries for data collection outside of Leak Survey
- Based on pipeline risk model
- Based on historical leaks
- Areas of interest for emissions reduction program
- Other operational factors

- Drive boundaries and generate EQ Reports in P-Cubed
- EQ 3.0 algorithm estimates emissions for each indication
- ALD 4.0 algorithm estimates the probability each indication is an above-ground leak, below-ground leak, or other source

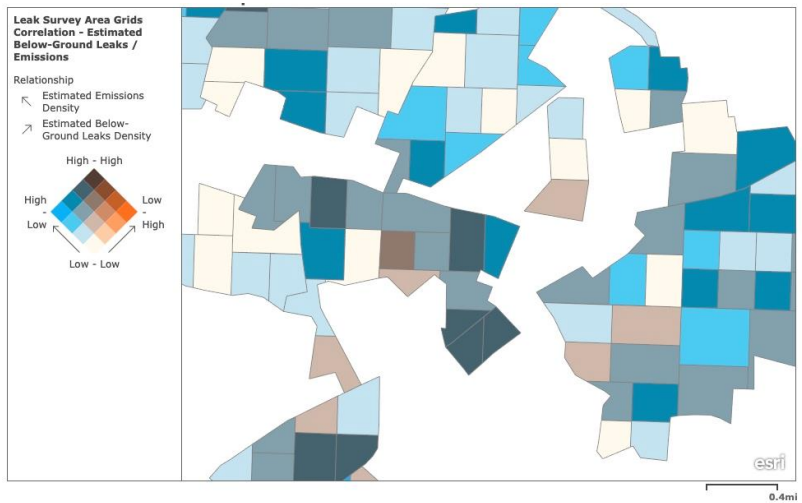
Data Aggregation and Reporting

Network Assessment Viewer displays aggregated results over:

Boundaries – areas of operational interest

Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA | Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA

Boundary Grids - flexible boundary partitions matching size scale of typical replacement project



Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA | Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA

Pipelines - indications matched to segment using probabilistic model

Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA | Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA

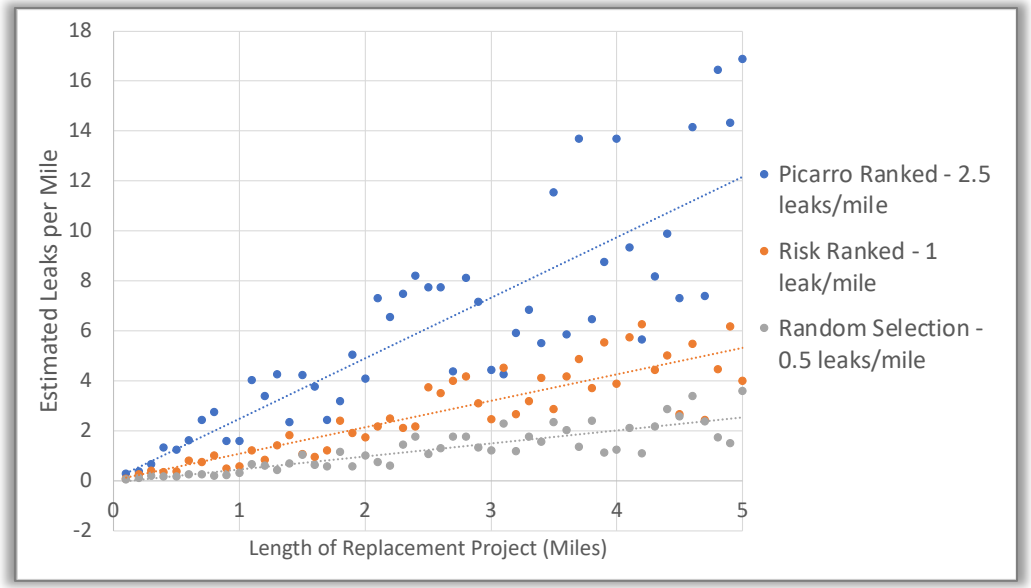
Example Result

- Prioritize or confirm scheduled replacement areas. Provide additional dimensions to pipeline risk model including estimate of leaks and environmental impact (emissions)

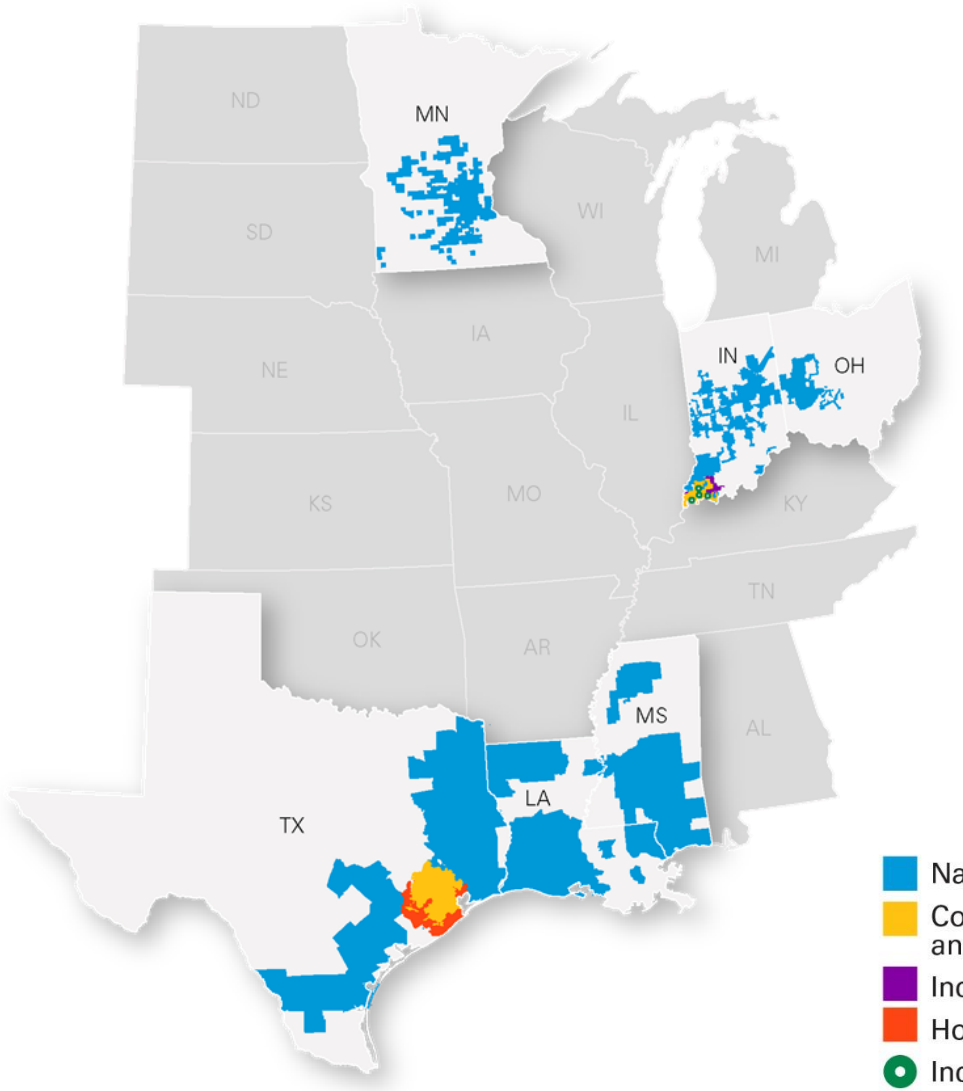
Pipeline segments identified with high likelihood/frequency of failure.

Pipeline segments with estimated active leakage (number of leaks and emissions).

Picarro algorithms are typically > 2x more effective at identifying areas of active leakage compared to risk models and > 5x more effective compared to random selection.



CenterPoint Energy Service Territory



Natural Gas Distribution, Electric Transmission & Distribution and Power Generation

nearly **7 million** gas and electric metered customers

6 states

- Natural Gas Distribution
- Combined Electric Transmission & Distribution and Natural Gas Distribution
- Indiana Electric Transmission & Distribution
- Houston Electric Transmission & Distribution
- Indiana Power Generation

PICARRO

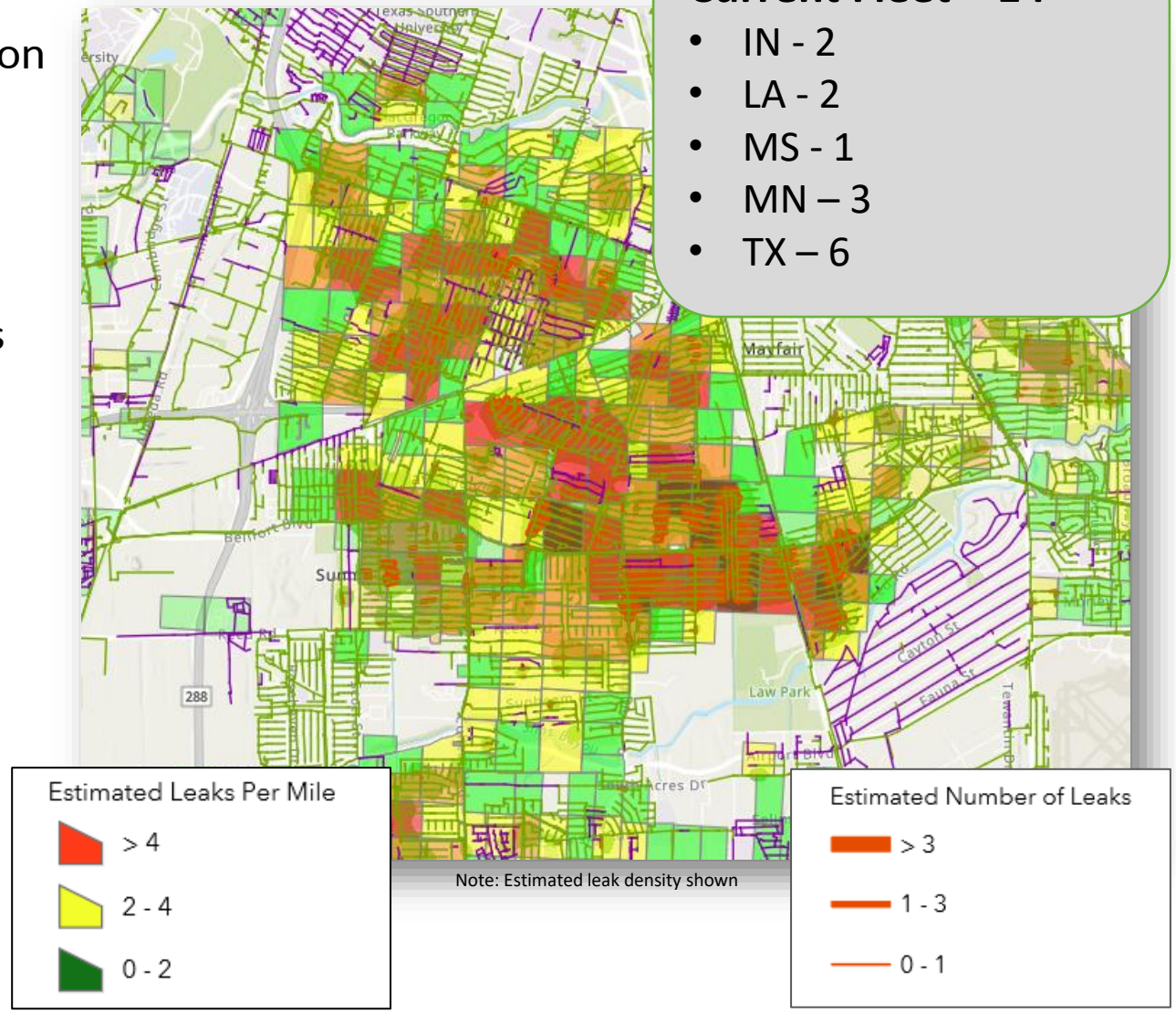
CenterPoint Energy

Picarro Emissions Quantification (EQ)

- Picarro EQ mode – estimates leak density based on emissions data
  - No compliance work as a result of running EQ mode only
- Data collected on all compliance leak survey runs
- EQ only and accelerated leak survey areas recommended by DIMP
- EQ Data collected
  - 2019 – 750 + miles
  - 2020 – 1600 + miles
  - 2021 – 1200 + miles

Current Fleet – 14

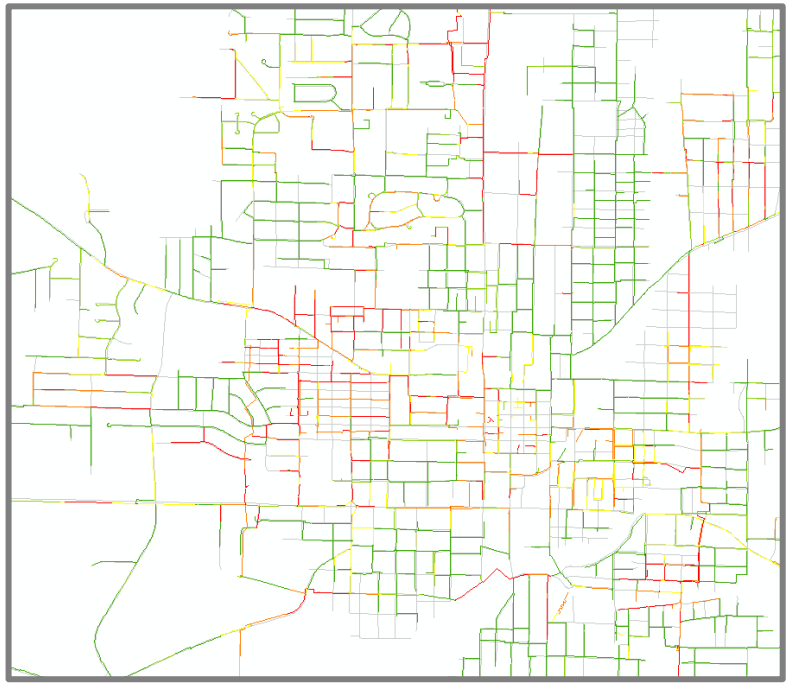
- IN - 2
- LA - 2
- MS - 1
- MN – 3
- TX – 6



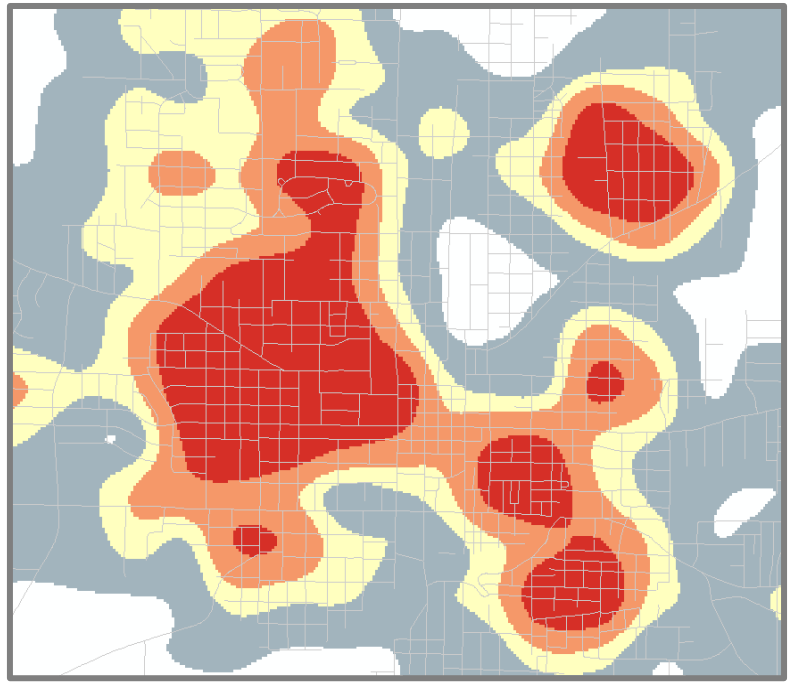
Note: Estimated leak density shown

Leak Data's Role in Distribution Integrity Management (DIMP)

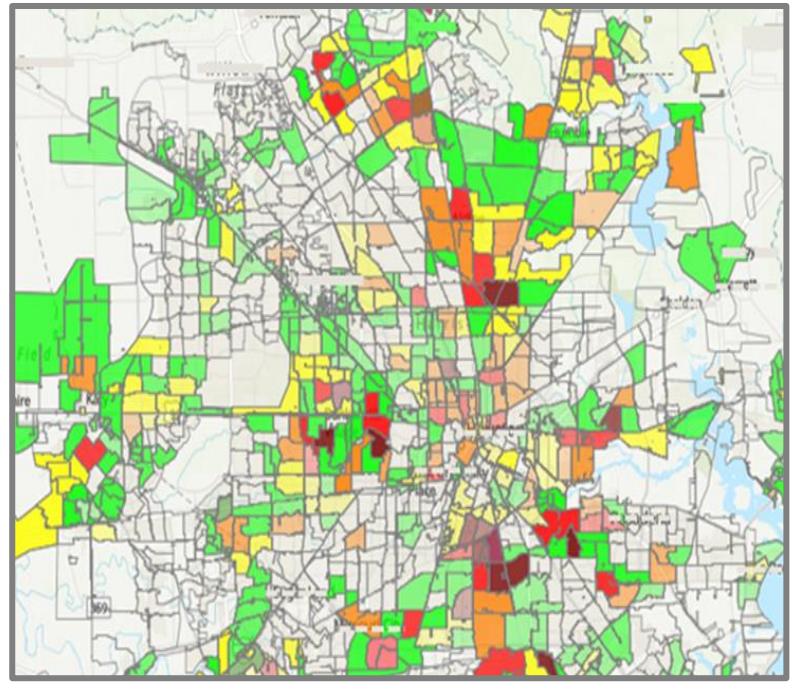
Asset Risk Prioritization Risk Model



Leak Density Heat Maps



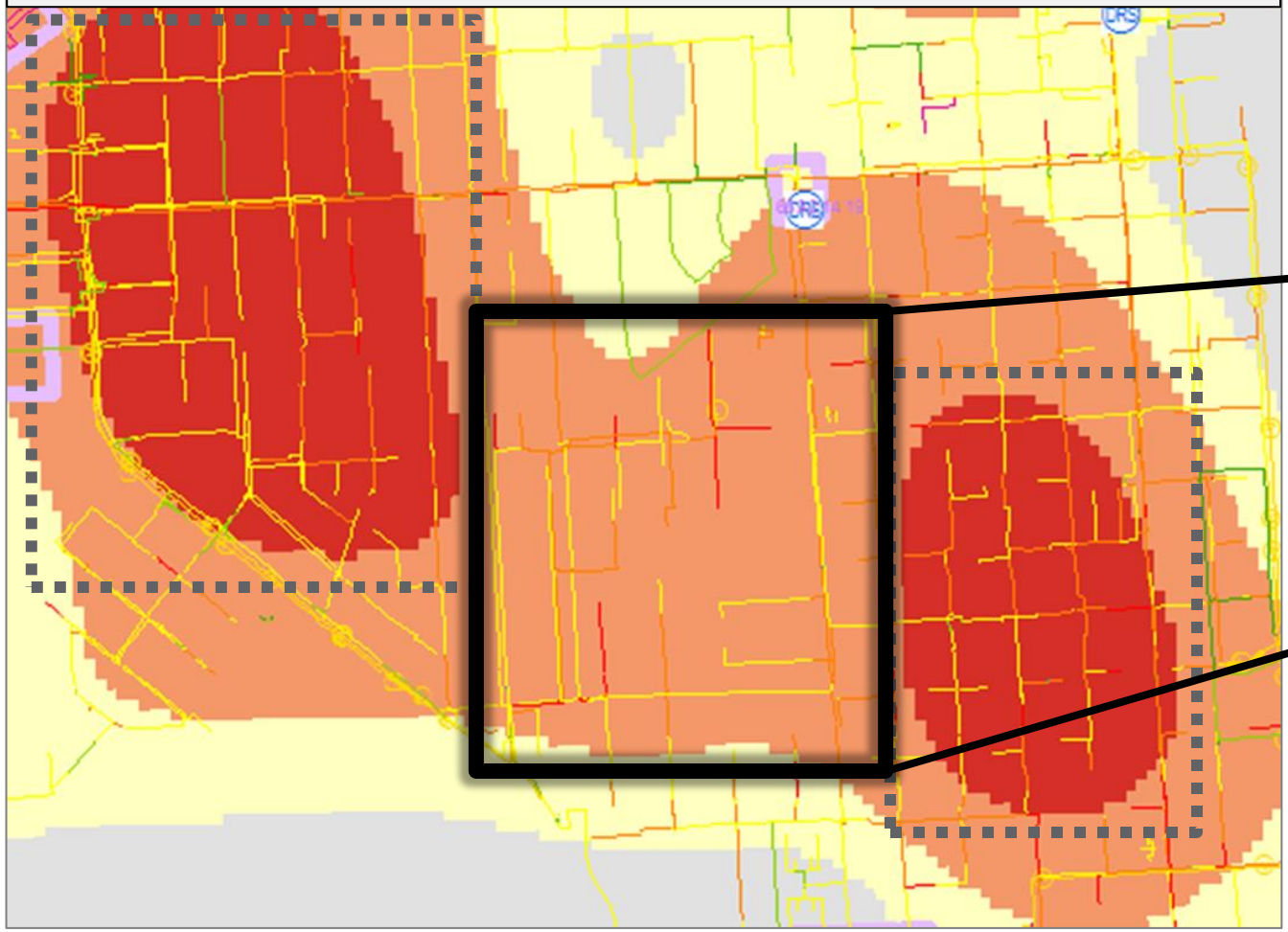
Picarro EQ Leak Density Dashboard

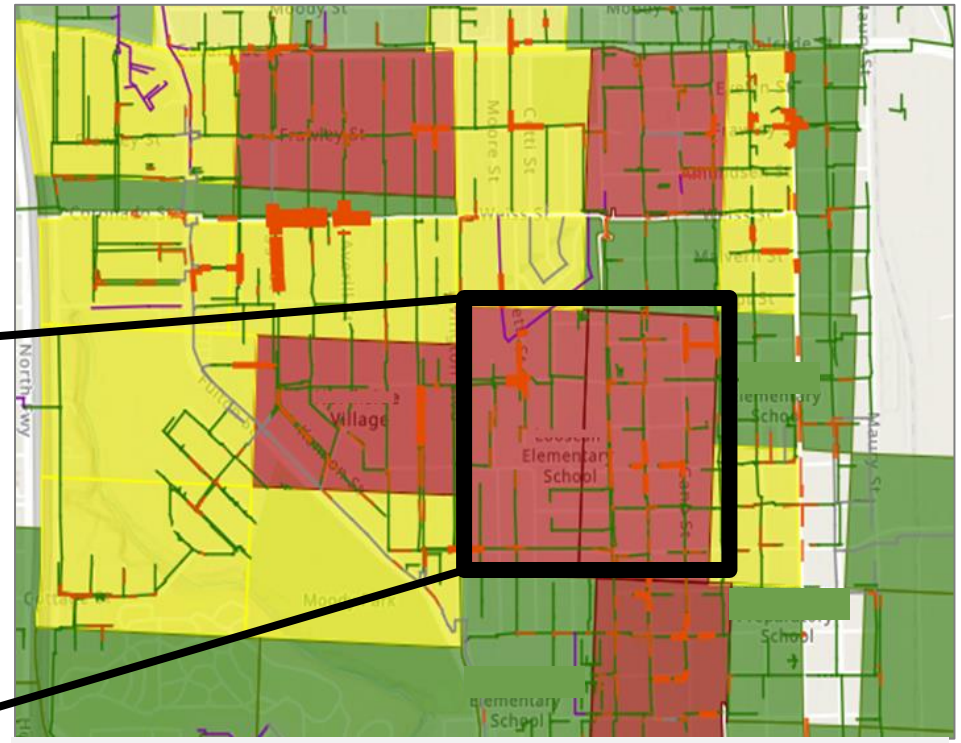


Internal Tools. Influenced by Picarro Advanced Leak Detection Technology

DIMP Project Selection – Prioritization of Phasing

Asset Prioritization Risk Model + Leak Density Heat Maps





Note: Estimated Leak Density Shown from Picarro Dashboard

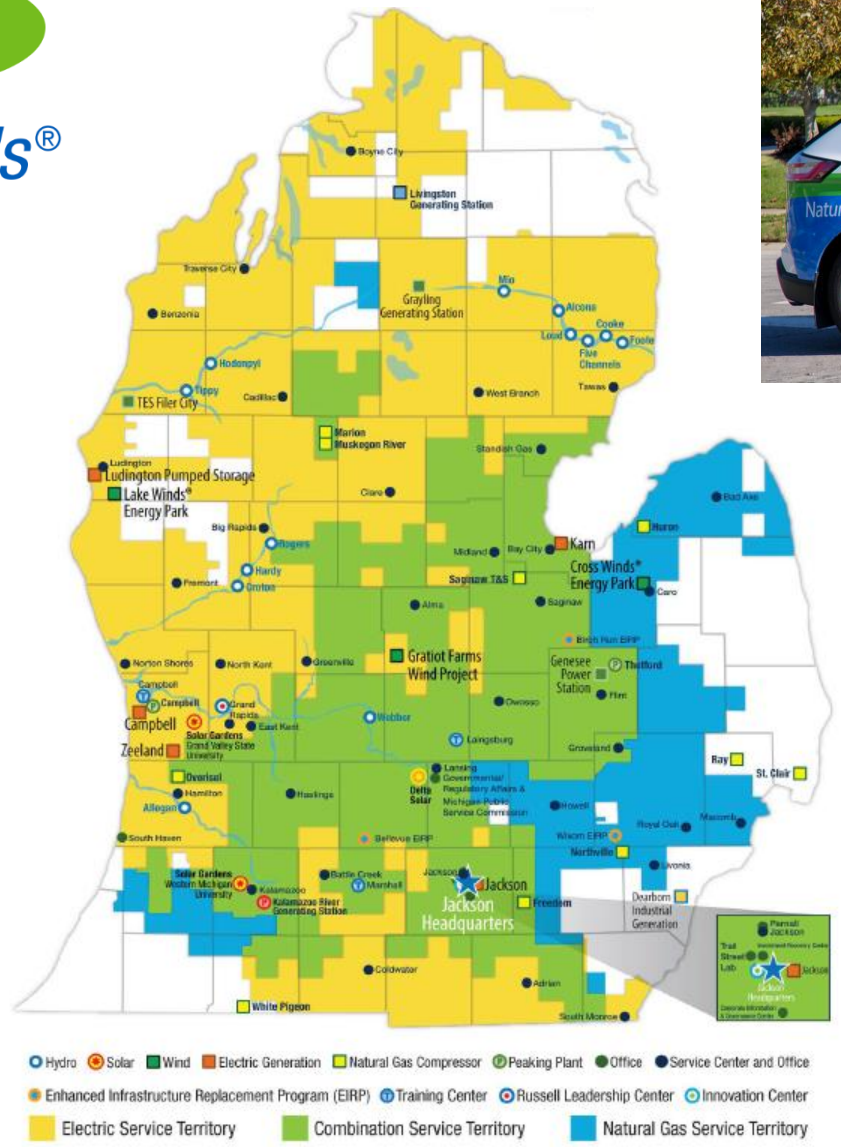
Consumers Energy

Count on Us®

At a glance:

- Founded in 1886
- 8,500 Employees
- 28,000 Miles of Distribution Main
- 1.8 M Gas Customers

- Two Picarro Units: Operationalized since October 15th, 2021



Drives Executed

Final Report ran in P3

CSV exported from ERV

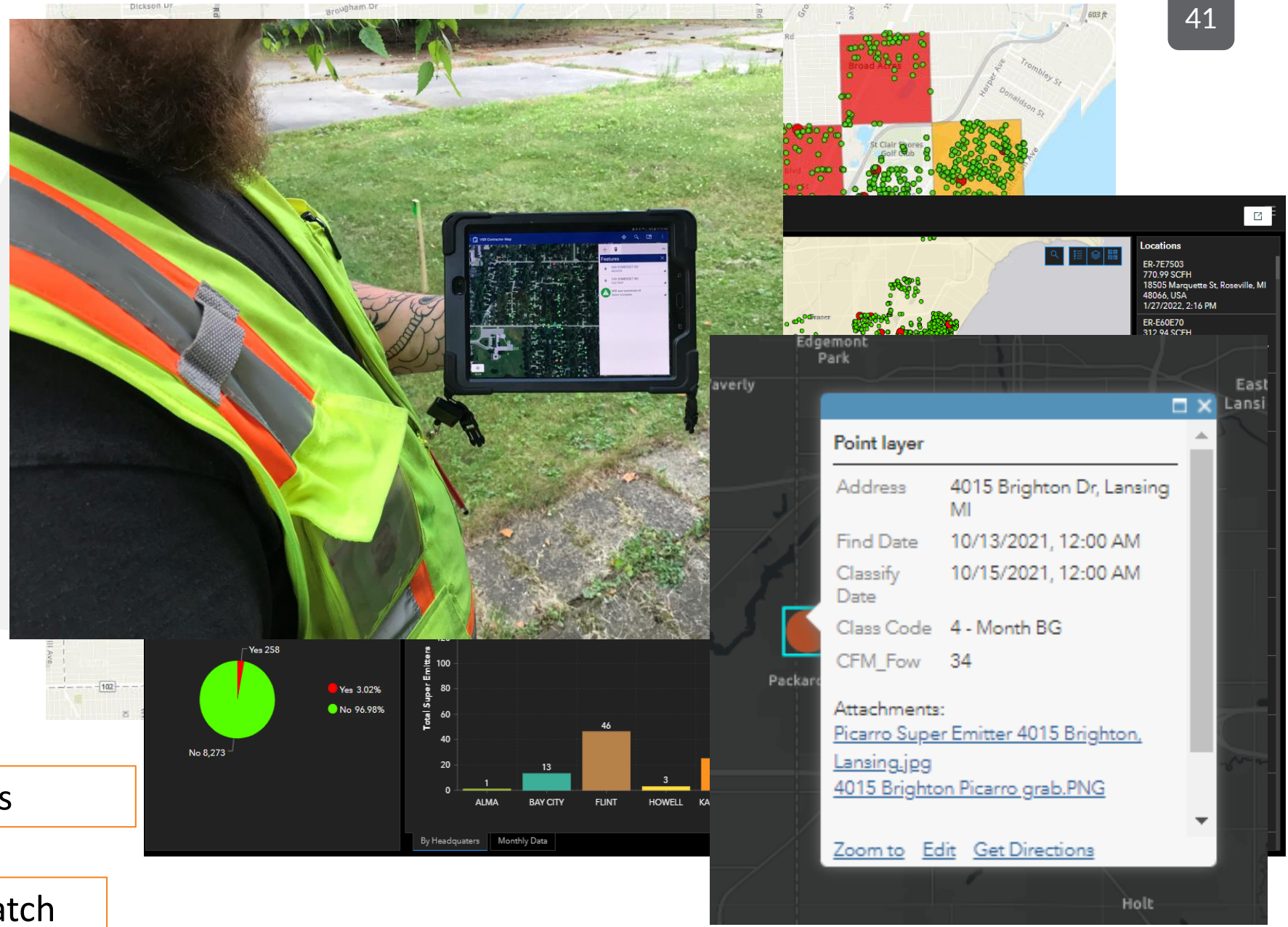
Upload and Append to GIS

Reporting

KPI's

Summaries

Field dispatch



PICARRO

Section #	Total Indications	Total SCFH	DRAM Ranking	SCFH Ranking	Indications Ranking
026334	50	68	1	38	36
016227	127	196	2	7	8
145521	37	57	3	43	42
016327	145	219	4	4	5
016331	81	140	5	19	23
026323	56	111	6	24	32
145520	137	154	7	14	6
016308	152	290	8	3	3
026004	57	83	9	30	31
040312	76	116	10	22	26
016334	93	188	11	12	17
145517	85	108	12	26	22
026314	95	144	13	18	16
016322	151	208	14	5	4
016335	39	112	15	23	40
085612	52	108	16	27	34
145222	1	2	17	50	50
016304	96	146	18	16	15
016333	80	132	19	20	25
016320	104	150	20	15	13
016330	71	201	21	6	27
030204	2	27	22	47	49
016234	104	191	23	10	13
016118	123	145	24	17	10
016329	123	170	25	13	10
145216	64	75	26	35	29
016319	115	195	27	8	12
016235	222	496	28	1	2
026036	49	64	29	40	38
026311	39	36	30	45	40
125424	37	35	31	46	42
016302	256	325	43	2	1
525929	128	192	44	9	7
120325	62	78	45	32	30
026127	45	71	46	36	39
016232	35	48	47	44	45
521134	50	78	48	33	36
145518	36	65	49	39	44
145533	86	59	50	41	20

Sections Scheduled	DRAM Sections Prioritized
30	10

Scenario	MCF Reduced	Indications Addressed	Equiv. Customers
DRAM - Current	19	2626	152,000
SCFH Focused	29	3219	225,000
Indications Focused	27	3318	216,000
Weighted	27	3156	210,000
Staggered	24	3098	192,000

Wt % (DRAM)	Wt % (SCFH)	Wt % (Indications)	Customer CF
40%	40%	20%	127

Scaling ALD, Internal and External Change Management

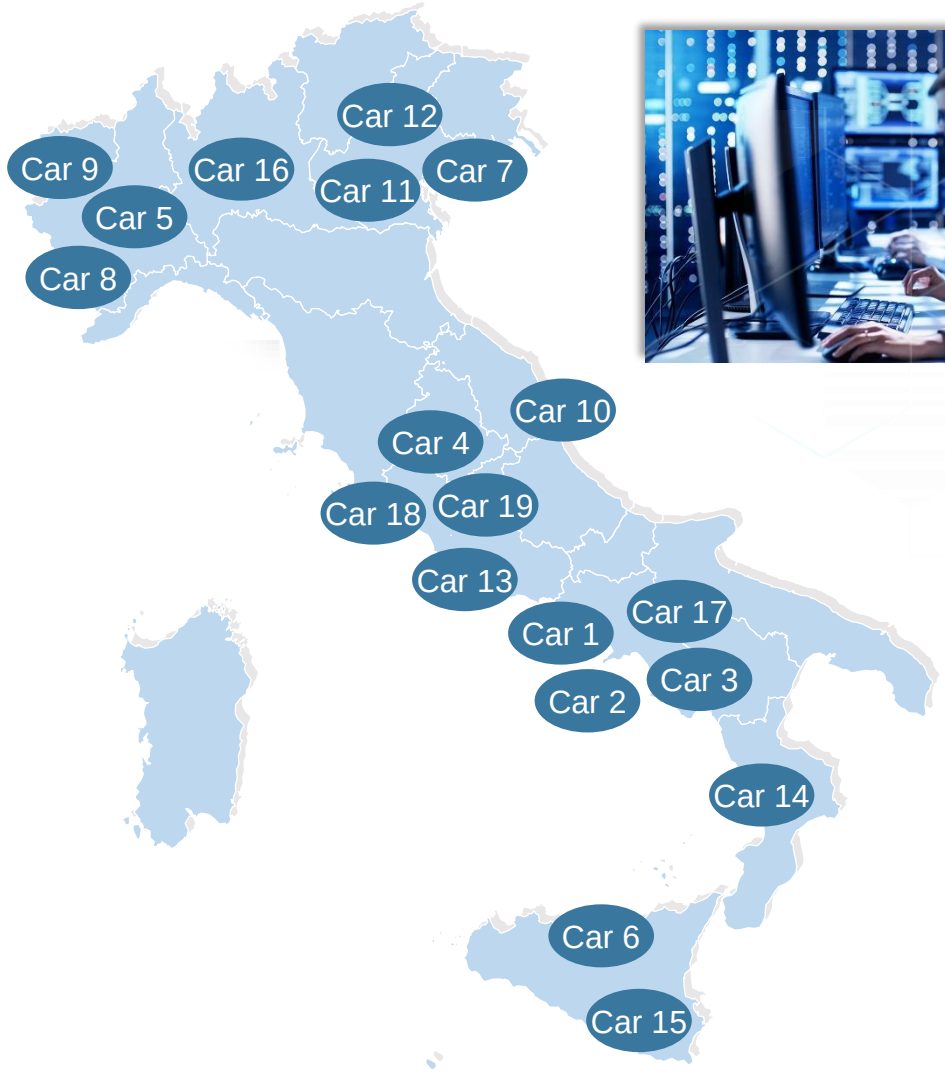
Scaling ALD, Internal and External Change Management

Tom Dockery
Senior Director, Client Delivery and Support at Picarro

Jeff Goetzman
Manager, Texas Technical Field Operations at CenterPoint Energy

Stefano Guglielmo
Head of Grid Management Central Services at Italgas

Scale



- Over 4.000 employees
- Adjusted Total Revenue (2020) 1,3 bn€
- Over 73.000 km of Main pipe
- 15 regional divisions with 1.887 municipalities served
- Italgas S.p.A. parent company is located in Milan with Italgas Reti S.p.A. offices in Turin
- ALD evaluation started in 2018 and today the have a fleet of 19 cars with 5 more ramping in the first half of 2022
- Italgas has a dedicated **Central Team** leading and providing support to the driving activity 24/7

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: 31 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

2022 Capex budget & predictive maintenance

With the results of our experience with CRDS technology, we are designing a significant dedicated 2022 capex budget for the asset management of the network, in order to reduce next year fugitive emissions.

Capex Budget based on

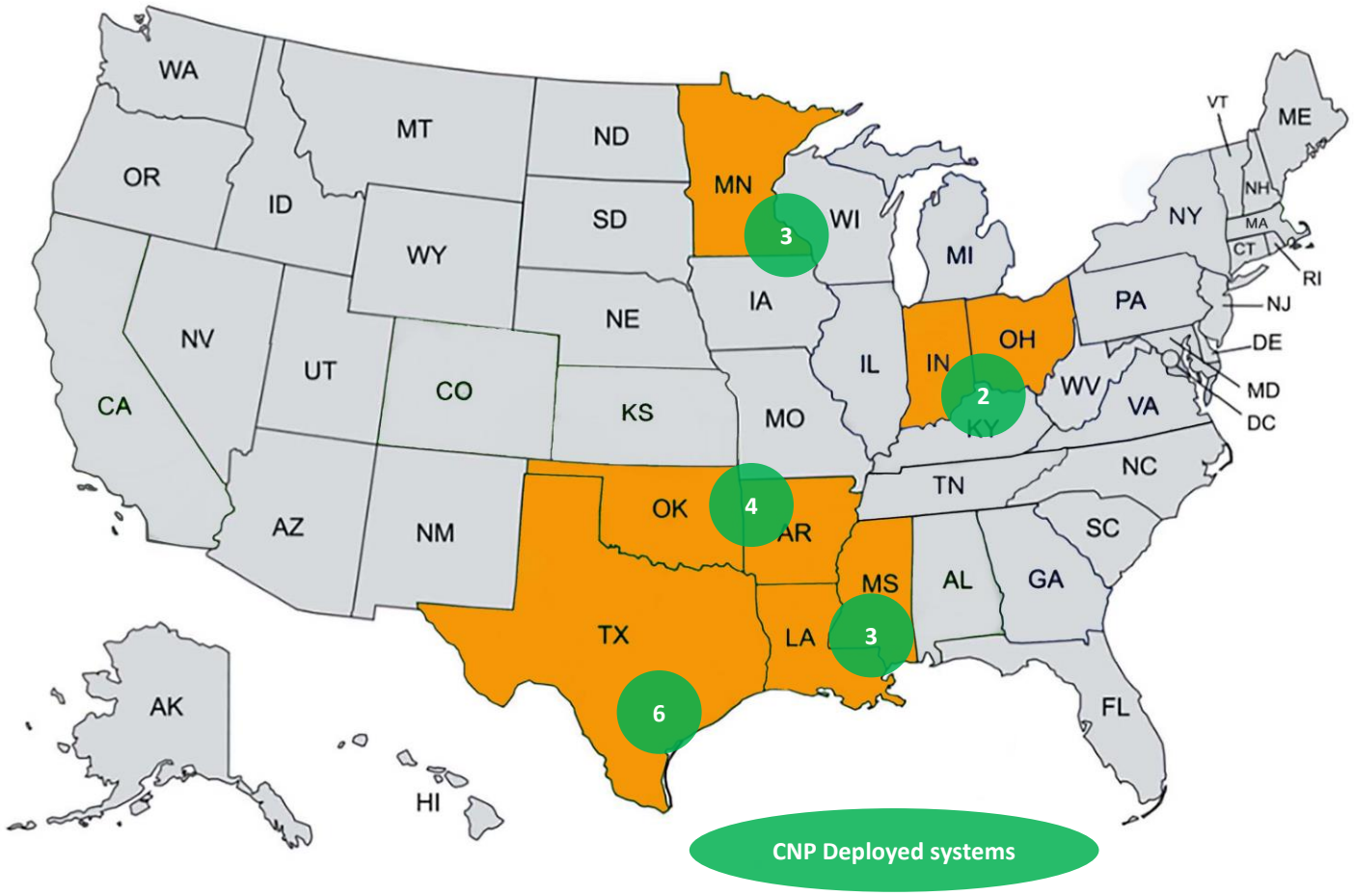
- **Smart Maintenance**
- **Network satefy and reduction of odor calls**
- **Emissions reduction**
- **Operational efficiency**

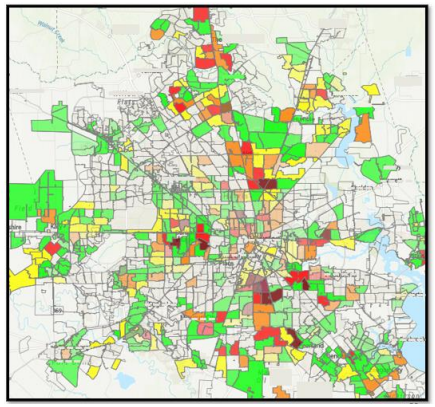
Asset management optimisation

Furthermore, we are currently developing with Picarro a **Smart Maintenance** model, based on ESRI digital platform, to better manage our assets.

CenterPoint Energy

- Over 4 Million customers
- Over 100,000 miles of main and transmission pipe
- 2020 Revenue of 7.4 billion USD
- Over 8,000 employees
- CenterPoint Headquarters in Houston, Texas
- Over 150 employees focused on ALD
- Joined forces with Vectren in 2019 adding Indiana and Ohio
- Transitioned Arkansas and Oklahoma to Summit Utilities in 2022
- 9 years of ALD experience





PICARRO

CenterPoint Energy

2013/2014

- First Engagement
- Enterprise User Pilots

2015

- Risk Based Deployment
- Solidify Regulatory Certainty

2016

- Migrating to Full DOT Compliance in TX and AR
- IT workflow integration
- Deploy P3300 Ethane capability

2017

- Deployed Analytics
- Increased Hazardous leak find rates by 84% over Traditional
- Reduced meter leaks by 40%

2018

- Full DOT Compliance in All Regions (TX, AR, OK, LA, MS, MN)

2019/2020

- Emissions Quantification drives for DIM analysis
- 750 DIM miles in 2019
- >1600 DIM miles in 2020

2021/2022

- Expanding into Indiana and Ohio
- Emissions Reporting

Thank You!