Advanced Leak Detection (ALD)

Operationalizing ALD with Leak Surveys

SC/NC Pipeline Safety Seminar

Columbia, SC

August 12, 2025

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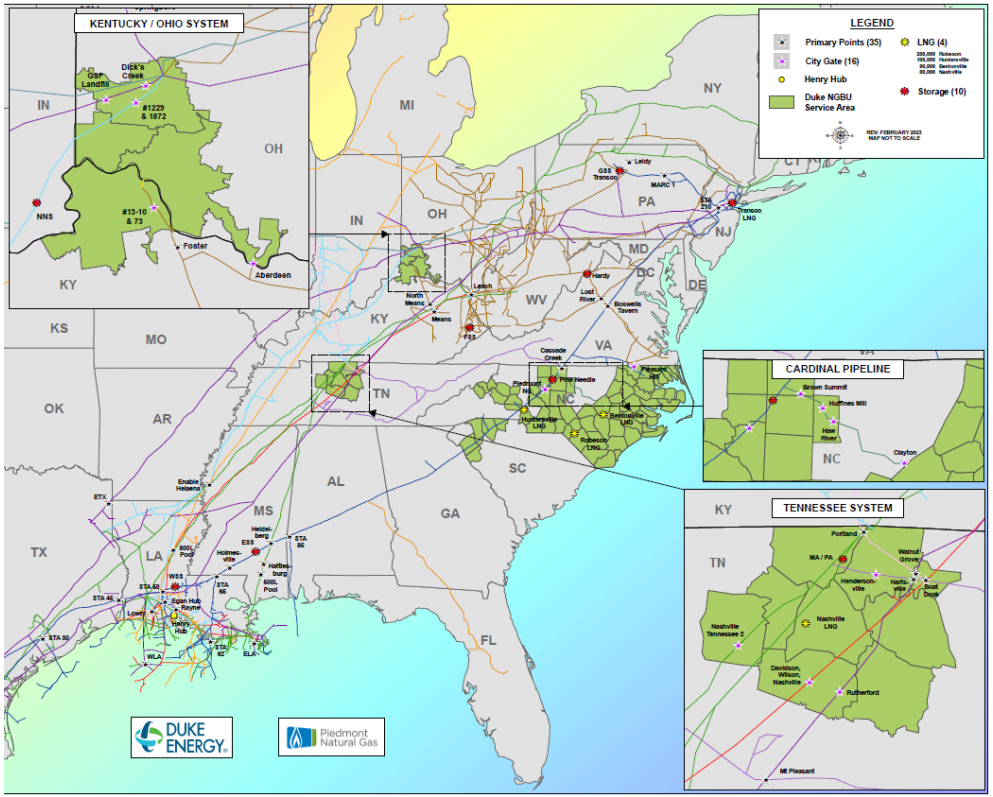
Piedmont Natural Gas®

The Natural Gas Business at Duke Energy



- 1.7 M customers in 5 states
- ~32,000 miles distribution main
- ~2,900 miles intrastate transmission main
- 7 Energy Reliability Centers (ERCs)
- 4 Liquified Natural Gas (LNG) sites
- 2,000+ employees in NGBU

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Natural Gas Business Unit Strategic Priorities

Customer	Employees	Operations	Growth	Environment
Happy and Loyal Customers	Great Place to Work	Safe and Event-Free Operations for You and Our Customers	Growing and Strong Performing Business	Operate a Net-Zero Methane Emitting Natural Gas System
Measure Net Promoter Score JD Power Score	Measure VOICE Survey Results Employee Retention	Measure Injuries PVA Outages Compliance Audits	Measure NGBU Earnings Growth	Measure Net Methane Emissions Natural Gas Supply Emission Intensity
▪ Billing and Payment ▪ PNG Web Presence ▪ Midwest Customer Satisfaction	▪ Internal Communications ▪ Visibility of Leaders/Field Visits ▪ Employee Recognition ▪ Diversity and Inclusion ▪ Everyday employee coaching and development	▪ Pipeline Safety Management System (PSMS)/Procedural Adherence ▪ Excavation Damage Reduction Program ▪ Integrity Management Program (TIMP/DIMP) ▪ Work Permit Process	▪ Capital Program Implementation and Efficiency ▪ Power Generation Additions ▪ Service Plus Growth ▪ Capture Unserved Market Segments	▪ Advanced Methane Leak Detection (AMLD) Implementation ▪ Leak Repair Response Time ▪ RNG and Hydrogen ▪ Procurement Activities

Stakeholder Engagement

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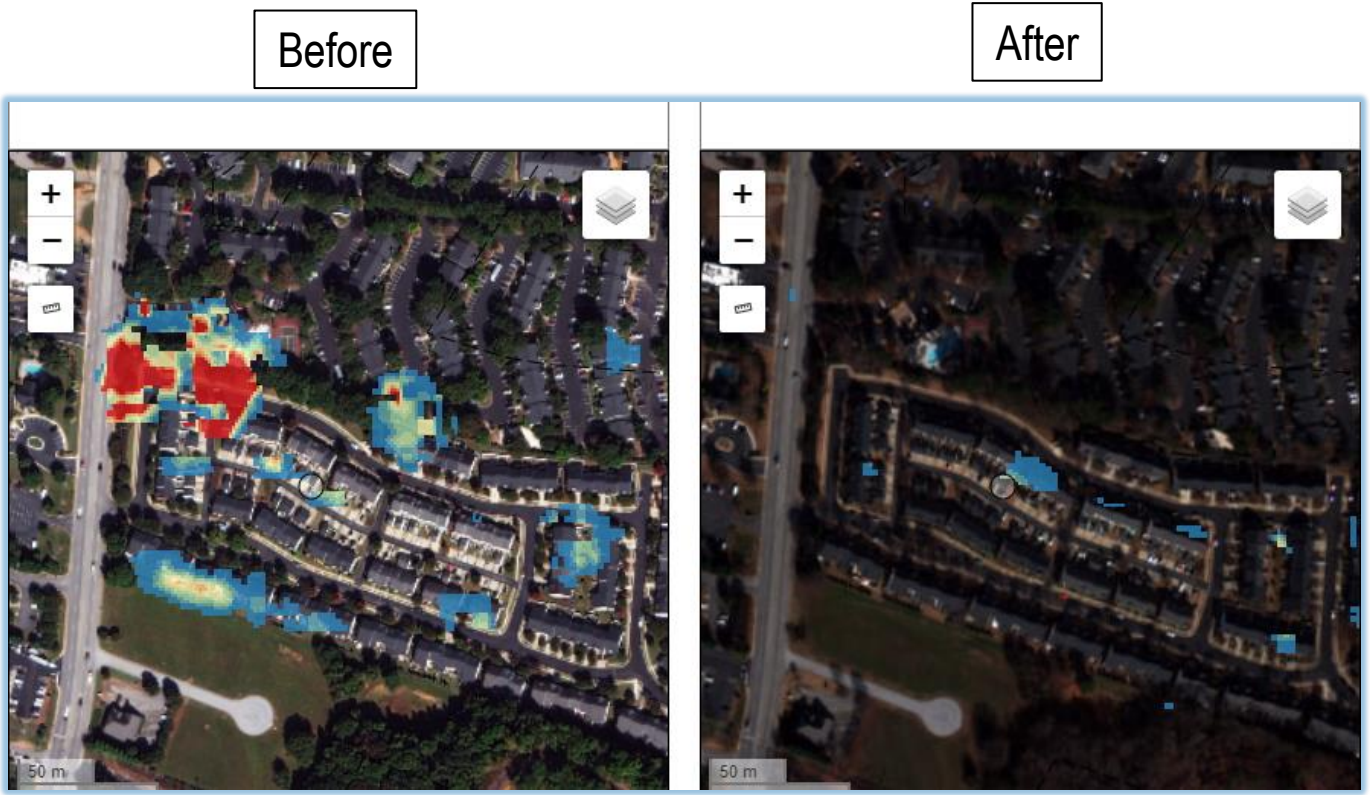
NGBU Net Zero Goal Review

The Natural Gas Business Unit (NGBU) Goals

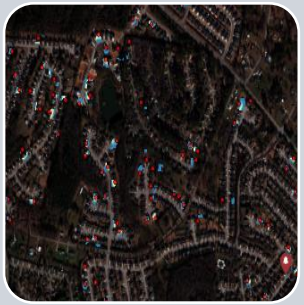
- Achieve net-zero Scope 1 methane emissions by 2030
- Reduce Scope 3 upstream methane emissions from purchased to net-zero by 2050
- Reduce Scope 3 downstream sold natural gas (not to include wholesale sales of natural gas on interstate pipelines) CO2 equivalent to net-zero by 2050

Satellite Leak Detection –“Find it, Fix It Model”

- October satellite capture found several methane plumes over this townhome complex
- ***21 confirmed leaks*** after site visit leak survey– all above ground, on various components of meter set (risers, union, service stops, regulators)
  - 16 repaired
  - 5 scheduled
- Latest capture in December found a significant reduction in methane plumes/emissions based on repairs complete



Emission Detection “System of Things”



Satellite

Operationalized satellite emissions captures in NC/SC/TN

Scaling satellite to OH/KY

Ground validation

Goal for “real-time” leak detection surveys of all LDC assets

USE CASE: Quickly and efficiently locating and repairing leaks on system

Cross Compression

Incorporated into major projects LDC work

USE CASE:

No intentional releases of gas or flaring for non-emergency situations

Continuous Monitoring Devices

Pilots underway at regulator stations, LNG facility & compressor station

Provides 24/7 surveillance of methane emissions

FUTURE OUTCOME: Real-time actual emissions data; quick remediation of discovered leaks

Vehicle ALD

Pilot in 2024 on vehicle mounted leak detection technology

Supplement to satellite emissions captures

USE CASE: Complimentary ground validation tool for top-down detection; quick remediation of discovered leaks

Multiple technology projects to reduce or eliminate methane emissions on our LDC system are underway with impressive results – these technologies can easily be implemented in most segments along the supply chain

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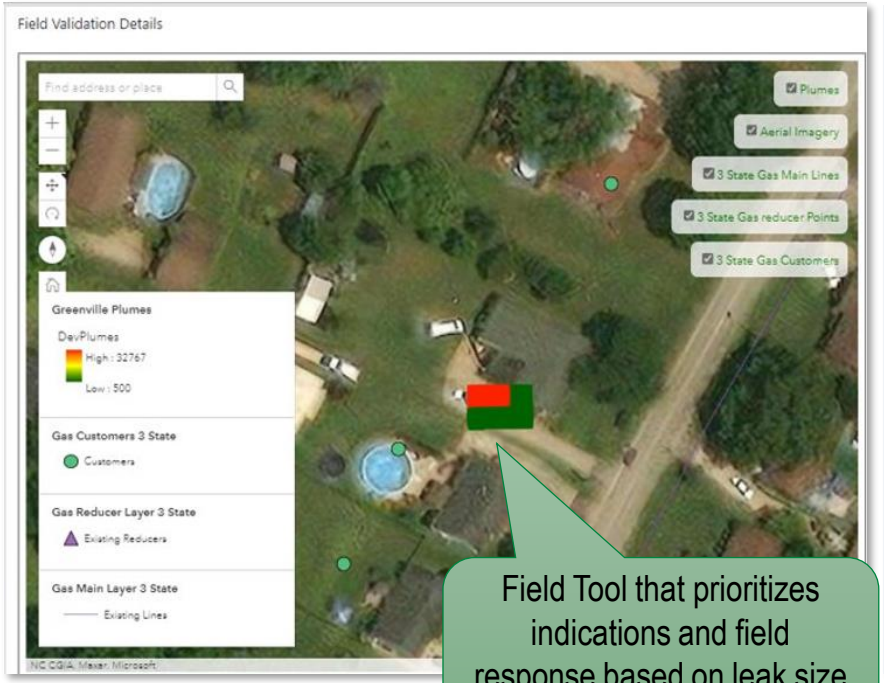
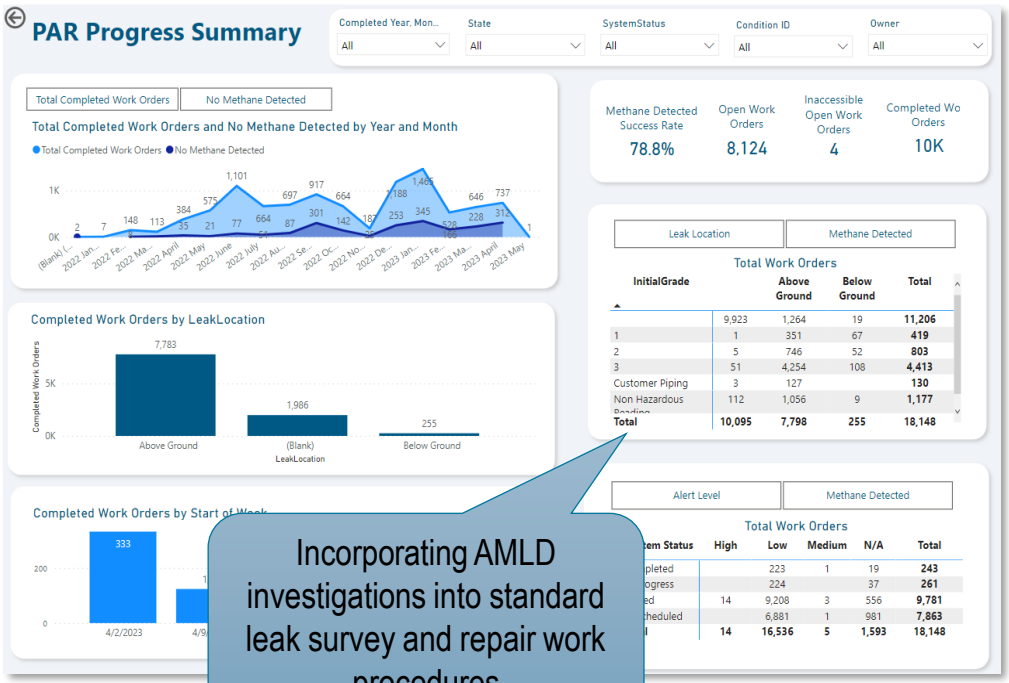
‘Top down’ Advance Methane Leak Detection (AMLD)

Plumes Investigated/Quantified with E-Mission Control Tools



Field Tool that prioritizes indications and field response based on leak size and risk criteria



Incorporating AMLD investigations into standard leak survey and repair work procedures

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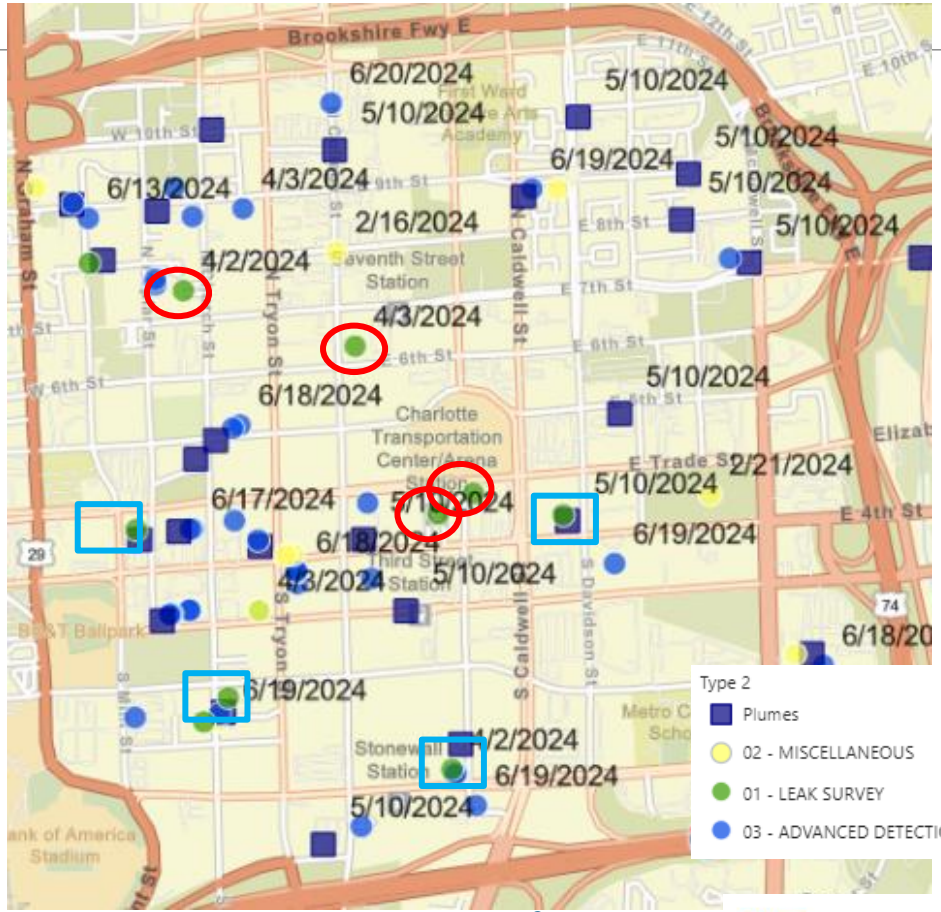
Central Business District Survey
Charlotte, NC

Summary Stats	Leak Survey	Satellite
When Conducted?	April 2024	May 1, 2024
Count of Leak Conditions Created?	13	39



Findings / Highlights

- For the most part, where there is a Blue square there is a corresponding blue dot indicating a leak condition was created from investigating the plume
- Out of the pictured area, only 4 leak survey conditions (circled in red) do *not* appear in proximity of a Blue square- Those conditions were repaired prior to capture.
- Out of the 4 open leaks, squared in blue, they all had a corresponding plume in close vicinity
- ~50% drop in plume count between 2023 to 2024, and same for leaks created from Leak Survey, ~65% drop

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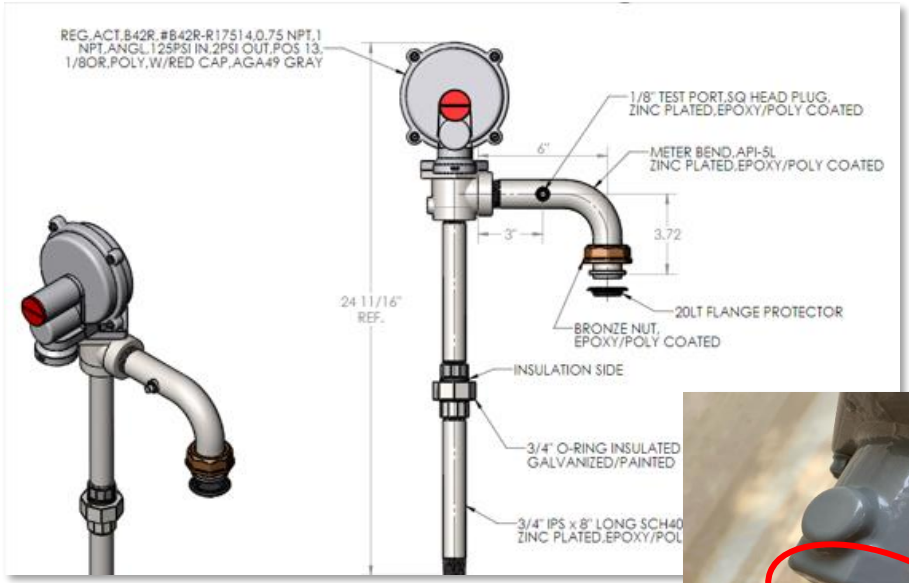
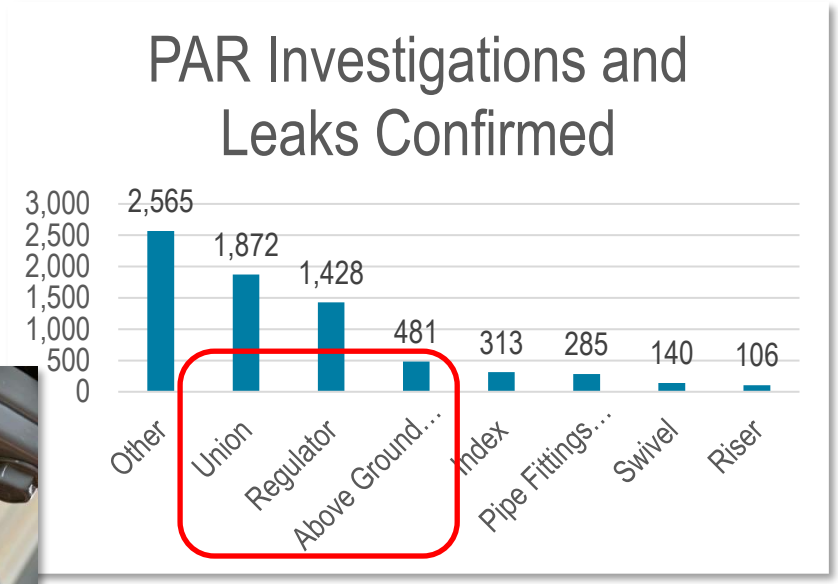
Insights Gained from Data Analysis

Nuisance Leak on a Meter Set





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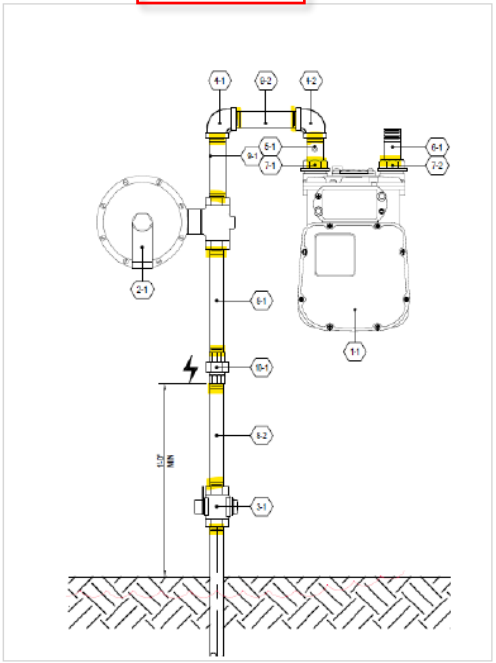
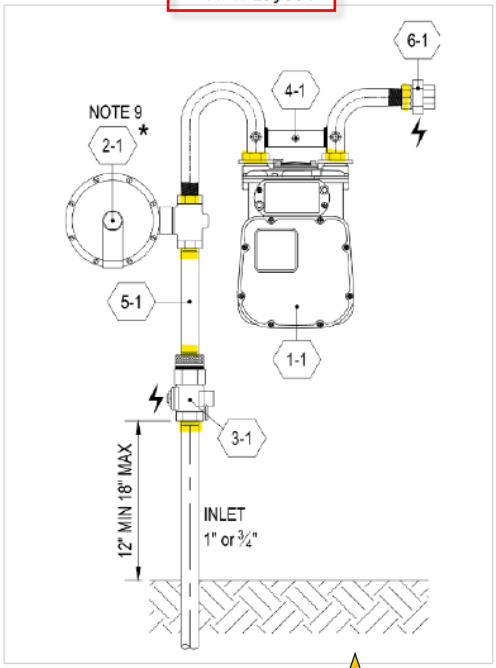
Operational Excellence: Designing Leaks Out of the System

Original Layout



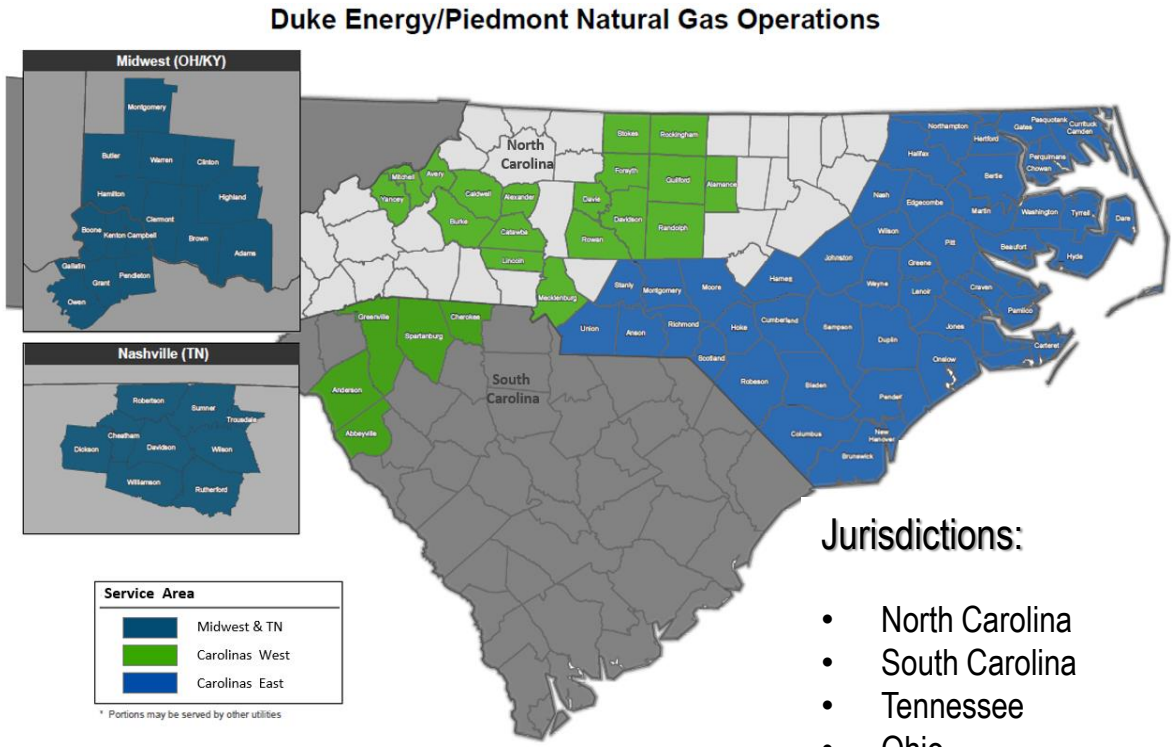
- 12 leak points
- Separated stopcock and insulating union
- Individual threaded components

New Layout



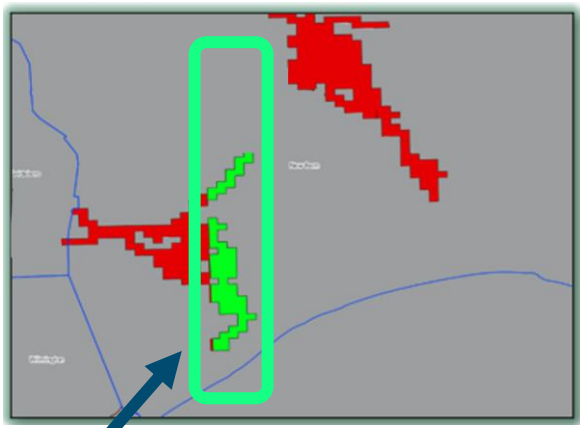
- 7 leak points
- Combined stopcock and insulating union
- Prefab meter bar

Satellite Leak Detection Scaling Plan - 2025



Jurisdictions:

- North Carolina
- South Carolina
- Tennessee
- Ohio
- Kentucky



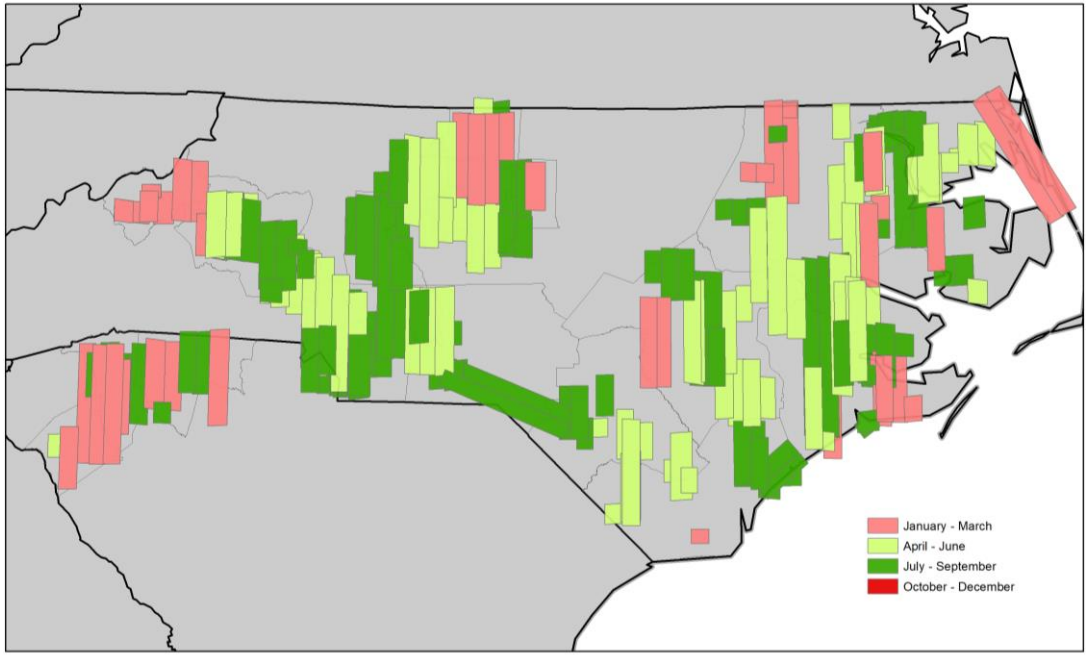
"Breadstick Model"

- By limiting the size of each satellite capture, we ensure quick investigative response to all indications.
- Each "breadstick" within an operations center should allow for timely response to plume indications.

Working with PUCs for Leak Survey Process Change

Other Potential Opportunities

Example of Satellite Collection Footprints



Leak Survey using satellite capture footprints to show leak survey area coverage.

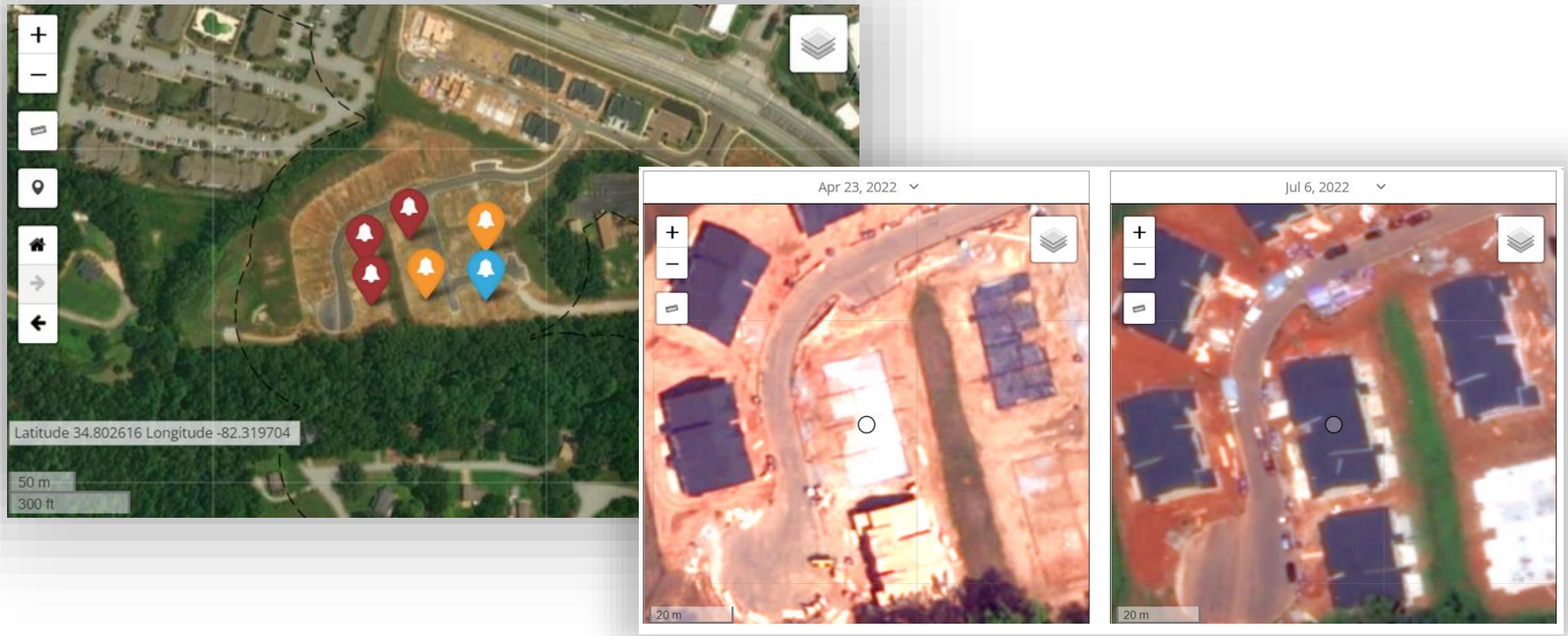
This compares to typical Map Grid based approaches of highlighting walking paths, riding paths, flight paths and ‘GIS breadcrumbing’ then cross referencing with asset databases.

Other opportunities include:

- Pre/Post Storm Analysis
- Fire Risk Analysis
- Land Use Analysis (Risk, Economic Growth)
- New Construction Starts
- Land Movement
- Potential Customer Identification – Propane Tank Leads

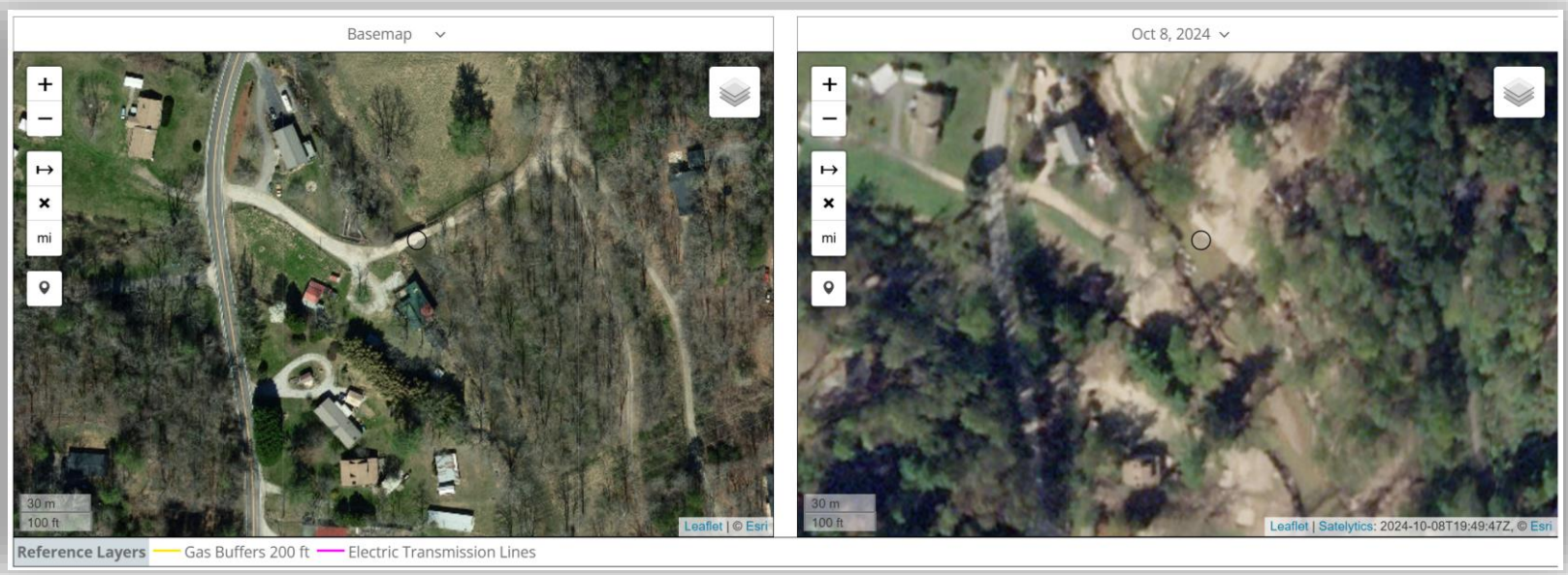
Economies of Scale – Additional Satellite Use Cases

New Construction Resource and Capacity Planning



Economies of Scale – Additional Satellite Use Cases

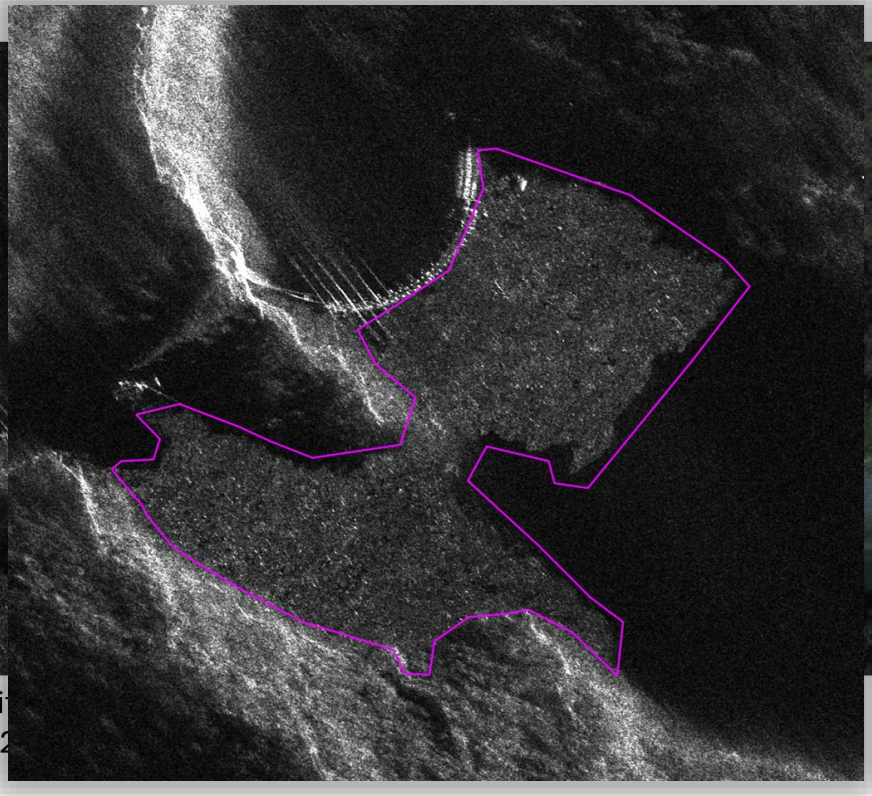
Storm Damage Assessment (Hurricane Helene)

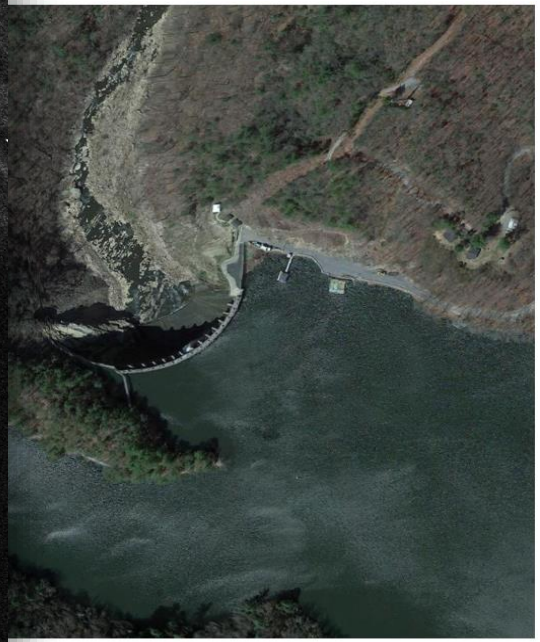


Economies of Scale – Additional Satellite Use Cases

Storm Damage Assessment (Hurricane Helene)

SAR Satelli
Sep 28, 202





Google Earth
April 3, 2022

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Economies of Scale – Additional Satellite Use Cases

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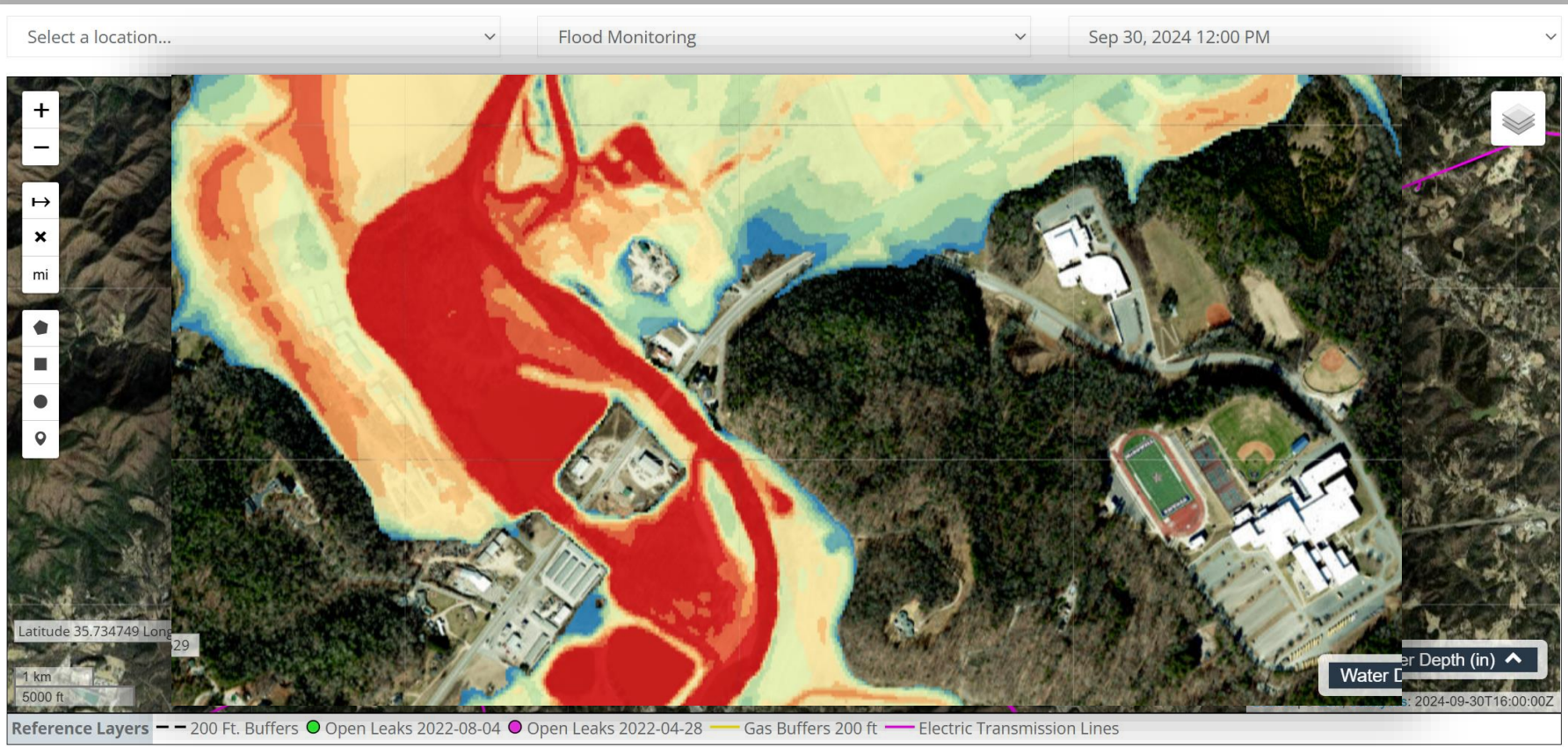
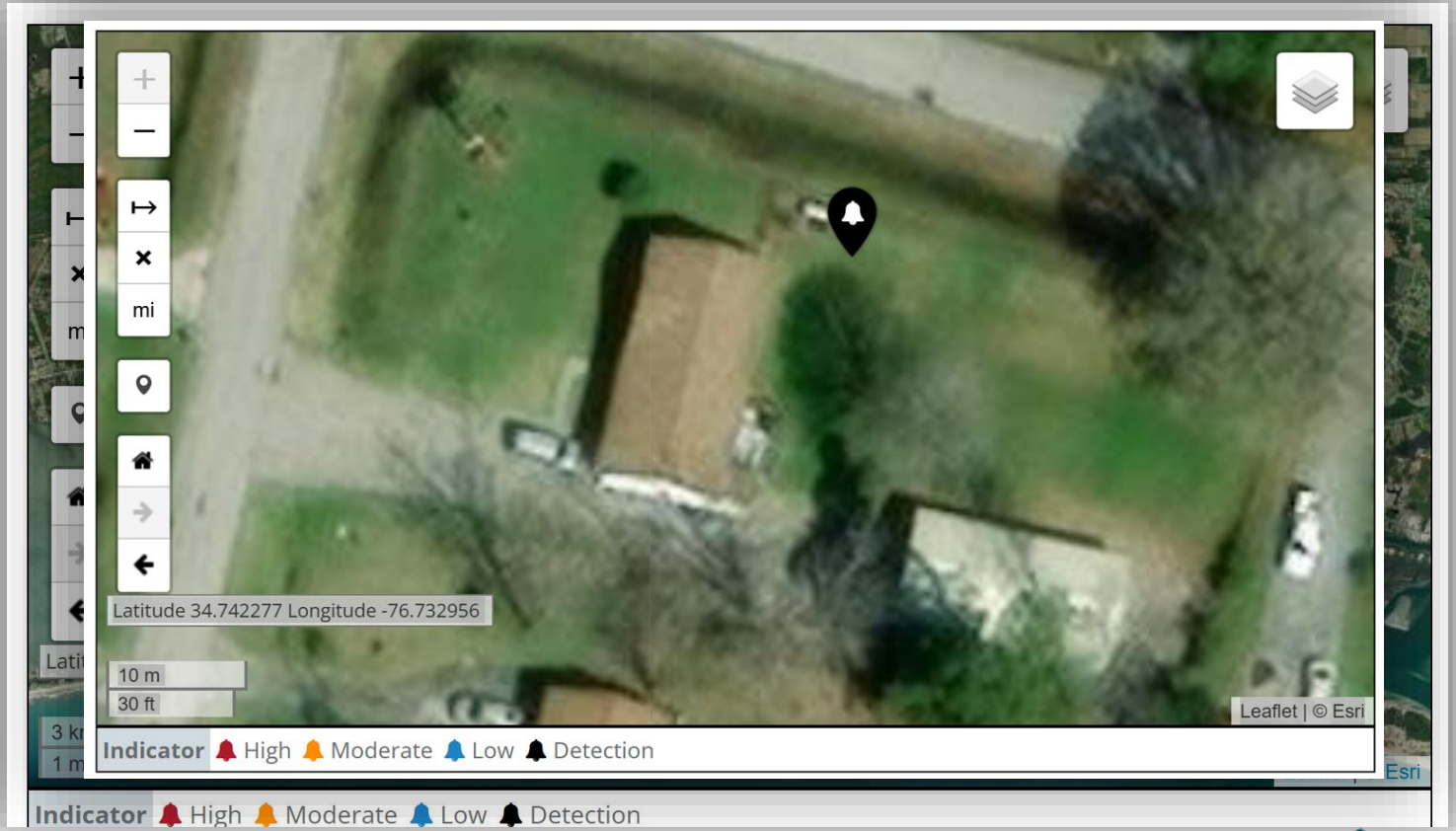


Economies of Scale – Additional Satellite Use Cases

Revenue Generation (Propane)



Questions?