



BLUE COMPLY



CONFIDENTIAL

FINAL REPORT

WELL SITE THIEF HATCH METHANE DETECTORS

ND Oil & Gas Research Program

Contract # G-005-110-C

LEADERSHIP TEAM



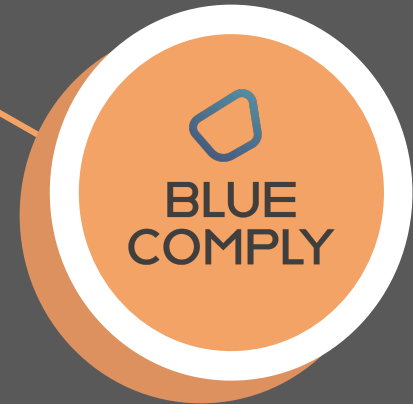
Troy Vareberg, PE

- President
- Registered Electrical Engineer



Emmy Vareberg, PE

- Vice President
- Registered Industrial Engineer



THIEF HATCHES

- Left Open (Process or Human Error)
- Not Latched (Human Error)
- Over Pressurization Relief
- Damaged Seals
- Obstruction (Failure)

2022 Methane Emissions from Oil and Gas Production Sector (129 MMTCO₂e)

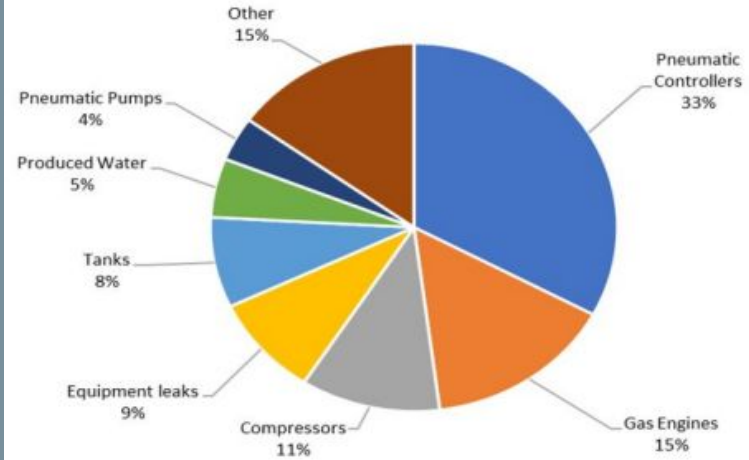
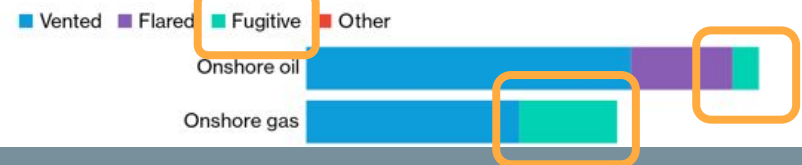


Figure 10: 2022 EPA estimated methane emissions from the oil and natural gas production segment

Oil and Gas Hotspots

Venting accounted for most of the industry's global methane emissions in 2021



Source: Dept of Energy and EPA's FundOpp_0003256.

IMSA

Internet-of-Things
Methane
Sensing
Apparatus



Deliverables: Device Design

- **Device Design and Components**

- Developed/Sourced explosion-proof and intrinsically safe components: IR gas sensor, component housing, lithium battery, electronics, and cellular antenna

- **Data Acquisition**

- Communicates over cellular network to Blue Comply dashboard







- **Required Listings from NRTL**

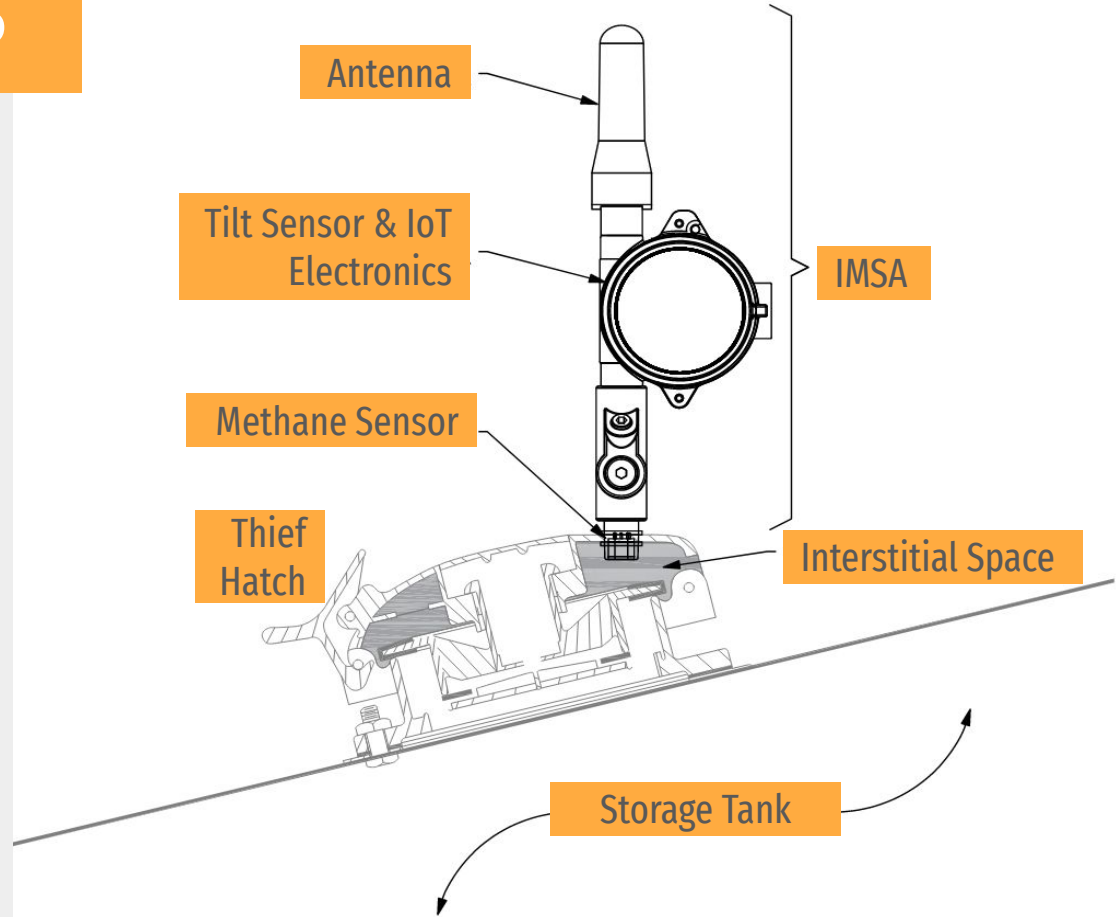
- Evaluation was performed by UL with action items for certification

- **Vendor Selection**

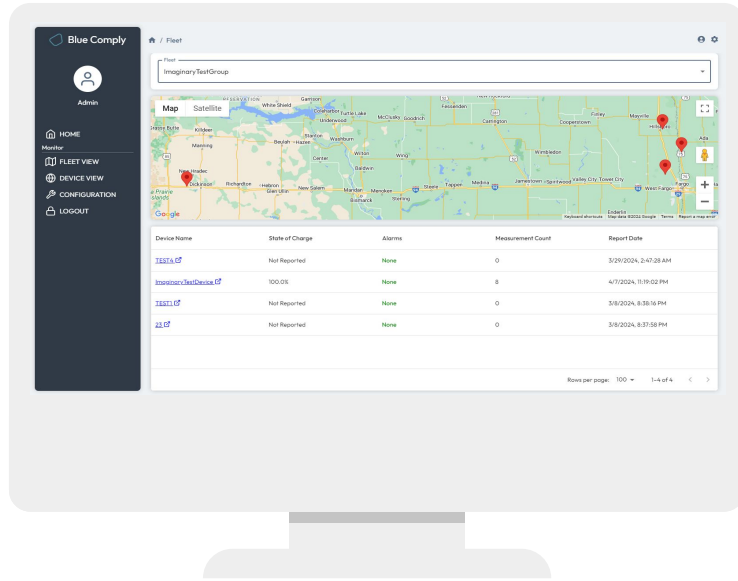
- Established relationships with vendors for component selection and design

IMSA Features

-  Cellular Communications
-  Continuous Monitoring
-  Explosion-proof
-  Wireless
-  Instantaneous Reporting
-  Patented Design



IMSA DASHBOARD



Web Application - Secured Cloud Processing



Device View or Fleet View



Notifications via Email & Text Messaging



Downloadable Reports for Compliance



User Roles & Permissions for 3rd Party Support



Admin

HOME

Monitor

FLEET VIEW

DEVICE VIEW

CONFIGURATION

LOGOUT

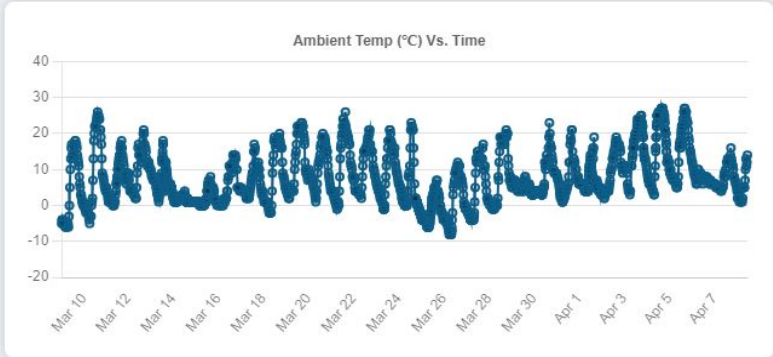
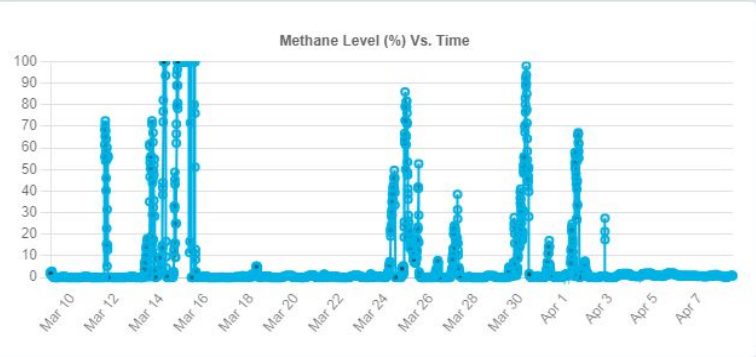
Fleet: Blue Comply

Device: 4.8.X2

Start Date: 03/09/2024

End Date: 04/08/2024

Device Name: 4.8.X2
State of Charge: 55.6%
Total Methane Reports: 7631
Total Methane Alarms: 692
Total Hatch Alarms: 0
Latest Methane Measurement: 0.7%
Latest Temperature Measurement: 14°C
FW Version: 1.2.2
Last Reported: 04/08/2024 15:52:11



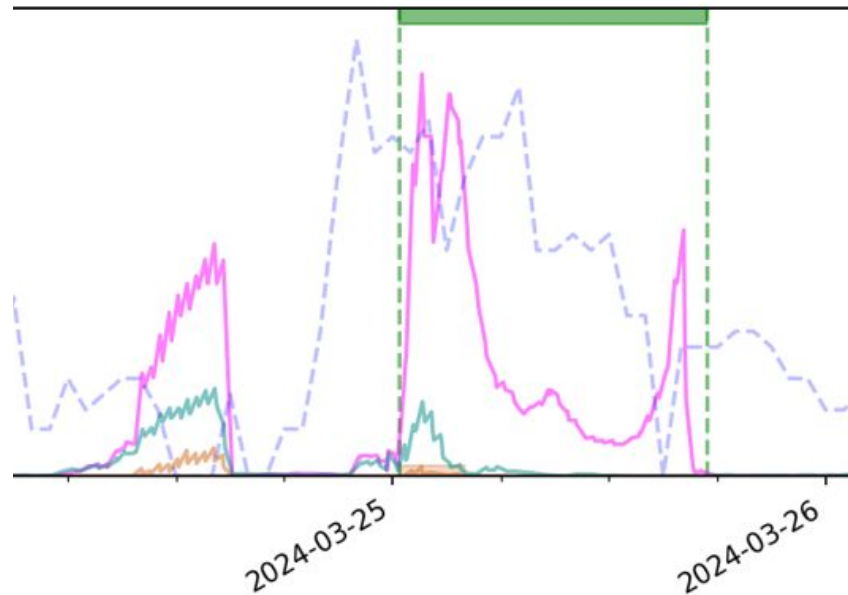
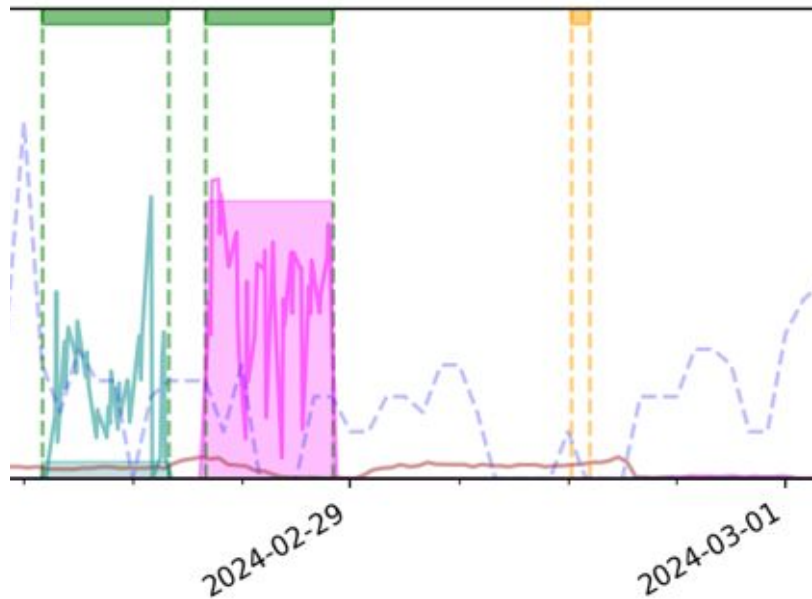
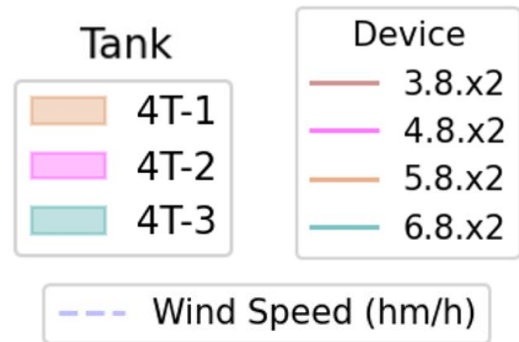
Deliverables: Device Testing

- **Fully-functional Prototypes**
 - Manufactured 25 devices for internal testing, field testing, and pilot projects
- **Pilot Program**
 - Completed METEC blind-test & collaborated with various oil/gas producers to develop pilot project plans
- **Rapid Detection of Leaks**
 - Adjustable detection polling periods

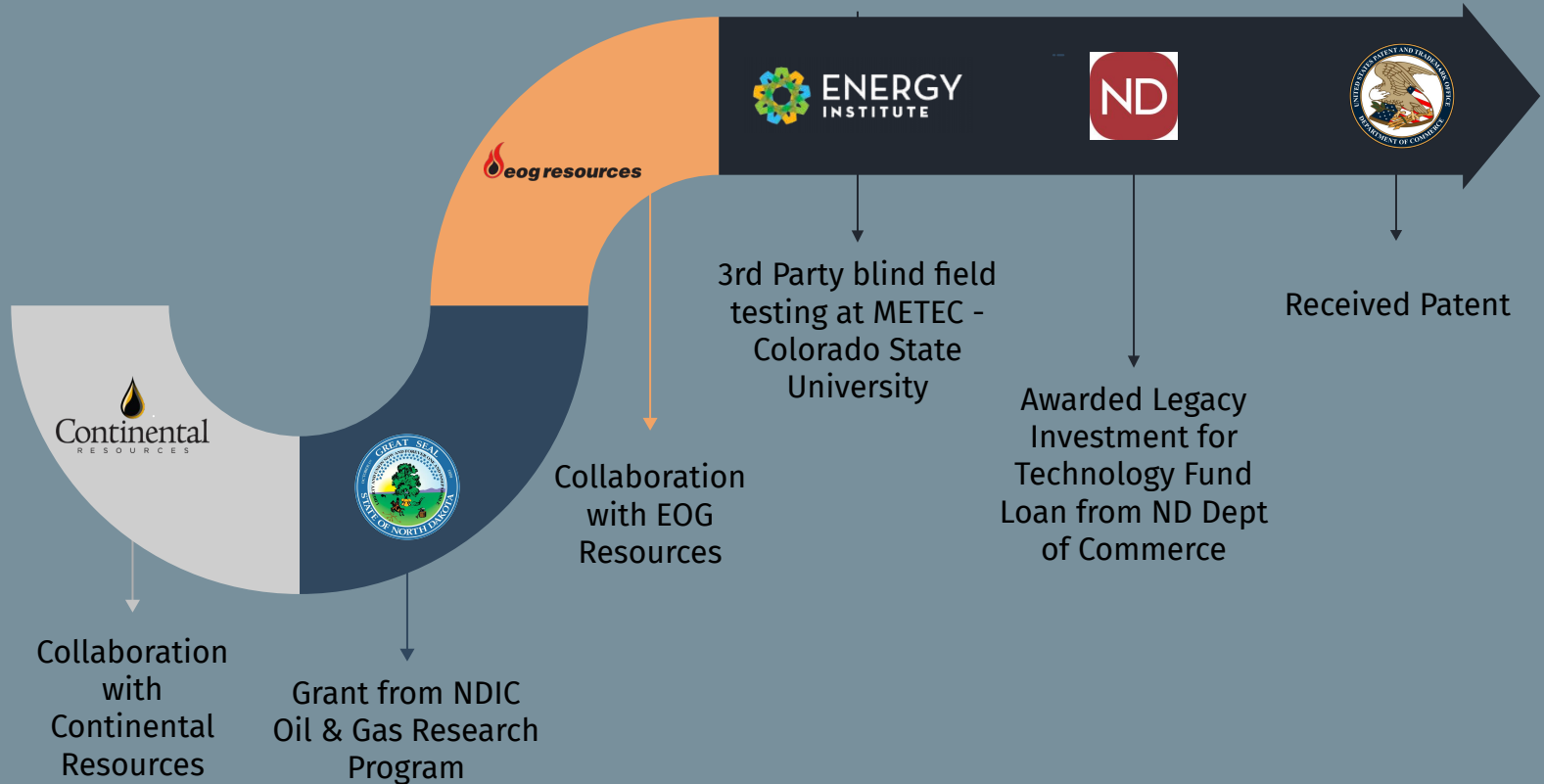
Third party blind testing at Methane Emission Testing Evaluation Center (METEC) at Colorado State University



METEC Sample Results



TRACTION



THANK YOU!!

Phase II →



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Phase II Proposal

WELL SITE THIEF HATCH METHANE DETECTORS

ND Oil & Gas Research Program

CUSTOMER FEEDBACK



Cost Scalability



Power Capacity



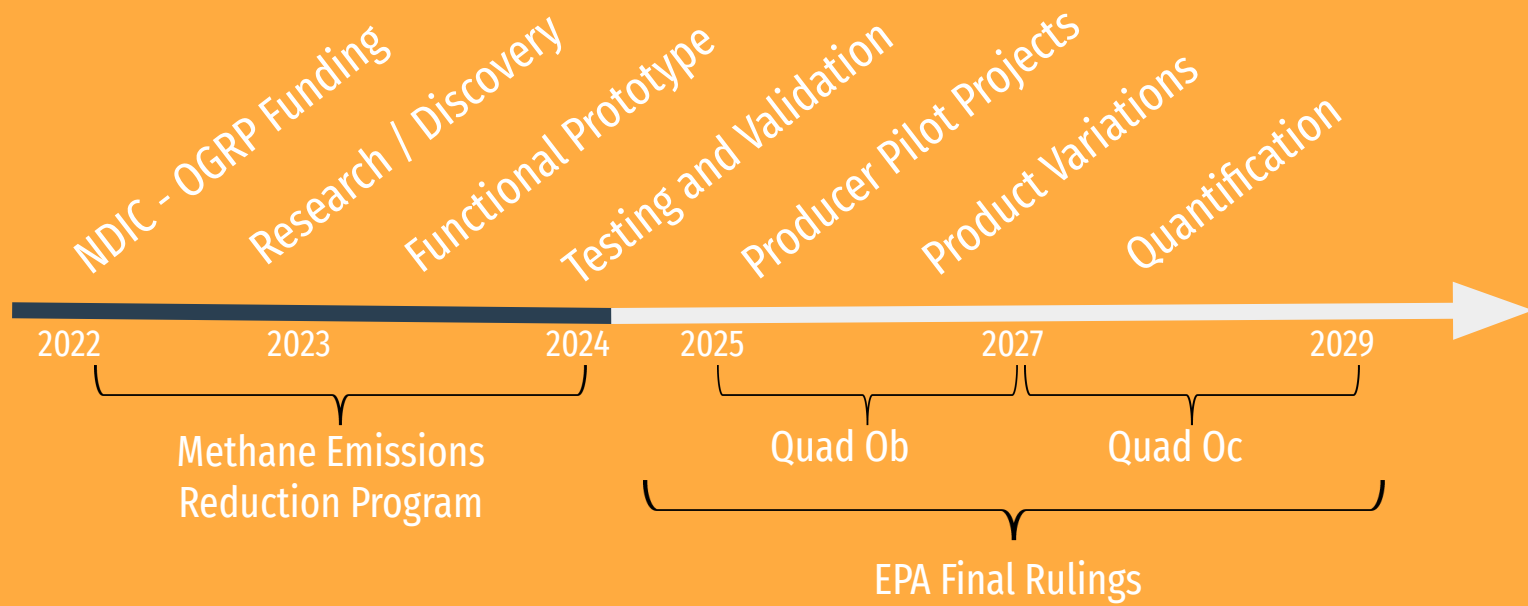
Data Pipeline

REGULATION UPDATES

Inflation Reduction Act

- ◆ Subpart W
 - Waste Emission Charge
- ◆ Quad Ob - New Source Performance Standards
 - Wells Constructed or Modified after December 6th, 2022
- ◆ Quad Oc - Emissions Guidelines
 - Existing wells prior to December 6th, 2022
 - State implemented plans

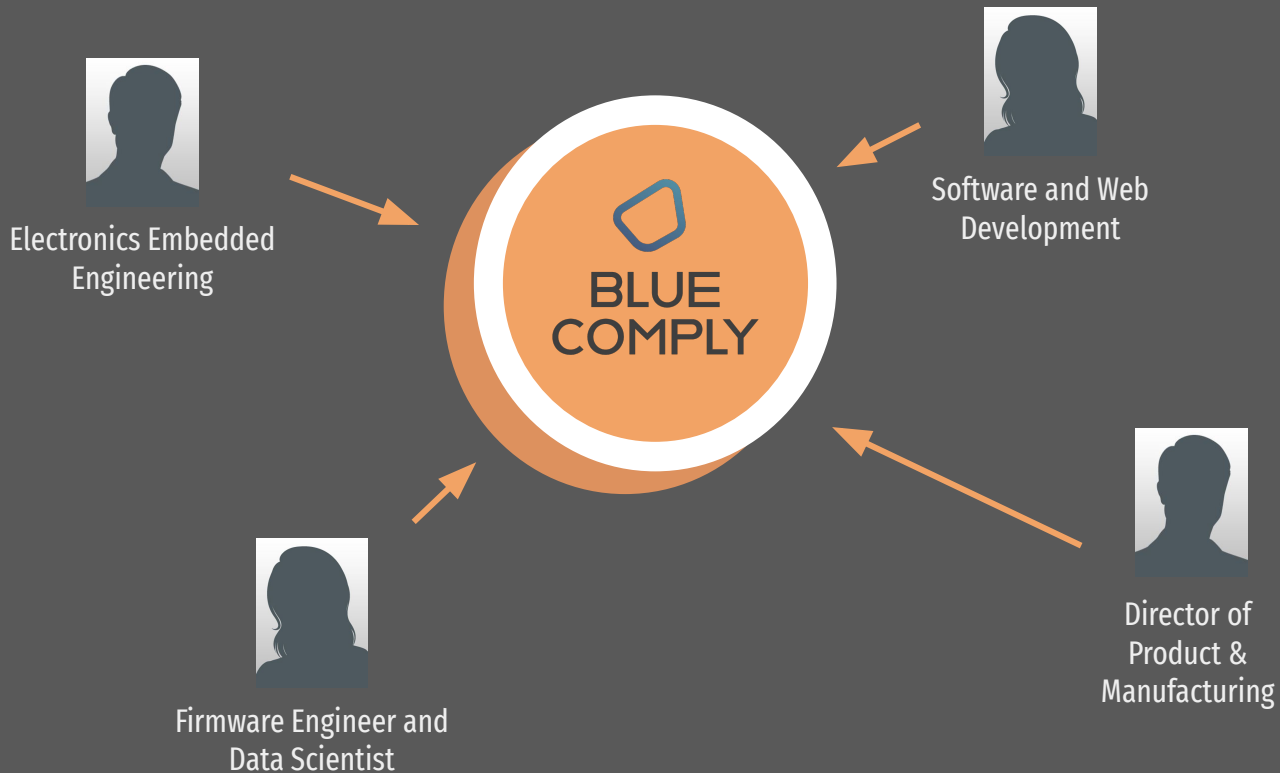
TIMELINE



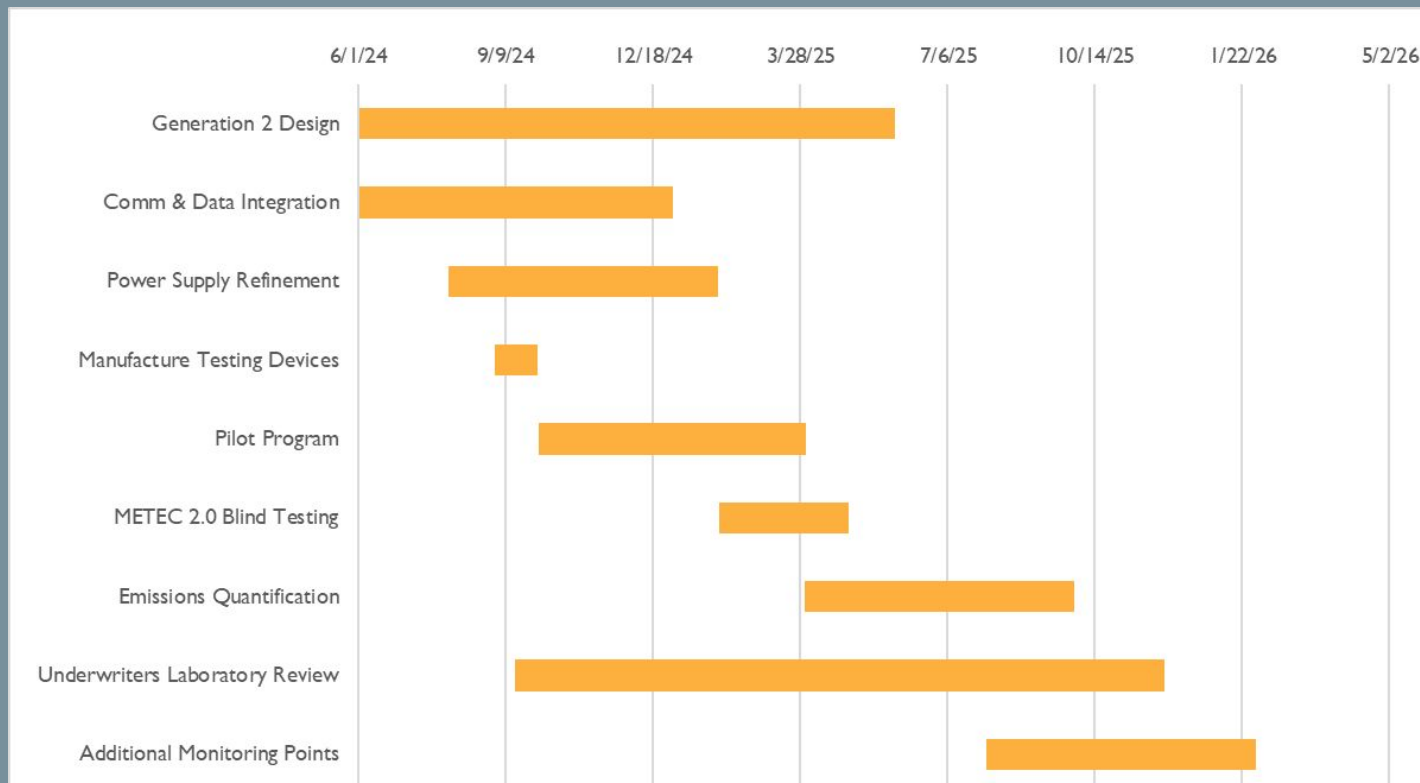
PHASE II - OBJECTIVES & GOALS

- **Kickoff Producer Pilot Project in Q4**
- **Develop device variation utilizing LoRaWAN (instead of cellular)**
- **Interface directly with Operator SCADA systems**
 - Develop gateway to connect end node devices to SCADA
- **Reduce overall cost per well**
 - Design intrinsically safe to eliminate need for Class I, Div 1 enclosure
- **Extend battery life/improve power supply performance**
 - Utilize intrinsically safe, rechargeable batteries with solar cells.
- **Investigate quantification options with Machine Learning / Artificial Intelligence**

NEW TEAM MEMBERS



PHASE II - TIMEFRAMES



PHASE II - BUDGET

BUDGET

| Project Associated Expense | Total Costs | NDIC Share | Applicant Share (Cash) | Applicant Share (In-kind) | Other Project Sponsor Share |
|---------------------------------|-------------|------------|------------------------|---------------------------|-----------------------------|
| Power Supply Refinement | \$150,000 | \$75,000 | \$37,500 | \$37,500 | \$0 |
| Comm and Data Integration | \$150,000 | \$75,000 | \$37,500 | \$37,500 | \$0 |
| Additional Monitoring Points | \$100,000 | \$50,000 | \$25,000 | \$25,000 | \$0 |
| Emission Quantification | \$250,000 | \$125,000 | \$62,500 | \$62,500 | \$0 |
| Field Testing (METEC/Producers) | \$100,000 | \$50,000 | \$25,000 | \$25,000 | \$0 |
| Certifications (UL/FCC) | \$150,000 | \$75,000 | \$37,500 | \$37,500 | \$0 |
| TOTAL | \$900,000 | \$450,000 | \$225,000 | \$225,000 | \$0 |

THANK YOU!!

QUESTIONS?

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