

RNG WORKS



An Introduction To Automated Landfill Gas Collection





THE LEADER IN AUTOMATED
LANDFILL GAS COLLECTION

Leveraging Automated Landfill Gas Collection



INCREASE REVENUE



INCREASE PRODUCTIVITY

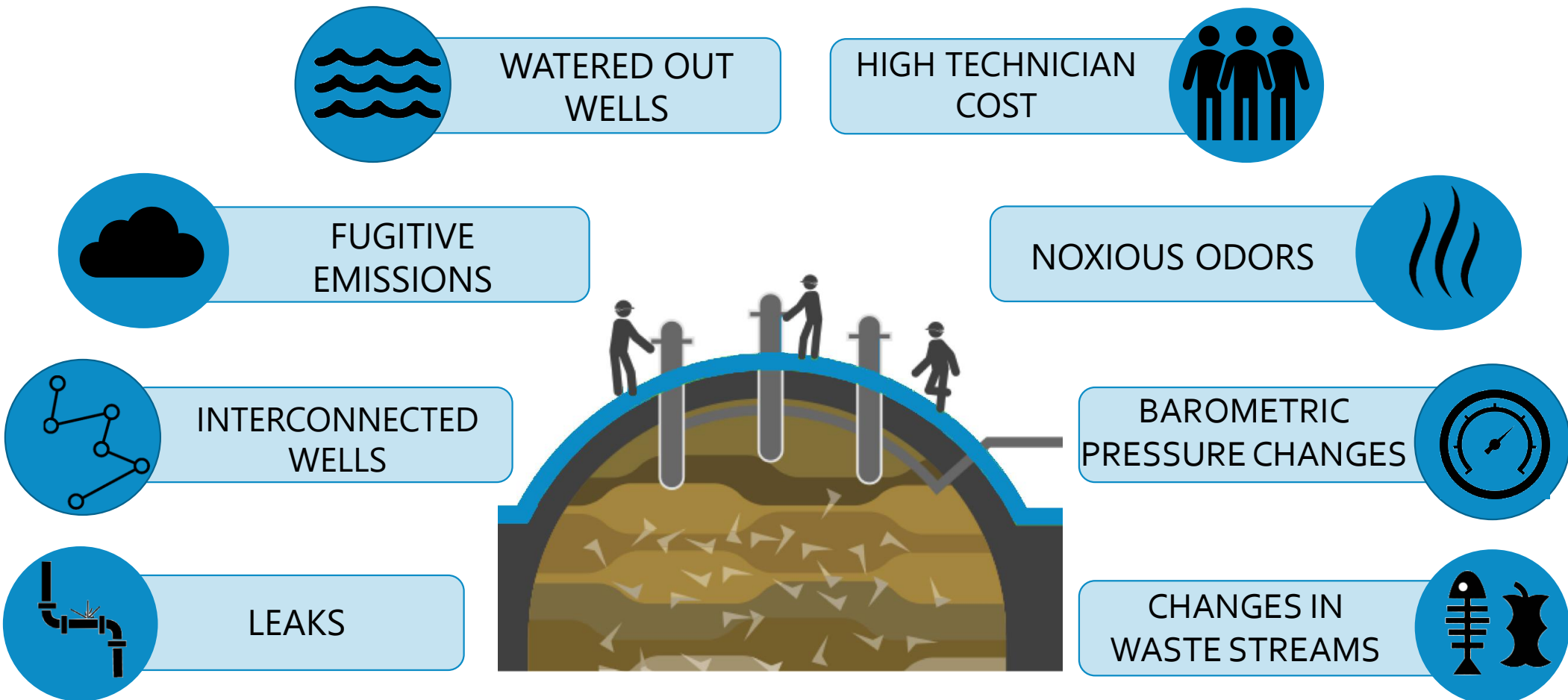


REDUCE ENVIRONMENTAL,
HEALTH & SAFETY RISKS



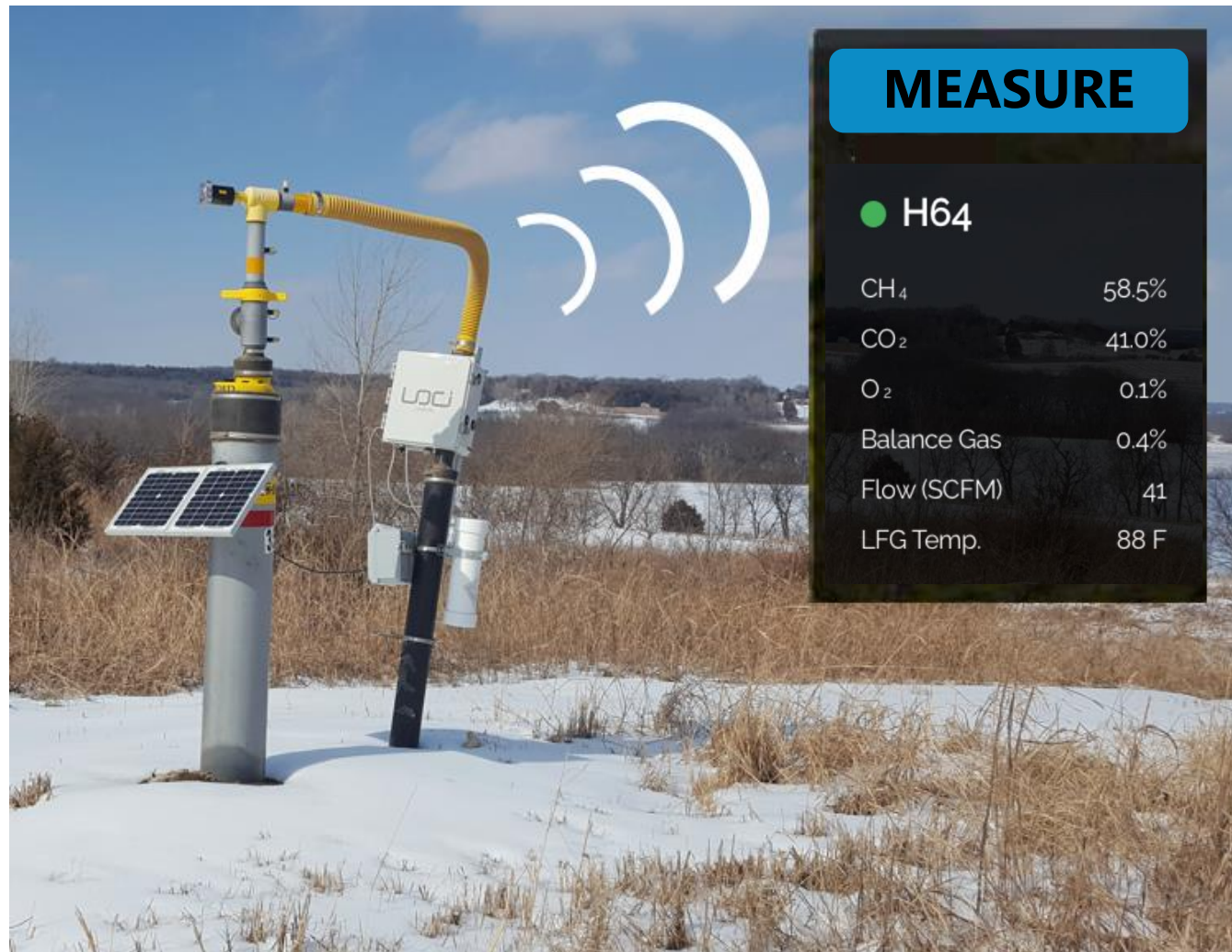
Several Challenges Involved In LFG Collection

From high technician costs, to a constantly changing environment, even the best operators have trouble optimizing collection when landfill gas is managed manually.



Automated Landfill Gas Collection with Loci

Our collection well mounted products make continual, automated adjustments to valve position based on measurements to respond to the constantly changing environment.



MEASURE

● H64

CH ₄	58.5%
CO ₂	41.0%
O ₂	0.1%
Balance Gas	0.4%
Flow (SCFM)	41
LFG Temp.	88 F

CONTROL



- Automated tuning through control algorithm
- User gas composition thresholds

SERVICE

- Automated calibration
- Routine maintenance
- Rapid troubleshooting leveraging field technicians



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Loci Automated Landfill Gas Collection

Increases Landfill Gas Collection By 15% or More

Loci Controls increases revenue through improved gas flow and quality while decreasing operational costs and reducing risks through more efficient operations.



Increase Revenue

- ✓ Maximize methane gas flow
- ✓ Control N2 in the wellfield
- ✓ Automated valve adjustments
- ✓ Better collection efficiency
- ✓ Reduce plant downtime



Increase Productivity

- ✓ For both plant and employees
- ✓ Lower labor cost for wellfield tuning and O&M
- ✓ Reduce plant maintenance costs



Reduce Environmental, Health & Safety Risks

- ✓ Reduce man hours spent in wellfield
- ✓ Reduce fugitive LFG emissions
- ✓ Reduce odors



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Products & Services

Depending on your project, we can help you select the optimal configuration of Controllers and Guardians for automated control and Sentry's for monitoring

	CONTROLLER	SENTRY	GUARDIAN
Mounting location	Vacuum Riser	Header	Vacuum Riser
Measures P, Av Vac, T, flow	✓	✓	✓
Measures gas composition (CO ₂ , CH ₄ , O ₂ , Balance Gas)	✓	✓	✓
LFG automation with actuated valve adjustments	✓		✓
Precision	10ths of a percent	10ths of a percent	Percentage point



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WellWatcher Platform

Our cloud-connected online platform displays live data from each well and allows users to view historical data through our user interface.

WELLWATCHER FEATURES

- ✓ 24/7/365 remote visibility on LFG operations
- ✓ Accessible via desktop, laptop and tablet
- ✓ Visual trending
- ✓ Proprietary algorithms
- ✓ Increased technician productivity

The screenshot displays the WellWatcher platform interface. On the left is a navigation sidebar with the LFC logo, a placeholder for 'YOUR LOGO HERE', and menu items: Dashboard, Map View (selected), Table View, Well Details, Reports, and Settings. Below the menu are 'Active Wells: 87', 'Total CH₄ Flow: 1,485 SCFM', 'Total LFG Flow: 2,539 SCFM', 'Total CO₂: 39.3%', and 'Total CH₄: 58.5%'. A 'Sign Out' button is at the bottom of the sidebar.

The main content area is divided into three sections. The top-left section, titled 'Wells', shows a 'Sort by:' dropdown set to 'Alphabetical' and a table of well IDs and counts. The top-right section, titled 'GW-0112', displays a grid of data cards for this specific well: Valve Pos (36), CH₄ (57.6%), CO₂ (38.6%), O₂ (0.0%), Balance Gas (3.8%), LFG Flow Rate (27 SCFM), CH₄ Flow Rate (16 SCFM), Pressure Above Loci Valve (-1.8 in. H₂O), System Vac (-12.8 in. H₂O), and Temperature (105 °F). A 'Detailed History' link is below these cards.

The central and largest section is an aerial map of a landfill site with numerous green location pins representing well locations. A 'Google' logo is at the bottom left of the map, and zoom controls are at the bottom right. The bottom right corner of the map area contains the text: 'Imagery ©2020, Maxar Technologies, USDA Farm Service Agency | Terms of Use'.



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Loci Uses Plant GC, Wellfield Data to Optimize Collection

Loci's fine-tuning algorithm is like having a technician at each well 100% of the time.

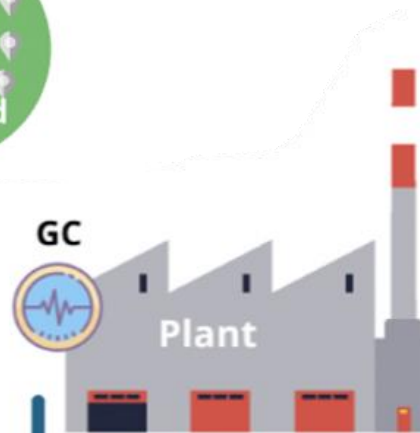
Loci's threshold algorithm makes adjustments to many wells at the same time based on changes in overall gas quality measured at the plant, something which can not be done manually.



Fine-Tuning Algorithm

1. The Loci system takes hourly individual collection well readings (gas, composition, flow, LFG temp, ambient pressure, temperature, valve position, and pressure above/below Loci's automated valve).

2. Automation is used to make small incremental valve adjustments (<1% open or close) every 2-3 hours based on last measurement. Finds optimum for each collection well.

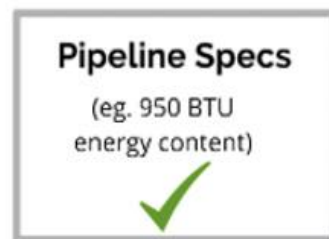


Individual Well Control

Valve adjustments for individual collection wells are weighted by gain factors. The gain factors reflect how responsive each collection well is to changes in gas composition based on valve position.

Aggregate Gas Composition Algorithm

Loci's automated system makes batch valve adjustments, changing multiple collection wells at the same time. Uses aggregate gas composition thresholds with top-level control variables: BTU, O₂, and N₂ as measured by plant Gas Chromatograph or Precision O₂ meter. There is a direct connection to plant measurement equipment via serial port to Loci Sentry.



Pipeline



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Loci Support for Landfill & RNG Plant Operations

Operational Support

**Landfill
Operations**



**RNG Plant
Operations**

Site Wide Operating Set-Points

- Established at a site wide level, to ensure aggregate gas composition meets plant spec.

Individual Collector Set-Points

- Established with Landfill and RNG Plant operator

Loci Analyst

- As required, communication between Loci's remote analyst, Landfill site personnel, and Loci field service representatives supporting gas collection operations

Service

- Loci has field personnel within 4 hr. drive of any RNG installation, so will be able to provide extensive support to ensure operation meets Landfill and RNG operator objectives.

Reporting

- Monthly or as required review meetings with operating personnel from Landfill Operations and RNG Plant Operations Teams



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Loci's Role



Increased Revenue/Profits

- Increased Project Revenue and Profitability – more CH4 flow, MMBTU to plant and to pipeline
- Increased collection system uptime



Operational

- Increased plant uptime/performance through on-site personnel productivity gains
- Reduced time to troubleshoot wellfield issues – air intrusions, etc.



EHS

- Reduced Emissions
- Reduced frequency of call-outs to wellfield
- Minimizes Lone Worker
- Reduced contact time per well and exposure to Wellfield Hazards
 - LFG
 - Travel
 - Weather/Nature – Insects, plants and animals
 - Large commercial equipment

Thank You!

Loci Controls

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