CASE STUDY

Improving Methane Quality & Stability

Landfills produce methane, a valuable energy source that must also be captured to meet regulatory requirements and environmental standards. Capturing it efficiently, however, can be challenging. Methane levels in landfill gas can fluctuate widely due to seasonal changes, atmospheric conditions, and the construction of new landfill infrastructure. Traditional monitoring, which relies on periodic measurements, often struggles to capture these rapid variations, making consistent collection difficult.

At Pierce County Recycling, Composting and Disposal (LRI) landfill in Washington state, managers wanted to improve both the quality and stability of methane collected from their wells to optimize the gas collection system, ensure compliance, and maximize energy recovery. In June 2025, the landfill installed 75 smartWell devices from Apis using state funding from the Climate Commitment Act (CCA). These devices automatically monitor gas quality and adjust flow multiple times a day, allowing the site to optimize methane capture.

Higher Methane Quality, Greater Stability

To measure impact, the team analyzed two key metrics from the first quarter post-installment:

Methane Quality (CH_4%) – This is the average concentration of methane in the gas collected from each well. Higher methane quality means more energy can be recovered from the gas, making the operation more profitable and efficient.

Methane Variance (Standard Deviation) – This measures how stable methane levels are over time. High variance means methane levels fluctuate, making collection unpredictable. Low variance indicates more stable gas, which is easier to manage and process.

Metric	Pre-Apis Average	Post-Apis Average	Results (% Change)
Methane Quality (CH_4%)	40.45%	42.88%	5.67%
Methane Variance (St Dev)	6.69	3.72	-44.36%

Methane quality increased by 5.67%, meaning the gas collected had a higher proportion of methane, which improves energy recovery. Methane variance dropped by 44.36%, showing that methane levels became much more stable and predictable at the site.

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Smart Tuning, Smart Results

Landfill gas wells need flow adjustments, or "tuning", to optimize quality. Traditionally, tuning was done manually every few weeks. Since installation, smartWells have automated this process, providing frequent fine-tuning for optimal methane capture.

Before smartWells, the 75 gas wells were tuned manually, equating to 450 times over the three month period. After installation, smartWells performed 42,074 automated tunes—a 93x increase in tuning frequency.

At this site, the average valve position movement was +/- 1.14% and the average time between readings was 2 hours and 33 minutes. The following statistics highlight the average valve position movement and time between readings post-smartWell installation, excluding samples with zero movement. Zero movement occurs when the algorithm is disabled due to factors such as site construction or field servicing events.

Month	Avg. Valve Movement (%)	Avg. Time Between Readings
Jul	+/- 1.08	2 hours 17 minutes
Aug	+/- 1.08	2 hours 50 minutes
Sep	+/- 1.24	2 hours 33 minutes

Impact on Methane Flow

At LRI landfill, data from the 75 smartWells showed an average methane flow increase of 5.49 SCFM per device per month, resulting in a 32.81% rise in methane flow across Apis-equipped wells over three months. This improvement was determined by comparing smartWell performance against well-level historical baselines, highlighting significant gains in methane capture efficiency, energy recovery, and overall well stability.

By installing smartWell devices, this landfill achieved:

- ☑ Higher methane quality for better energy recovery
- ☑ More stable and predictable gas collection
- ☑ Dramatically increased tuning efficiency
- ☑ Overall improved landfill gas management

These results demonstrate how smartWells use real-time data to drive better decisions, boost operational performance, and increase methane recovery.

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