Sprouts Farmers Market Case Study:

Using AI-based “Automatic Leak Detection” to enable refrigerant leak rate reductions

AMERICA ATMO Summit Business Case for Natural Refrigerants

June 10-11 2024, Washington D.C.

SPROUTS FARMERS MARKET

AXIOM CLOUD

Refrigerant Leaks: Current State of Grocery Industry

~200% cost increase per lb of refrigerant in the last 4 years (Source: Sprouts)

20%/year trigger leak rate for commercial refrigeration (Source: EPA)

>50% of a store's scope 1+2 emissions due to leaks (Source: Therm)

> "22 million tons of CO2 are leaked annually related to refrigerant. That's huge. In fact, emissions from refrigerant leaks often exceed 50% of a grocery store's carbon footprint. So it's significant."
>
> - Fritz Troller, CEO Therm

Sprouts' Refrigerant Goals

From Sprouts' 2023 Impact Report:

> "We are taking steps toward lowering our carbon footprint attributable to our in-store refrigeration, including installing CO2 refrigeration in all new stores in California and gradually transitioning higher GWP refrigerants to lower GWP refrigerants. We are also implementing refrigeration leak detection technology to more quickly and efficiently detect and mitigate fugitive emissions."

The big question: What do we do about the existing fleet of stores with HFCs (18% leak rate in 2023)?

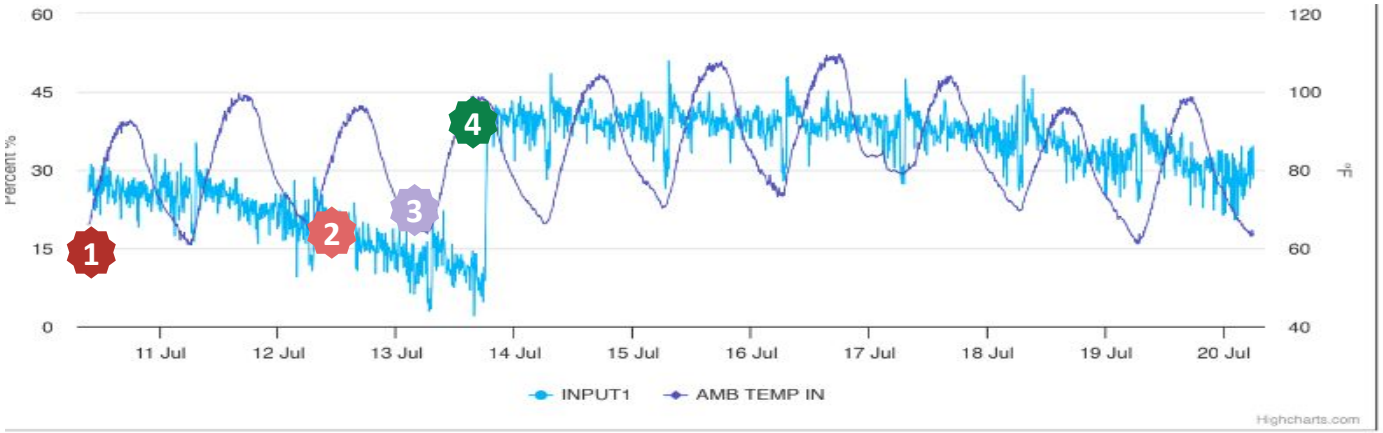
Customer Story - Back-to-back refrigerant leaks

Each resolved within 1 day

- On a 95 degree day in July 2023, a Sprouts Farmers Market near Sacramento, CA began leaking 407F refrigerant from Rack 1/2.
- No receiver level alarms were triggered
- The store's leak detector was out of calibration, so it was being ignored.

Customer Story - Back-to-back refrigerant leaks

Leak #1



1

July 10, 4:22pm

Axiom's AI-driven models detected the leak using 8 system-level indicators to estimate relevant changes in refrigeration levels.

2

July 12, 4:35pm

Model reaches 98.5% confidence and leak is confirmed by Axiom refrigeration specialist.

"High Urgency" Anomaly notification sent to regional service manager.

3

July 13, 8:15am

Sprouts service manager opened a high-urgency work order - copying and pasting anomaly notification directly into CMMS.

This detail helped explain the issue to technician and improved efficiency.

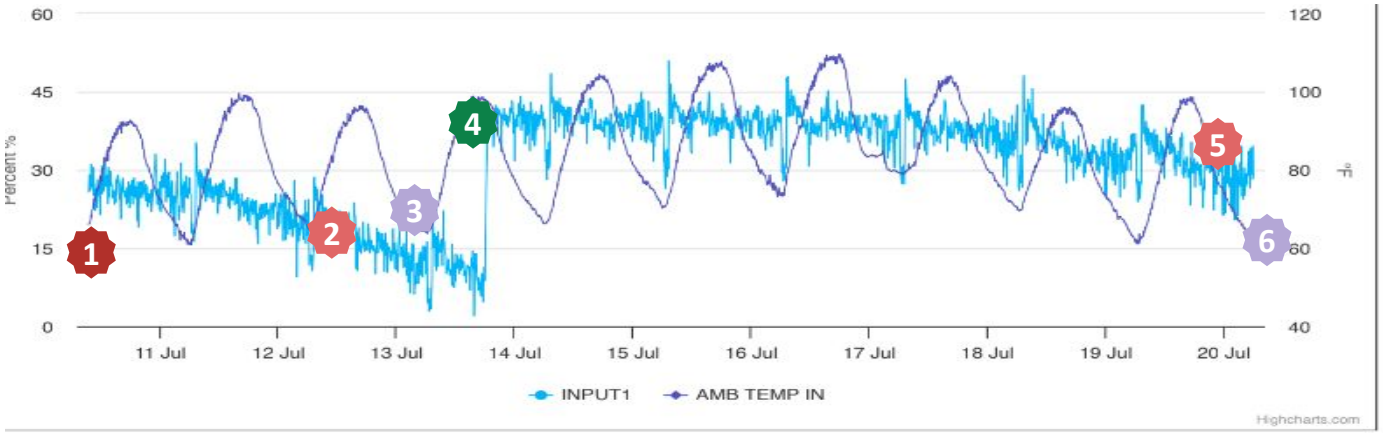
4

July 13, ~6:00pm

Service technician went onsite to repair the leak (a faulty compressor fitting) and refilled the system with 50 lbs of gas (to 38%). Estimated that the rack would have lost **~200 lbs of additional gas** and experienced a stressful **"rack fail"** within 24 hours if Axiom hadn't caught the leak.

Customer Story - Back-to-back refrigerant leaks

Leak #2



5

July 20, 7:51am

Axiom's AI-driven models detected another leak on the same system.

Another "High Urgency" anomaly notification was sent.

Sprouts service manager opened work order by copy/pasting directly into CMMS.

6

July 20, ~4:00pm

A service technician successfully repaired the leak and identified a faulty leak detector onsite.

No gas refill necessary.

Estimated that rack would have lost another **~100 lbs of gas + "rack fail"** within 5 days had leak not been identified.

August 1, 5:27 pm

Axiom used data to validate that the root cause of the anomaly was solved and marked it as resolved!

Customer Story - Back-to-back refrigerant leaks

"Without Axiom's support, we would have lost hundreds of pounds of refrigerant and experienced a critical cooling outage within 24 hours. And, it happened twice in a week!"

-Sprouts Service Manager

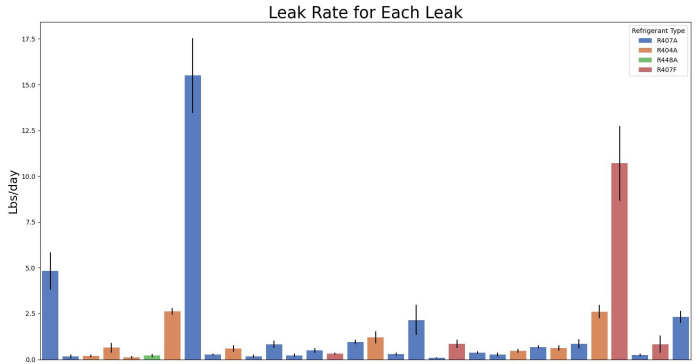
Key Outcomes

- Avoided 2 potential emergency cooling outages (otherwise undetected)
- Saved **~300 lbs of refrigerant** (550,000 lbs CO2e)
- Saved **$9,600** in refrigerant costs alone
- Avoided **$2,500** unnecessary sensors replacement (parts + Labor)

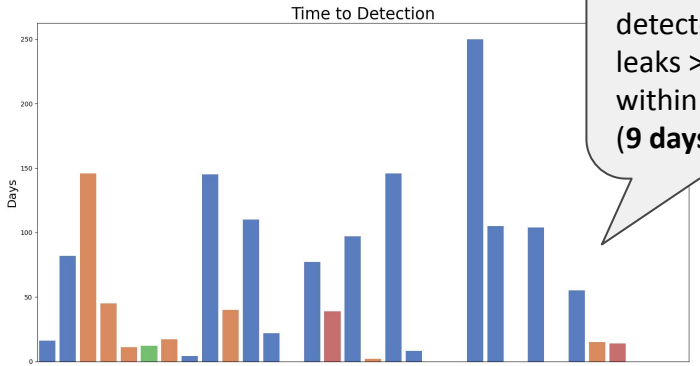
Background

- Sprouts uses Axiom Cloud modules to support energy efficiency, predictive maintenance, and early leak detection goals
- Axiom's "Early Leak Detection" (ELD) module detects leaks early, quantifies the leak rate (lbs/day), and confirms when leaks are fully repaired.
- By using Axiom, Sprouts no longer needs to complete quarterly manual leak inspections mandated by CARB.
- Sprouts uses Axiom to achieve compliance with EPA's AIM act related to "automatic leak detection"
- **This analysis evaluates automatic leak detection performance by Axiom at 115 Sprouts stores in CA (April 1 - December 31, 2023)**
- This analysis ignores all other maintenance and energy anomalies

32 Leaks Detected by Axiom: April-Dec 2023

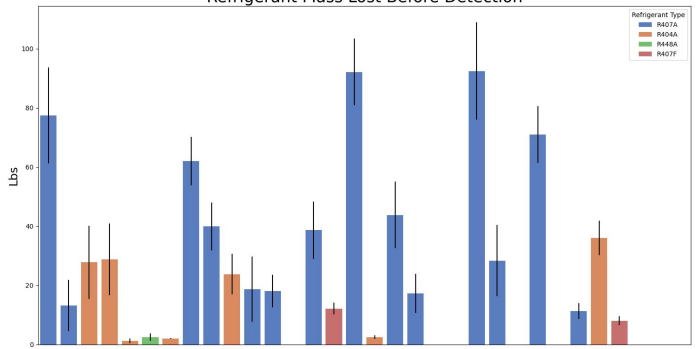


Est. leak rates: **0.1 to 15.5 lbs/day**

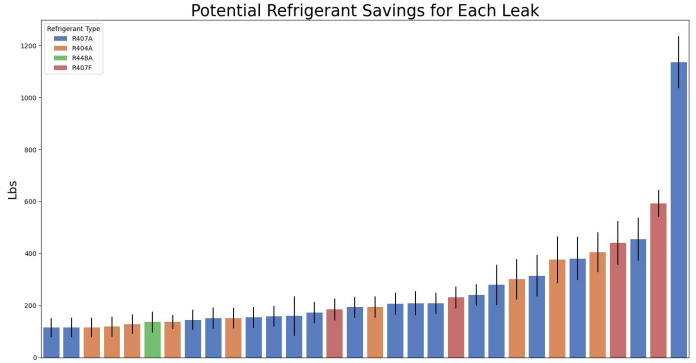


Note: Axiom detected all leaks >1 lb/day within 17 days (**9 days on avg.**)

Est. time to detection: **0-250 days**



Est. avg. refrigerant loss before detection: **24 lbs/leak**



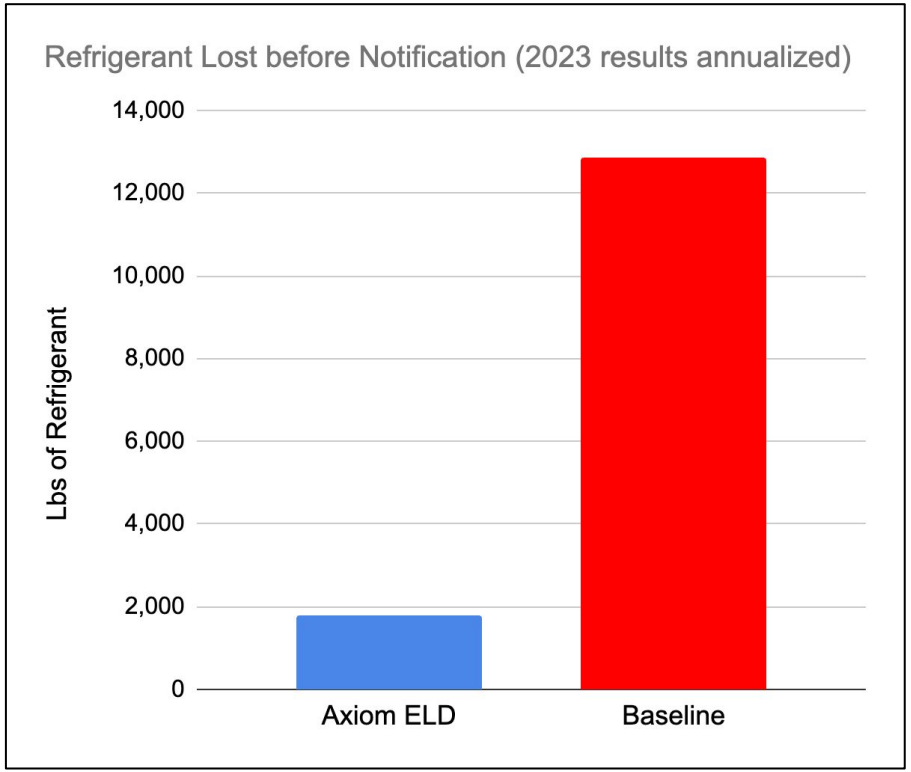
Est. savings due to early detection: **8,303 lbs refrigerant**
Est. GHG savings equivalent: **8,914 metric tons CO2e**

Annualized Results

Compared to baseline (wait for case temperature alarms)

- **43 leaks/year** detected early
- Average refrigerant savings of **259 lbs/leak**
- Enabled Sprouts to save **~11,071 lbs/yr** of refrigerant
- Enabled Sprouts to lower California leak rate by **40.1%**

Note: Sprouts also operated a 2nd leak detection solution simultaneously at the same sites - **contact us to review results of this head-to-head comparison**



Potential Impacts of Axiom's Leak Detection: Annualized

Financial

Refrigerant Savings	"Finished Cost" of Leaks	Total Savings (115 stores)	Savings per Store
11,071 lbs/year	$100 per lb	$1,107,067 per year	$9,627 per year

Climate

Refrigerant Savings	Average CO2e*	Total Savings (115 stores)	Savings per Store
11,071 lbs/year	2,367	11,886 metric tons CO2e	103 metric tons CO2e

*CO2e (GWP) = 2,367. Assumes 33% 404a, 33% 407F, 34% 448a.
Source: https://ww2.arb.ca.gov/resources/documents/high-gwp-refrigerants

2024 is your opportunity to reduce leak rates. **Why Axiom?**

Listed by the EPA and CARB as an ALD-compliant solution

Covers 100% of the system, eliminating required quarterly leak inspections (unlike direct ALD)

Best-in-class leak detection

Enabled major grocer to lower leak rates by 40.1% across 115 stores throughout CA in 2023. Enabled savings of ~11,071 lbs of refrigerant/year (~259 lbs/leak).

$$ carbon credits available!

Can be deployed quickly and easily across hundred of sites

No expensive hardware or site visits to coordinate. Achieve **2024** compliance deadlines.
Software only. Does NOT require invasive retrofits of analog receiver level sensors

Goes beyond detection - supports rapid leak repairs

Locates leaks, prioritizes repairs based on leak rates (lbs/day), and rapidly catches “gas-and-gos”

Examples

Example Anomaly: **Refrigerant Leak - Present Post Refill**

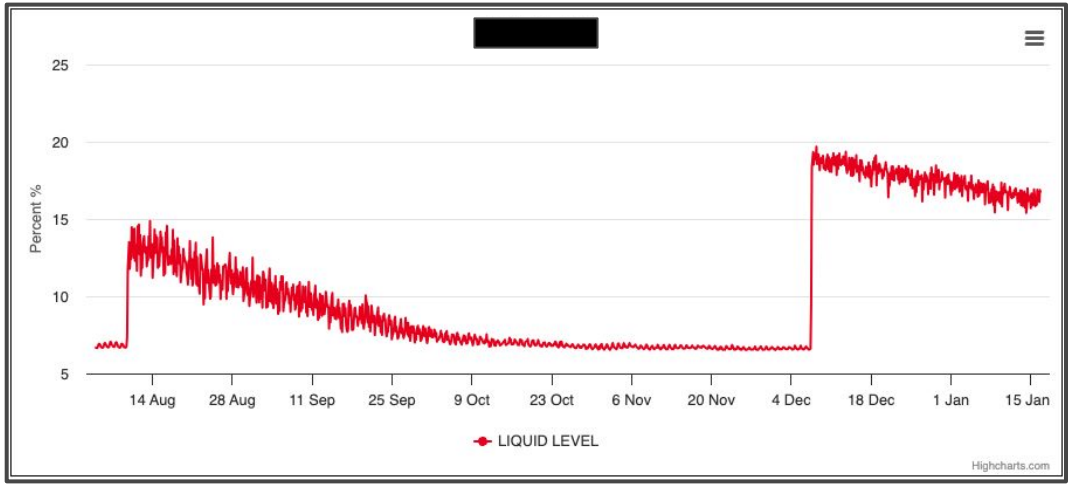
Urgency: High - Address immediately

Est. impact if not addressed: $3,829

Description and Root Cause: Refrigerant leak detected on Rack 1. Receiver liquid level does not correlate with outdoor air temperature, condenser split, or any other factors, indicating a leak. Refill completed on 12/7/23, however leak is still present.

Suggested Actions:

- Generate work order for a technician to inspect Rack 1 and associated suction group(s) with a handheld leak detector.
- Check fittings and piping for oil residue, often indicative of a leak.
- Once a leak is found and repaired, add additional refrigerant to OEM specification.



Example Anomaly: **Refrigerant Leak - Location Identified**

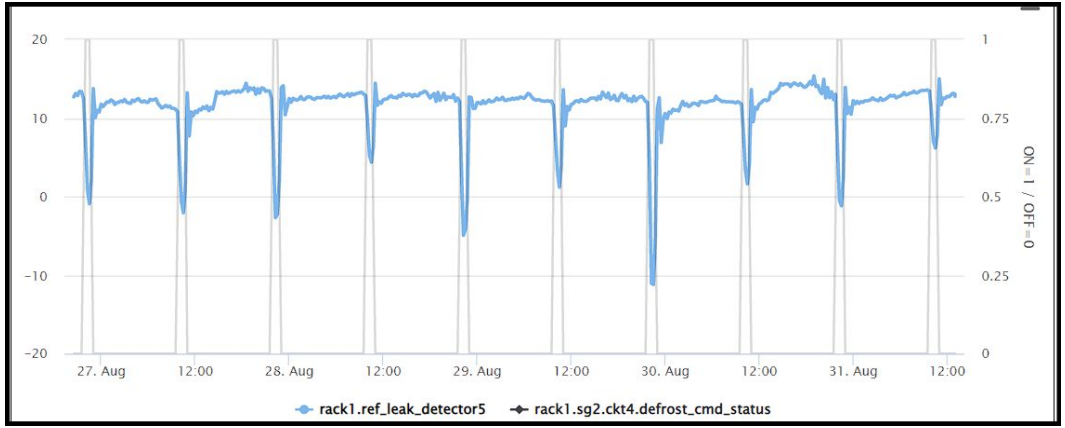
Urgency: High - Address immediately

Est. impact if not addressed: $5,212

Description and Root Cause: High refrigerant concentrations detected by 2A MRLDS, suggesting a refrigerant leak. This is likely caused by Circuit 2A DYBX, as PPM concentrations decrease during defrost.

Suggested Actions:

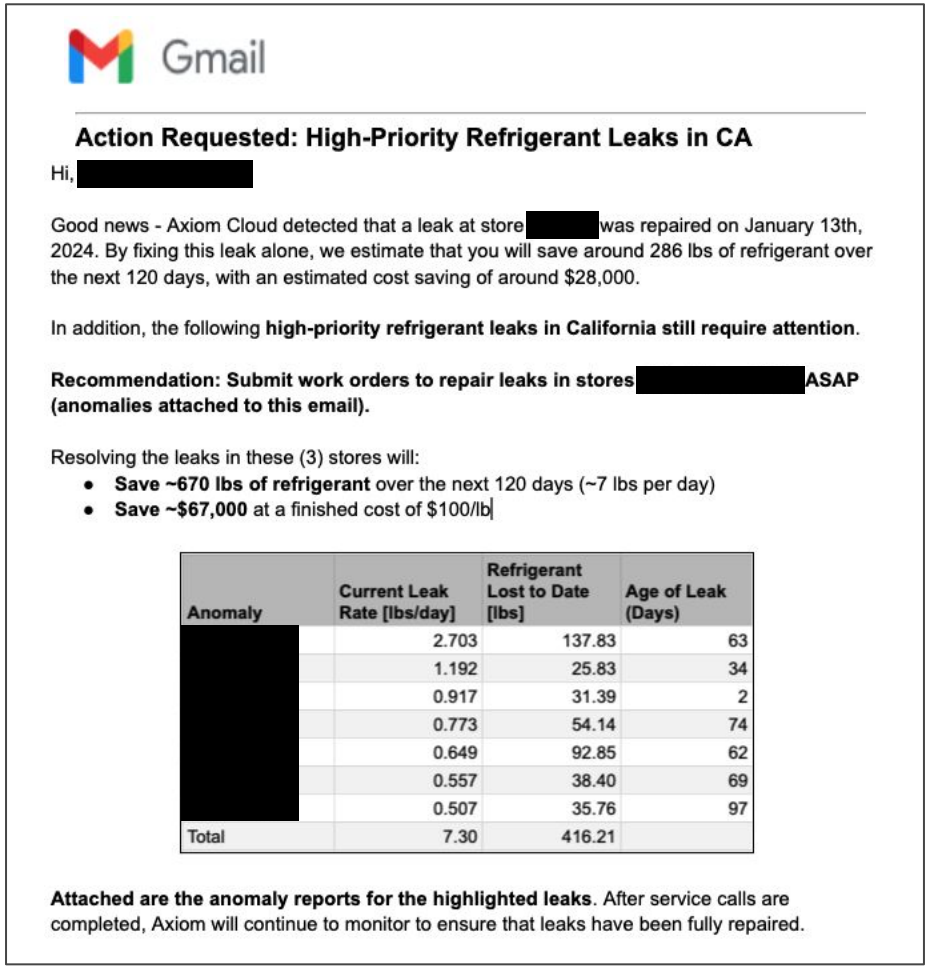
- Generate work order for a technician to inspect Rack 1 and associated suction group(s) with a handheld leak detector.
- Check fittings and piping for oil residue, often indicative of a leak.
- Once a leak is found and repaired, add additional refrigerant to OEM specification.



Example: **Monthly Leak Digest**

For each leak, Axiom determines the leak rate (lbs/day) and the age of the leak (days).

Optional bi-weekly or monthly “digest” of leaks enables customers to prioritize repairs efficiently.



Gmail

Action Requested: High-Priority Refrigerant Leaks in CA

Hi, [redacted]

Good news - Axiom Cloud detected that a leak at store [redacted] was repaired on January 13th, 2024. By fixing this leak alone, we estimate that you will save around 286 lbs of refrigerant over the next 120 days, with an estimated cost saving of around $28,000.

In addition, the following **high-priority refrigerant leaks in California still require attention**.

Recommendation: Submit work orders to repair leaks in stores [redacted] ASAP (anomalies attached to this email).

Resolving the leaks in these (3) stores will:

- **Save ~670 lbs of refrigerant** over the next 120 days (~7 lbs per day)
- **Save ~$67,000** at a finished cost of $100/lb

Anomaly	Current Leak Rate [lbs/day]	Refrigerant Lost to Date [lbs]	Age of Leak (Days)
[redacted]	2.703	137.83	63
	1.192	25.83	34
	0.917	31.39	2
	0.773	54.14	74
	0.649	92.85	62
	0.557	38.40	69
	0.507	35.76	97
Total	7.30	416.21	

Attached are the anomaly reports for the highlighted leaks. After service calls are completed, Axiom will continue to monitor to ensure that leaks have been fully repaired.

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Thank you for listening!