

PHASE SIGHT AI

> THE MATH

Annual cost of a split HVAC system. Over 22 years.

Per-unit and portfolio-scale economics for ductless mini-split HVAC across three maintenance scenarios. All assumptions and sources in this file.

> THE HEADLINE

Annualized total cost of ownership per HVAC unit, across the same 22-year horizon for all three scenarios. Lower is better.

01 • NO MAINTENANCE

No maintenance

// 10-year unit lifespan
// 3 units bought over 22 years
// ~13 emergency repairs

\$2,193

/ unit / year

02 • PHASE SIGHT AI

Phase Sight AI managed

// 22-year unit lifespan
// 1 unit bought over 22 years
// 1 emergency repair

\$978

/ unit / year

03 • STANDARD QUARTERLY

Standard quarterly maintenance

// 17-year unit lifespan
// 2 units bought over 22 years
// ~3 emergency repairs

\$1,557

/ unit / year

Phase Sight saves \$579/unit/year vs. standard quarterly maintenance (37% reduction), and
\$1,215/unit/year vs. no maintenance (55% reduction).

> AT PORTFOLIO SCALE

Annual savings vs. standard quarterly maintenance, extrapolated to typical multifamily portfolio sizes.

50 units

\$28,950

saved per year
\$636,900 over 22 years

100 units

\$57,900

saved per year
\$1,273,800 over 22 years

250 units

\$144,750

saved per year
\$3,184,500 over 22 years

500 units

\$289,500

saved per year
\$6,369,000 over 22 years

> SCENARIO 1

No maintenance

10-year average unit lifespan. Property runs HVAC equipment with no scheduled service, addressing problems only when something fails. Over a 22-year horizon, the property buys 3 HVAC units total.

Line item	Calculation	Cost
Installs	3 x \$4,000	\$12,000
Scheduled maintenance	\$0 over 22 years	\$0
Emergency repairs	~13 events x \$700	\$9,100
Reactive major repairs	4 events x \$1,500	\$6,000
Water damage from condensate failures	2 incidents x \$1,500	\$3,000
Tenant relocation during emergencies	6 incidents x \$300	\$1,800
Electricity (25% efficiency loss avg)	\$345/yr x 22	\$7,590
Wasted truck rolls (no diagnosis upfront)	17 extra x \$200	\$3,400
Refrigerant losses (slow leaks unmonitored)	\$80/yr x 22	\$1,760
Emergency replacement premium	3 forced x \$1,200	\$3,600

TOTAL OVER 22 YEARS

\$48,250

ANNUALIZED PER UNIT

\$2,193 / yr

> SCENARIO 2

Phase Sight AI managed

22-year average unit lifespan with Irvin sensors monitoring continuously and Phase Sight AI generating pre-diagnosed work orders. Over the same 22-year horizon, the property buys 1 HVAC unit. Scheduled maintenance becomes on-demand: contractors visit when sensor data flags a developing issue, not on a calendar.

Line item	Calculation	Cost
Install	1 x \$4,000	\$4,000
Irvin sensor pair (one-time)	Pre-order price	\$299
Phase Sight AI platform	\$144/yr x 22	\$3,168
On-demand maintenance	\$350/yr x 22	\$7,700
Emergency repairs	1 event x \$700	\$700
Proactive component replacement	1 x \$500	\$500
Water damage incidents	Caught early via sensors	\$0
Tenant relocation	No catastrophic failures	\$0
Electricity (15% efficiency gain)	\$234/yr x 22	\$5,148
Wasted truck rolls	Pre-diagnosed work orders	\$0
Refrigerant losses	Leaks detected within days	\$0
Emergency replacement premium	Planned replacement only	\$0

TOTAL OVER 22 YEARS

\$21,515

ANNUALIZED PER UNIT

\$978 / yr

> SCENARIO 3

Standard quarterly maintenance

17-year average unit lifespan with bi-annual or quarterly visits from a maintenance contractor. Over a 22-year horizon, the property buys 2 HVAC units total. This is the most common operating model for multifamily today, particularly properties with manufacturer warranty requirements.

Line item	Calculation	Cost
Installs	2 x \$4,000	\$8,000
Quarterly maintenance	\$600/yr x 22	\$13,200
Emergency repairs	~3 events x \$700	\$2,100
Reactive major repair	1 event x \$1,200	\$1,200
Water damage from condensate failures	0.5 incidents x \$1,500	\$750
Tenant relocation during emergencies	1 incident x \$300	\$300
Electricity (maintained baseline)	\$275/yr x 22	\$6,050
Wasted truck rolls (no pre-diagnosis)	4 extra x \$200	\$800
Refrigerant losses (caught at quarterly visits)	\$30/yr x 22	\$660
Emergency replacement premium	1 forced x \$1,200	\$1,200

TOTAL OVER 22 YEARS

\$34,260

ANNUALIZED PER UNIT

\$1,557 / yr

How this model was built

Anchor assumptions, ranges, and source attribution for every line item in the scenarios above.

Unit assumptions

Single-zone ductless mini-split, ~12,000 BTU, the most common configuration in multifamily apartments. Install cost \$4,000 reflects mid-range pricing.

Lifespan ranges

No maintenance: 8 to 12 years (model: 10). Standard: 15 to 20 (model: 17). Predictive: 20 to 25+ (model: 22). Source: ASHRAE Journal, manufacturer specs.

Emergency repair cost

\$700 average reflects mid-range component replacement (capacitor, contactor, motor) plus after-hours premium. Source range: \$300 to \$1,500.

Major repair cost

\$1,200 to \$1,500 reactively; ~\$500 to \$600 caught proactively before catastrophic failure (Phoenix Strategy: 4 to 5x cheaper when caught early).

Maintenance cost (S3)

\$600/year = quarterly visits at \$150 each, typical of multifamily full-coverage contracts. Source range: \$600 to \$1,200/unit/year for multifamily.

Maintenance cost (S2)

\$350/year reflects on-demand maintenance, ~40% reduction vs quarterly. McKinsey and Siemens cite 25 to 40% reduction with predictive maintenance.

Phase Sight AI platform

Includes Irvin connectivity, diagnostic platform, pre-diagnosed work orders, software updates. Irvin sensor pair is one-time.

Electricity baseline

\$275/yr derived from 12,000 BTU mini-split, 1,800 to 2,500 kWh/yr at \$0.13/kWh. 15 to 25% degradation without maintenance is well-documented.

Phase Sight efficiency gain

15% reflects continuous monitoring of compressor and refrigerant charge. LLumin: 25%+ within 6 to 12 months; McKinsey: 10 to 15% at portfolio scale.

Collateral costs

Water damage from condensate failures; tenant relocation during emergencies. Both eliminated by predictive maintenance via sensor monitoring.

Wasted truck rolls

Standard repair = 2 visits (diagnose + return). Pre-diagnosed work orders eliminate the first visit. Cost per truck roll: \$150 to \$250, anchored at \$200.

Refrigerant losses

Slow leaks lose 1-2 lbs/yr undetected. R-410A successor: \$80 to \$150/lb. Sensors detect leaks within days via pressure/temperature drift.

> WHAT IS NOT IN THE MODEL

Conservative omissions

Real costs Phase Sight reduces that are too situational to defend in a headline. Each line favors Phase Sight; leaving them out keeps the model defensible. The true savings are larger than reported.

Cost line	Magnitude	Captured by	Why excluded
Tenant retention	\$50/unit/year	Property	Correlation, not causation
Insurance discount	\$20 to \$80/unit/yr	Property	Carrier-dependent
Warranty preservation	\$3 to \$10/unit/yr	Property	Rare events
Demand response revenue	\$25 to \$100/unit/yr	Property	Market-dependent
Capital planning lead time	Variable	Property	Counted partially in install line

> SOURCES

Lifespan	HVACDirect, Trane, Carrier, HVAC.com, Blue Ridge, Thiele, Valley Home
Installation cost	EnergySage, HomeGuide, U.S. EIA, Fixr
Emergency repair cost	Hoover Air, JP Heating, Angi, Phoenix Strategy Group
Maintenance cost	Angi, Fixr, Today's Homeowner, Mynd Property Management, Oxmaint
Predictive maintenance ROI	McKinsey, Siemens, ASHRAE Journal, U.S. DOE, LLumin, 75F.io
Electricity consumption	EIA, HVAC PRO Sales, Carrier, Senville, Blue Ridge

All figures in 2026 USD. Inflation and refrigerant transition costs (R-410A phase-out) are not modeled and would widen the gap in favor of Phase Sight. Mileage varies by climate zone, tenant behavior, equipment, and labor market. The Phase Sight AI platform is currently in pre-order. Irvin hardware ships Early 2027. Performance commitments are modeled projections from cited research, not customer outcome data; pilot data will be published as it becomes available.

> READY TO START A PILOT?

Let's talk fleet size, install, and timeline.

phasesight.ai
hello@phasesight.ai
Made in Richmond, VA