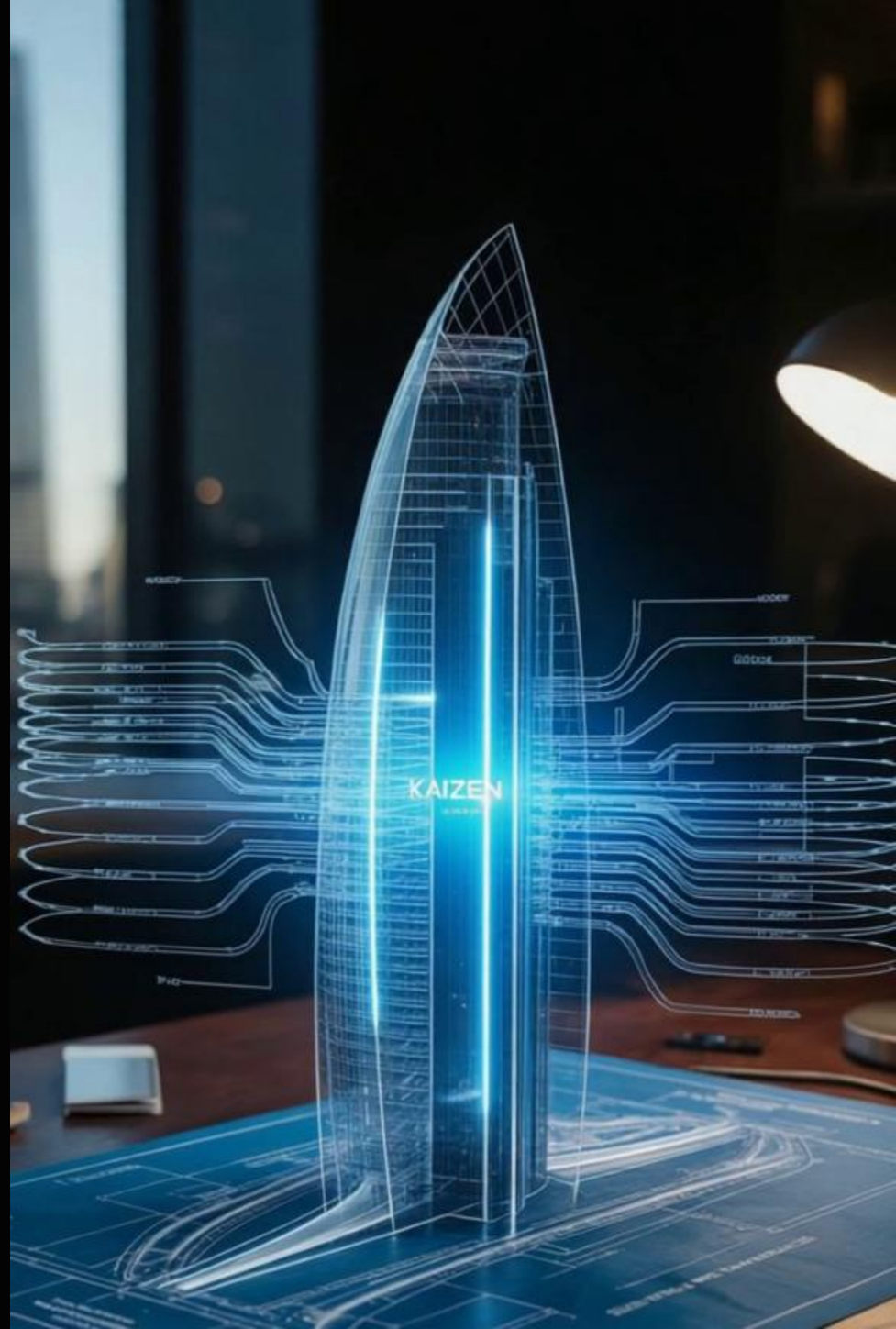
CopperTree Analytics

Introduction & Capabilities

June 2026



Presentation Outline

1. Introduction to CopperTree Analytics
2. Challenges faced
3. Our Solutions
4. Kaizen Platform
5. Project types

About CopperTree

- **Founded in 2012:**
  Delivering operational and energy efficiencies through building optimization
- **Innovator**
  Developer of KAIZEN software, a powerful analytics tool
- **Global Presence**
  Our solution has been deployed to 5,000+ buildings across 6 continents
- **Massive Scale:**
  Collecting over **145 Billion data objects** per year from our client buildings
- Member of Sidara, a global engineering powerhouse

Connecting **Buildings** | Connecting **People**

CopperTree Analytics

About Sidara

Sidara is one of the world's leading consultancies, providing design, planning, engineering, and project management services for energy, buildings, cities, transportation, civil, infrastructure, water and the environment.

55k+
Employees

20+
Companies

70+
Countries

450+
Offices

Sidara

Our Collaborative

Sidara

Buildings & Infrastructure	Architecture	Infrastructure & Engineering	Project Management	Energy & Materials
dar	Perkins&Will	TYLin	CURRIE & BROWN	wood.
MAFFEIS engineering	NELSON NYGAARD	Introba		PENSPEN
CopperTree Analytics	MCLENNAN DESIGN	L&B		C&I
R&H Rail (Pty) Ltd	PORTLAND.			
su/yapi	PIERRE-YVES ROCHON			
PARA	SCHMIDT HAMMER LASSEN			
Urban Initiatives	RØRBÆK OG MØLLER ARKITEKTER A/S			

Our Sector Experience

Education


Public


Commercial


Energy

Manufacturing


Health

Overcoming the Hidden Challenges of Building Operations

Indoor environment

- Occupancy comfort
- Indoor air quality
- Productivity of occupants

Energy & Operational Efficiency

- Energy Waste
- Suboptimal Equipment Performance
- Peak Demand Charges

Maintenance & Reliability

- Reactive Maintenance
- Asset Degradation & Early Failures
- Inefficient Work Order Management

Sustainability & Compliance

- Sustainability & Carbon Impact
- Regulatory Compliance
- Indoor Air Quality (IAQ) Concerns

Decision-Making

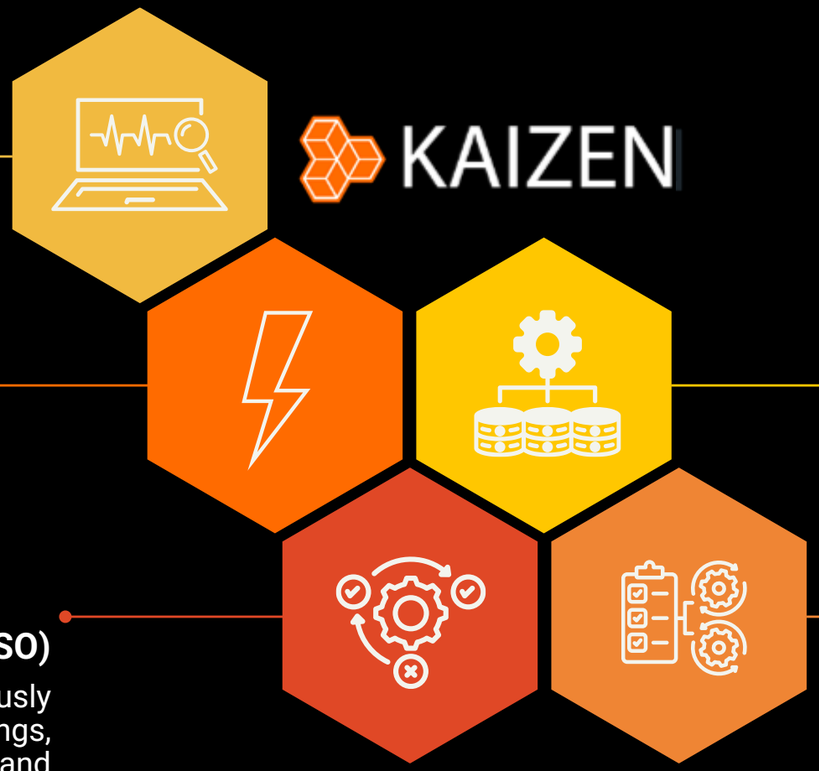
- Prioritization Challenges
- Lack of Performance Benchmarking
- Investment Justification

CopperTree's Solutions

Data-Driven strategies to transform building operations challenges into opportunities to drive efficiency, reduce costs, and support sustainability.

Fault Detection & Diagnostics (FDD)

Detects inefficiencies in BMS, generates insights, and provides prioritized recommendations to enhance building performance.



Energy

Provides a centralized Energy Management Information System (EMIS) to monitor and analyze energy performance across entire building portfolios.

Independent Data Layer (IDL)

Aggregates and normalizes data across disparate systems for unified insights.

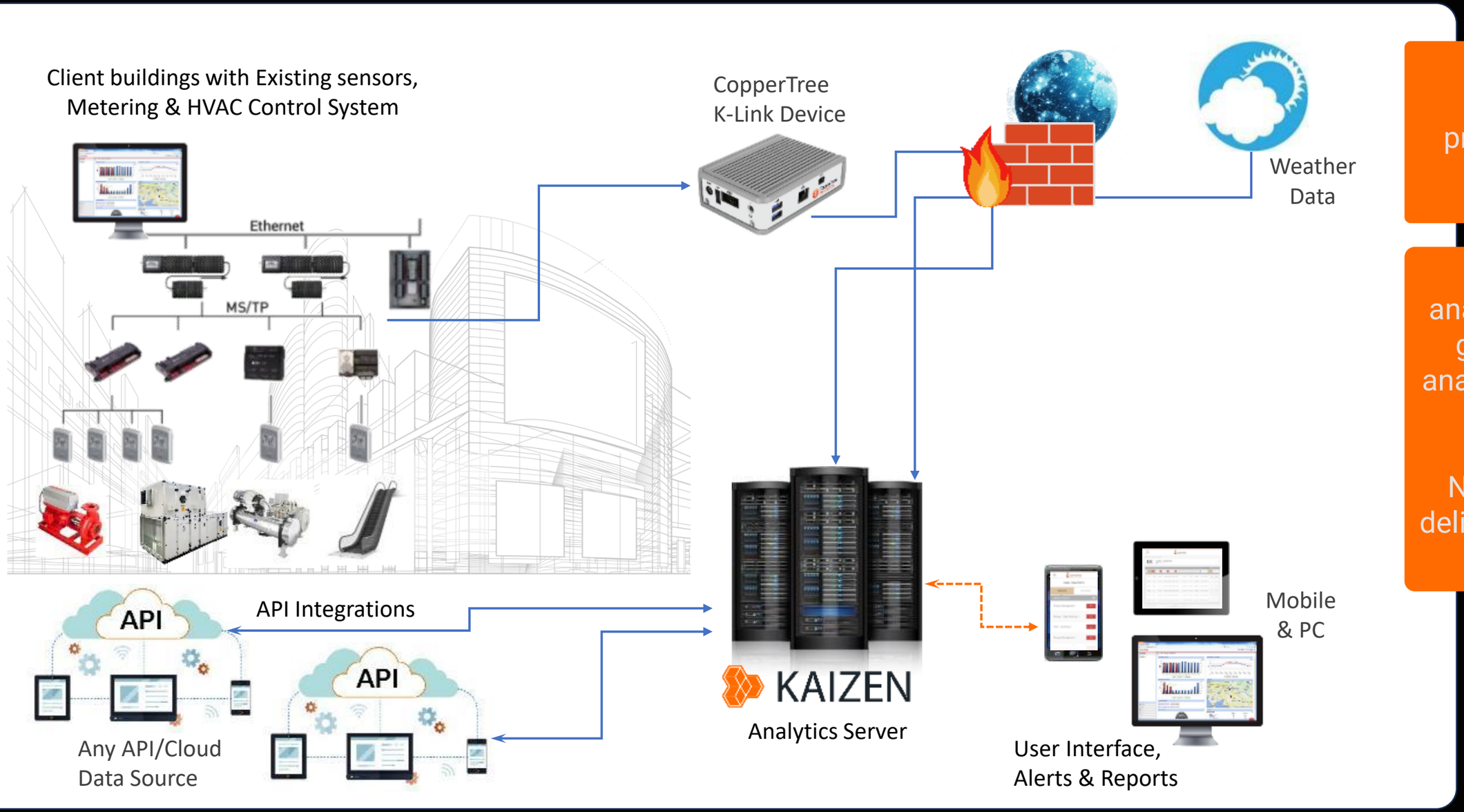
Automated System Optimization (ASO)

Uses AI and ML to continuously analyze data, adjust system settings, and drive real-time energy and operational efficiency.

Automated Commissioning (ACx)

Performs functional testing of BMS components, validates performance, and identifies issues to ensure optimal operation.

Functional Solution Diagram



Onsite device acquires and prepares data for delivery

Cloud Server analyzes the data & gives access to analytics, charts and reports.

Notifications are delivered via the web and mobile

Data Sources, Abstraction & Applications

Background

Buildings generate vast amounts of data from multiple sources. Our building analytics architecture follows a structured and clearly defined step by step process to identify, verify and package this data to proactively deliver efficient, low energy, healthy buildings.

Data Sources

- Utility Bills
- Interval Meters
- Weather Data
- BAS & IoT Devices
- Any Other Data (time-series)

Integration Layer

- BACnet
- Databases
- CSV
- APIs
- Other Protocols

Independent Data Layer (IDL)

- Central & Foundational
- Normalized & Tagged
- Single Source of Truth
- All Data available through API

Application Layer

- EIS & FDD
- ASO
- Automated Cx
- Advanced Analytics

3rd Party Outbound Integrations

- Digital Twins
- CMMS
- Unified UI
- Custom Dashboards
- Engineering Tools

Consolidation Layer

The Independent Data Layer (IDL)

Why It Matters?

- Integrate, tag, and store all project data, enhanced with ontology and hierarchy of systems
- Validate all data is present and accounted for, named properly and ready for commissioning
- Run pattern recognition on all available data to identify early issues and failures

How Kaizen IDL Works

- Uses a large library of data connectors to integrate various data sources (BAS, Energy, Lighting, More)
- Data is trended directly from source systems every 5-10 minutes
- Pattern recognition ML analyzes data based on its tags and ontology to pinpoint faults in sensors & data well before Cx testing

The Result

Early validation of:

- Cx readiness
- Streamlined test planning
- Identification of deficiencies far earlier in the process

Our platform is built on creating an Independent Data Layer (IDL) that ingests, tags, and structures data from any source into a vendor-agnostic 'single source of truth.' This critical first step transforms disparate, often inconsistent data streams into a unified, analysis-ready format.

Analytics Application Layer

Fault Detection & Diagnostics (FDD)

Why Use CopperTree's Kaizen FDD Platform?

- BMS tells you what's happening – displays alarms or trends
- Fault detection & diagnostics tells you what's wrong, why it's happening and what's required to resolve it
- Kaizen FDD is a transparent analytics platform
- Every rule and logic path derived from proven engineering principles & industry standards.
- Proactively identifies inefficiencies in Building Management Systems and other data sources
- Prioritizes faults, track performance and adopt proactive maintenance
- Pinpointing faults
- Streamline both commissioning and post-construction phases

Automated Fault Detection

Continuously monitors HVAC, mechanical, and electrical systems to detect faults early in the construction phase.

Data Driven Commissioning

Verifies that systems are installed and operating as designed, ensuring compliance with project specifications.

Actionable Insights

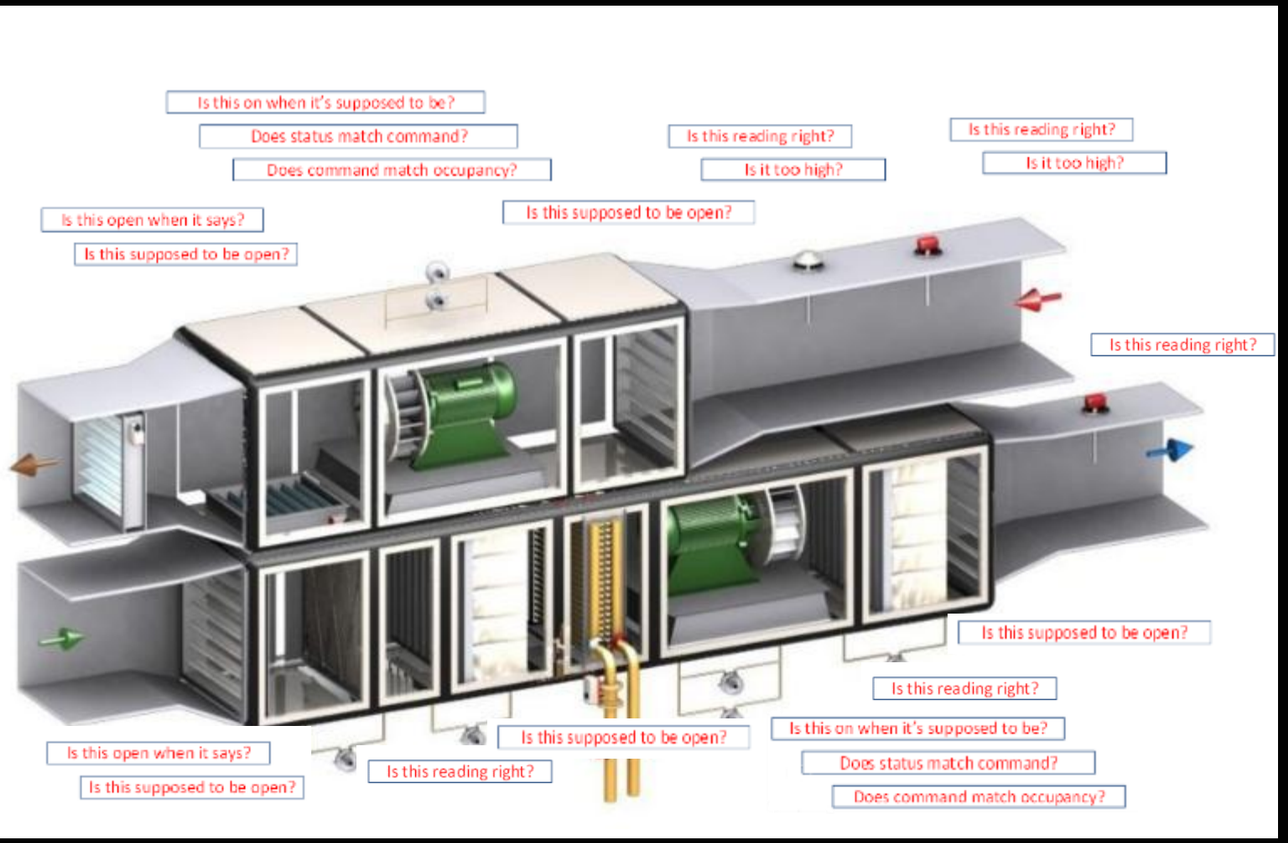
Provides detailed reports on deficiencies and optimization opportunities to improve system performance before handover.

Proactive Risk Management

Identifies potential issues that could delay timelines or lead to costly rework.

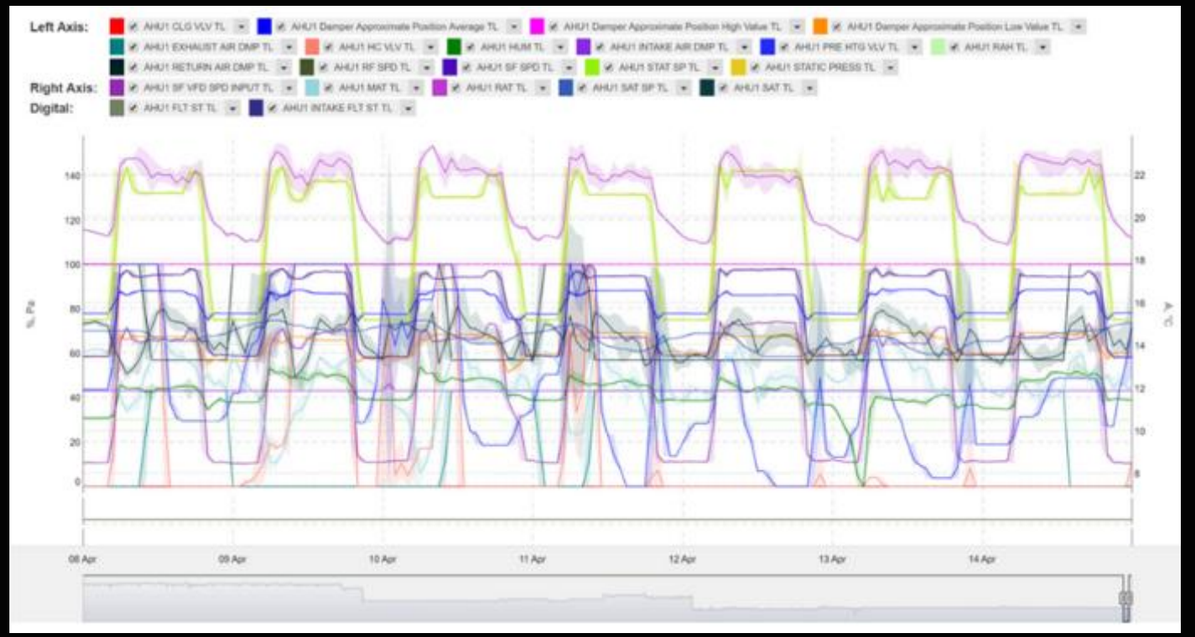
Analytics Application Layer

Fault Detection & Diagnostics (FDD)



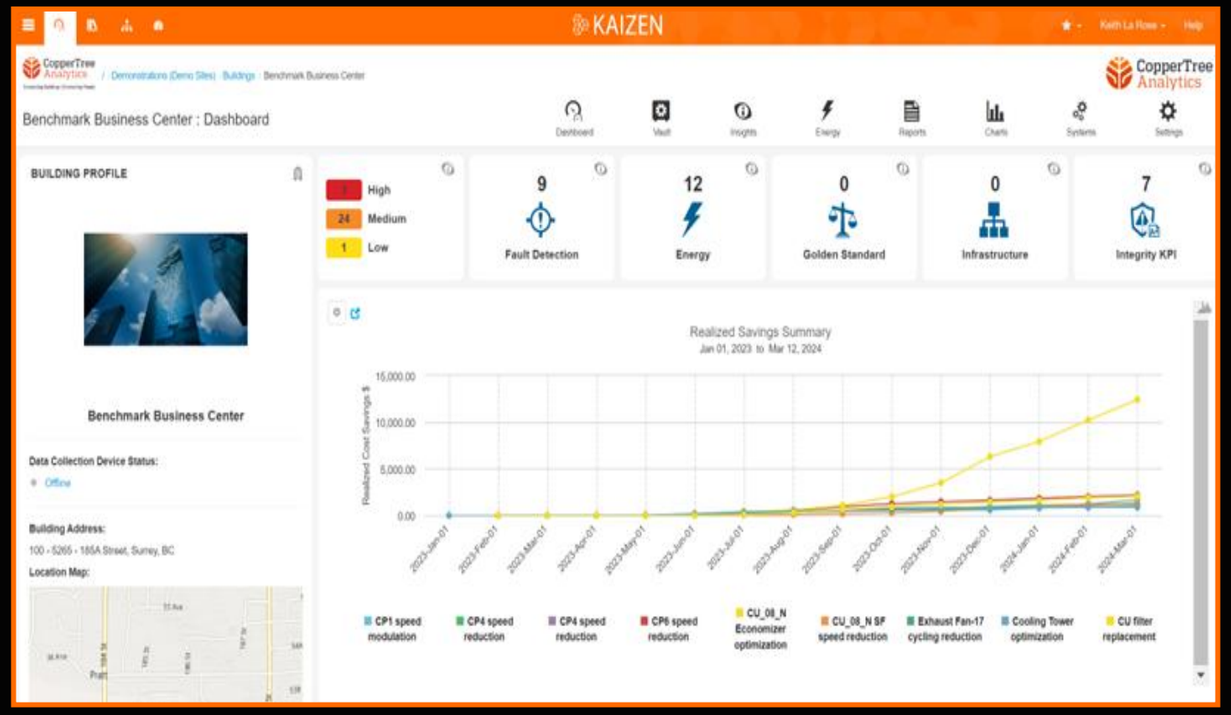
Big Data

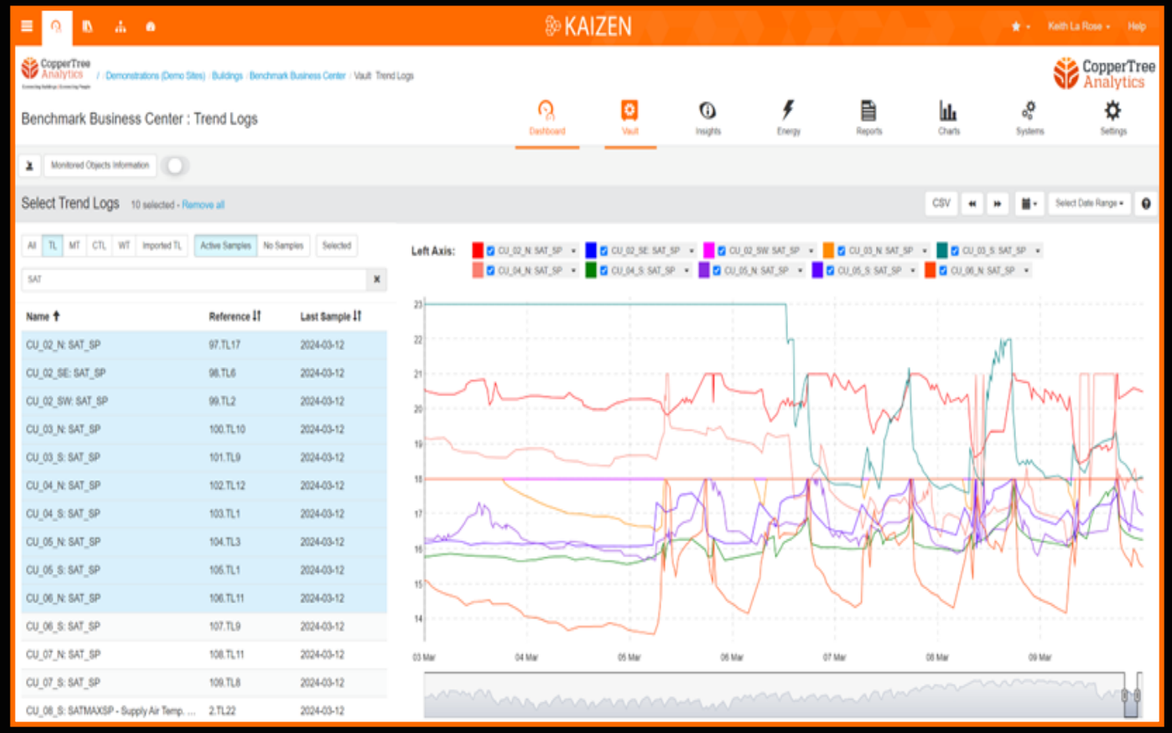
- Our platform processes vast amounts of operational data, delivering accurate, forward-looking insights enabling proactive building performance management
- A single AHU with 30 data points generates 3,000,000+ data samples per year
- With 1,000 similar assets in your building, this scales to 3 billion data samples annually
- Manual processing is impossible at this scale



Analytics Application Layer

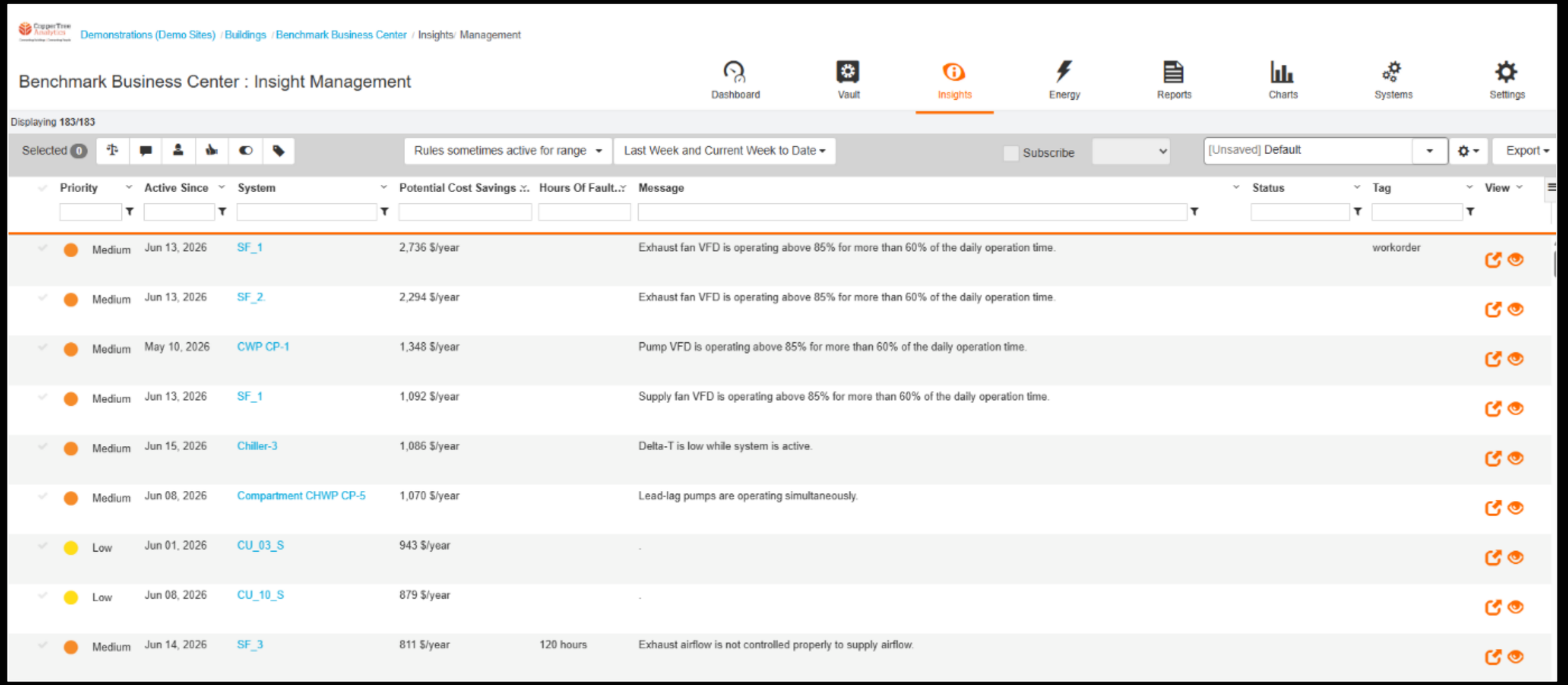
Fault Detection & Diagnostics (FDD)





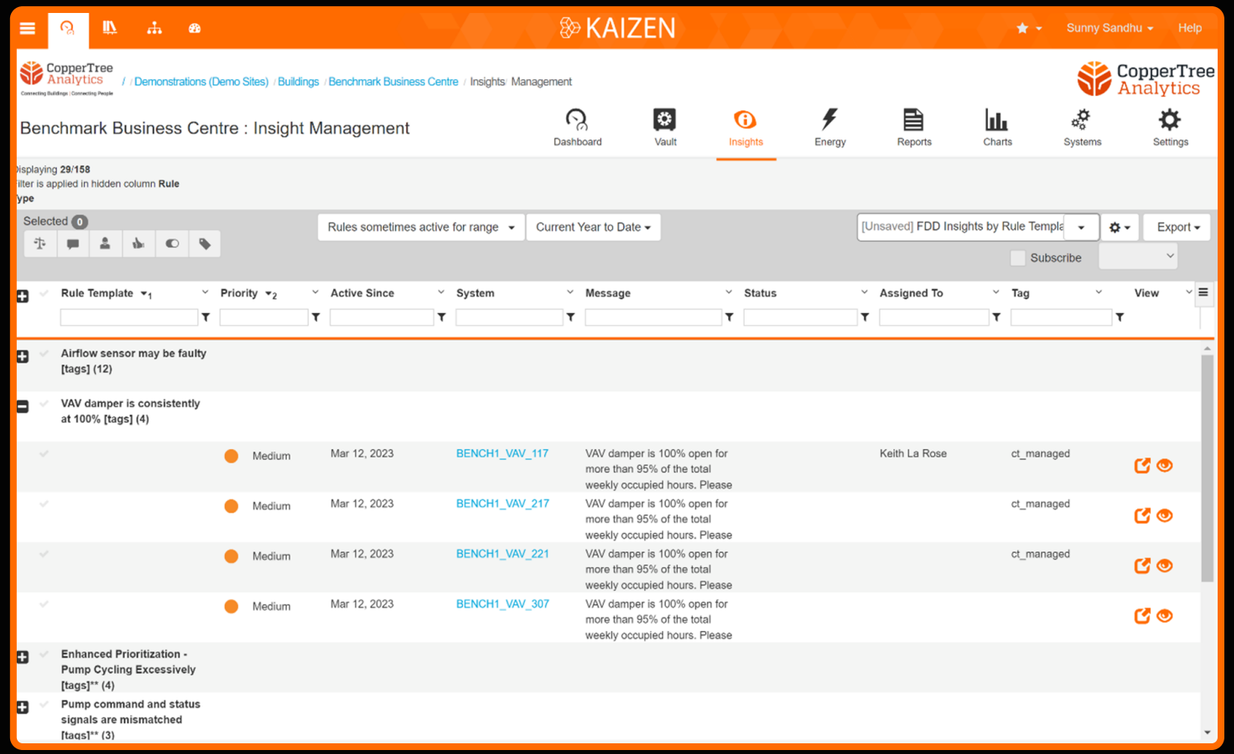
Kaizen

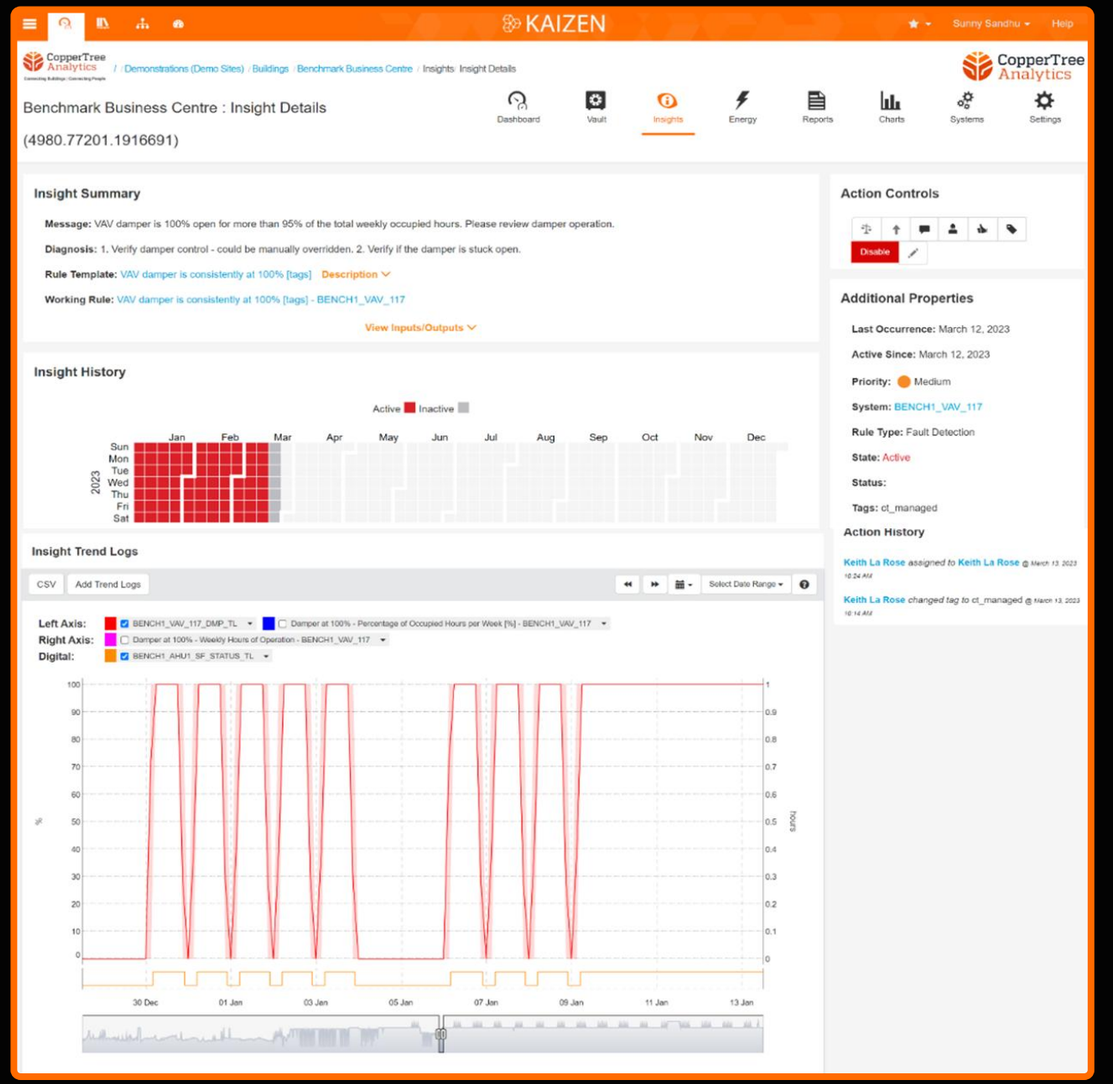
Dashboard - Insights



Analytics Application Layer

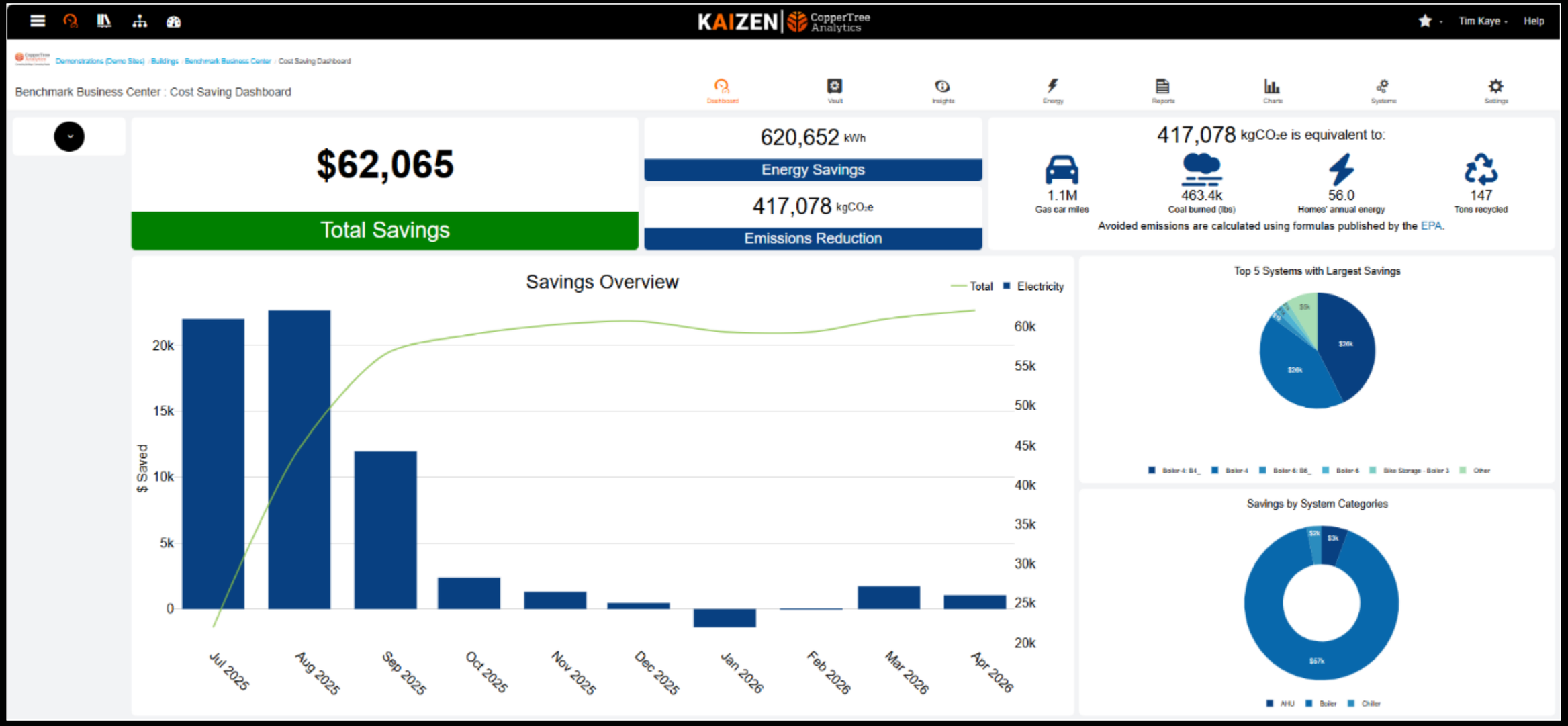
Fault Detection & Diagnostics (FDD)





Kaizen

M&V Dashboard



Supervisory Analytics Application Layer

Automated Commissioning (ACx)

Why Use CopperTree's Kaizen ACx Platform for Commissioning?

CopperTree’s Kaizen Automated Commissioning (ACx) solution streamlines and enhances the commissioning process for projects. By leveraging advanced analytics and automation of functional testing, Kaizen ACx ensures comprehensive testing, early fault detection, and actionable insights saving time, reducing costs, and improving system reliability.

With Kaizen ACx, teams can deliver high-performance projects with confidence while strengthening client relationships through validated results.

Automated Functional Testing

Kaizen ACx verifies field devices and control sequences in BMS, ensuring optimal system performance under all conditions.

Comprehensive System Coverage

Unlike traditional methods, ACx tests 100% of systems, including HVAC, mechanical equipment, and secondary systems like VAVs, FPUs, FCUs and heat pumps.

Proactive Fault Detection

Advanced algorithms identify hidden issues such as damper leaks or improper valve responses before they escalate into costly problems.

Customizable Reporting

Flexible reports provide detailed insights into system performance, highlighting areas requiring attention for quick remediation.

Analytics Application Layer

Automated Commissioning (ACx)

- ACx is an automated commissioning solution
- Verifies the performance of terminal (secondary) units monitored and controlled by the Building Management System (BMS)
- Leveraging real-time and historical operational data to continuously evaluate equipment performance, identify patterns, anomalies, and deviations
- The platform enables automated, large-scale **functional testing**
- Analysis of HVAC and mechanical systems
- Delivers a level of independent verification and performance validation that is not achievable through traditional manual commissioning processes

CopperTree's ACx application is specifically focused on secondary (zone-level) equipment, helping ensure optimal performance, occupant comfort, and energy efficiency throughout the building lifecycle.

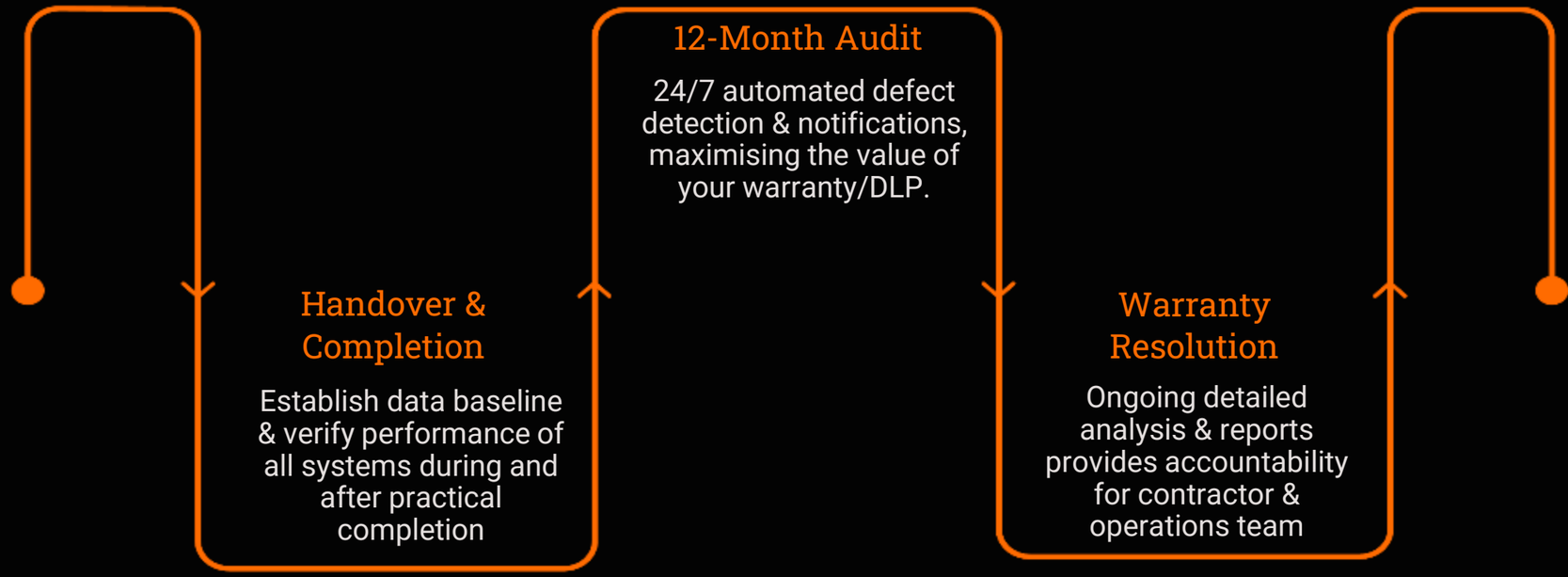
ACx tests range of measurements including:

- Leakage
- Feedback Mismatch
- Response Time
- Low Airflow
- Cooling/Heating Control
- Reduced Heating/Cooling Capacity

Analytics Application Layer

Automated Commissioning (ACx)

The warranty period is a critical period for any newly build asset.
Unidentified latent defects or control anomalies silently accumulate becoming long-term liabilities the moment the warranty expires.

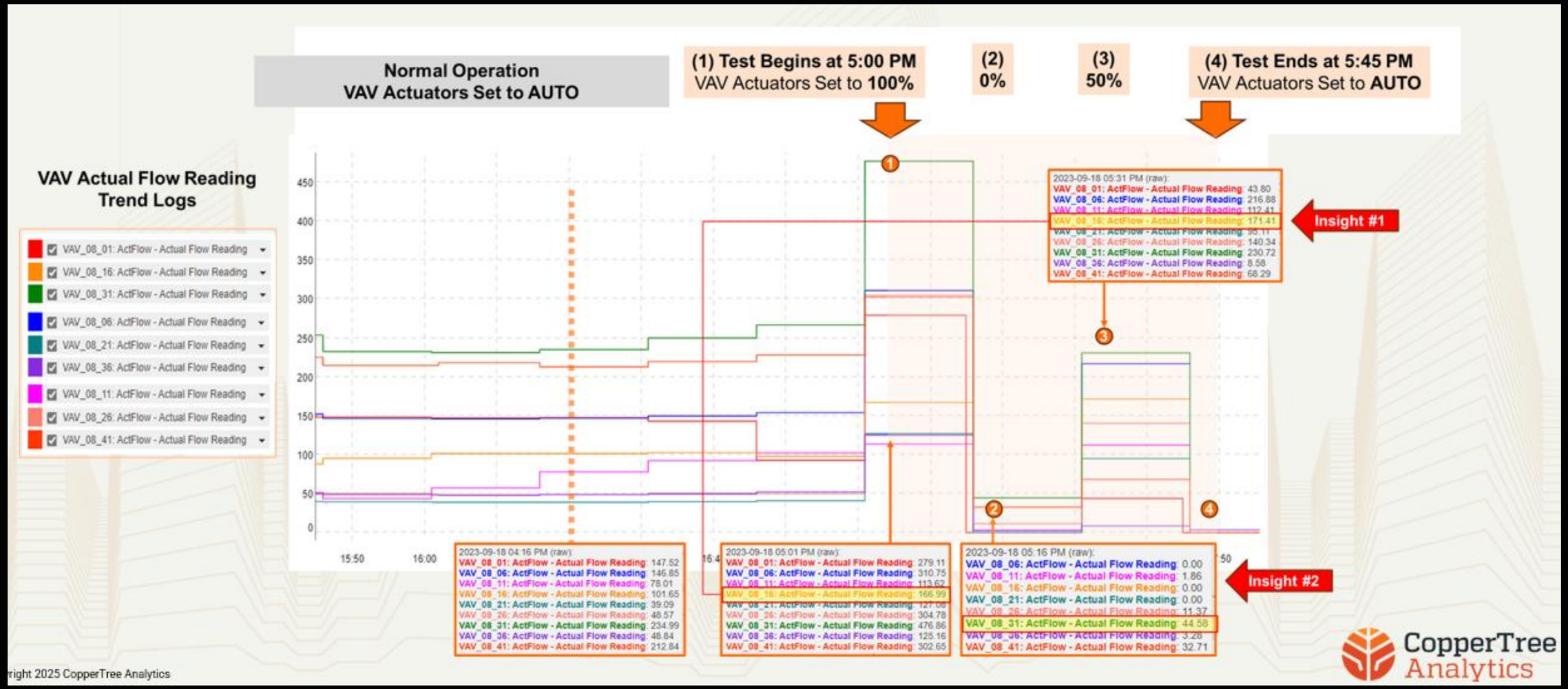


Latent Defect Identification

CopperTree continuously audits equipment operation throughout the defect liability period. By cross-referencing actual system behaviour against expected sequences, the platform automatically isolates short-cycling motors, sensor inaccuracies, and faulty valves before they become owner/operator liabilities.

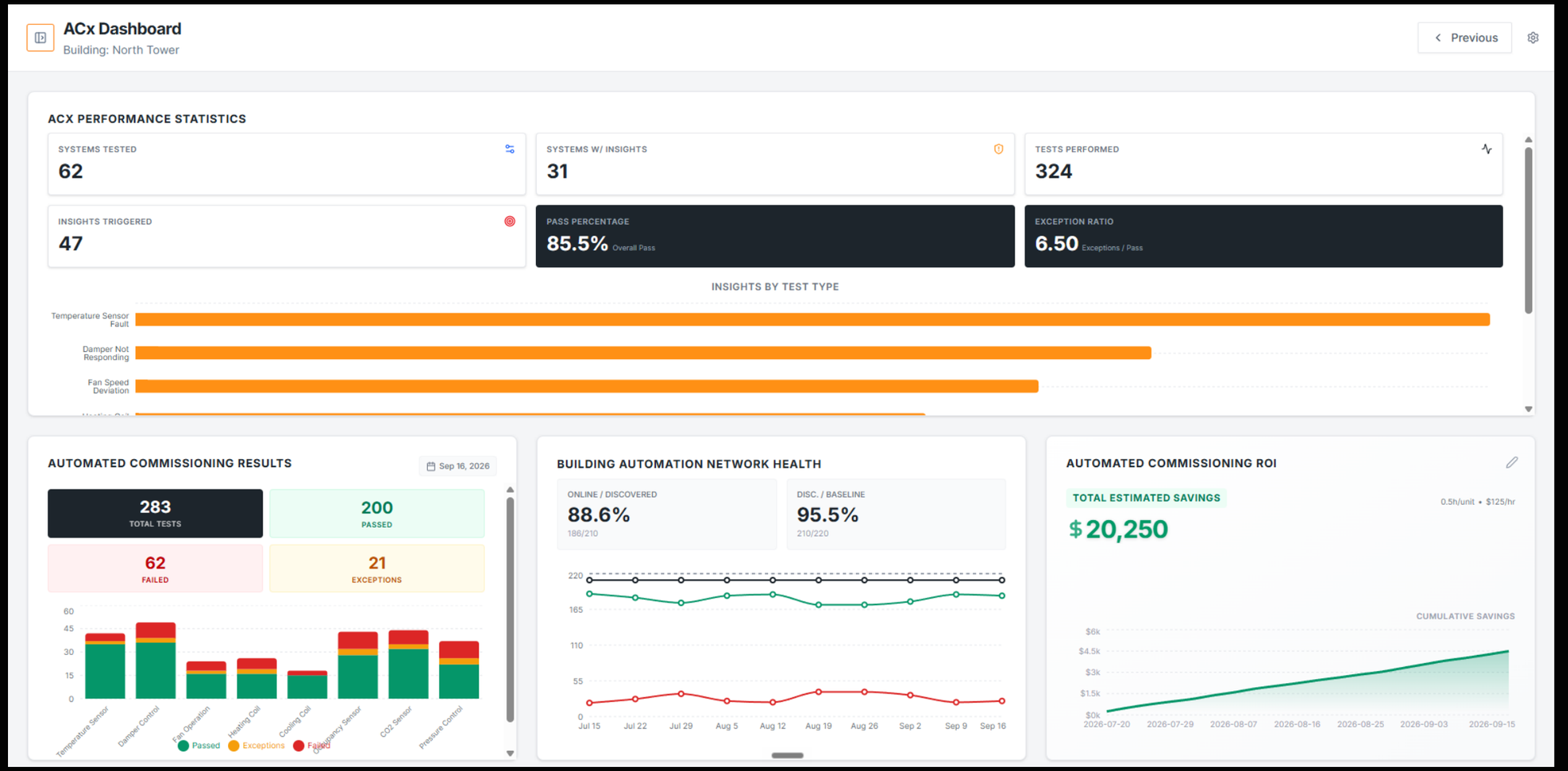
Analytics Application Layer

Automated Commissioning (ACx) Reporting



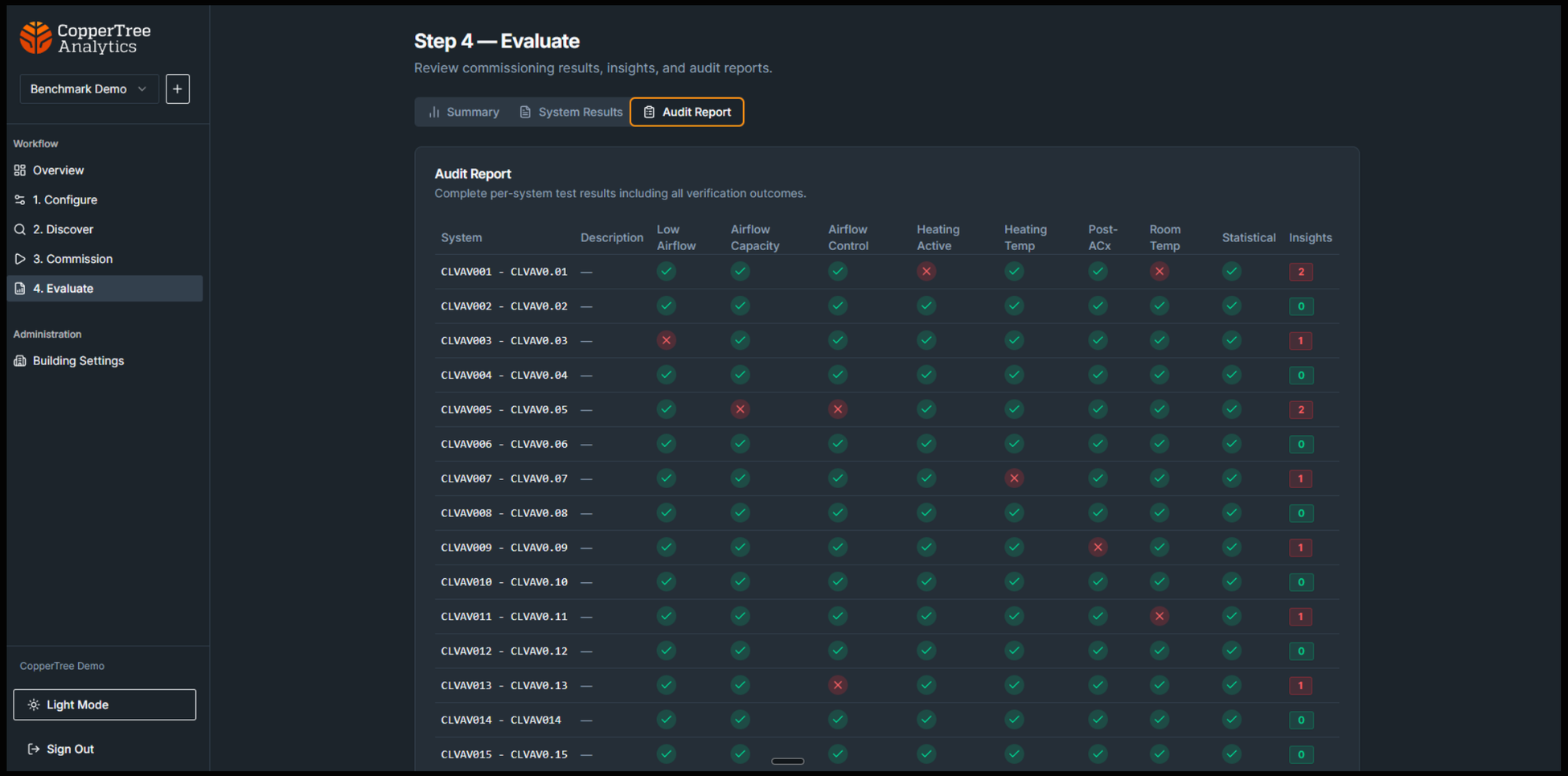
Analytics Application Layer

Automated Commissioning (ACx) Reporting



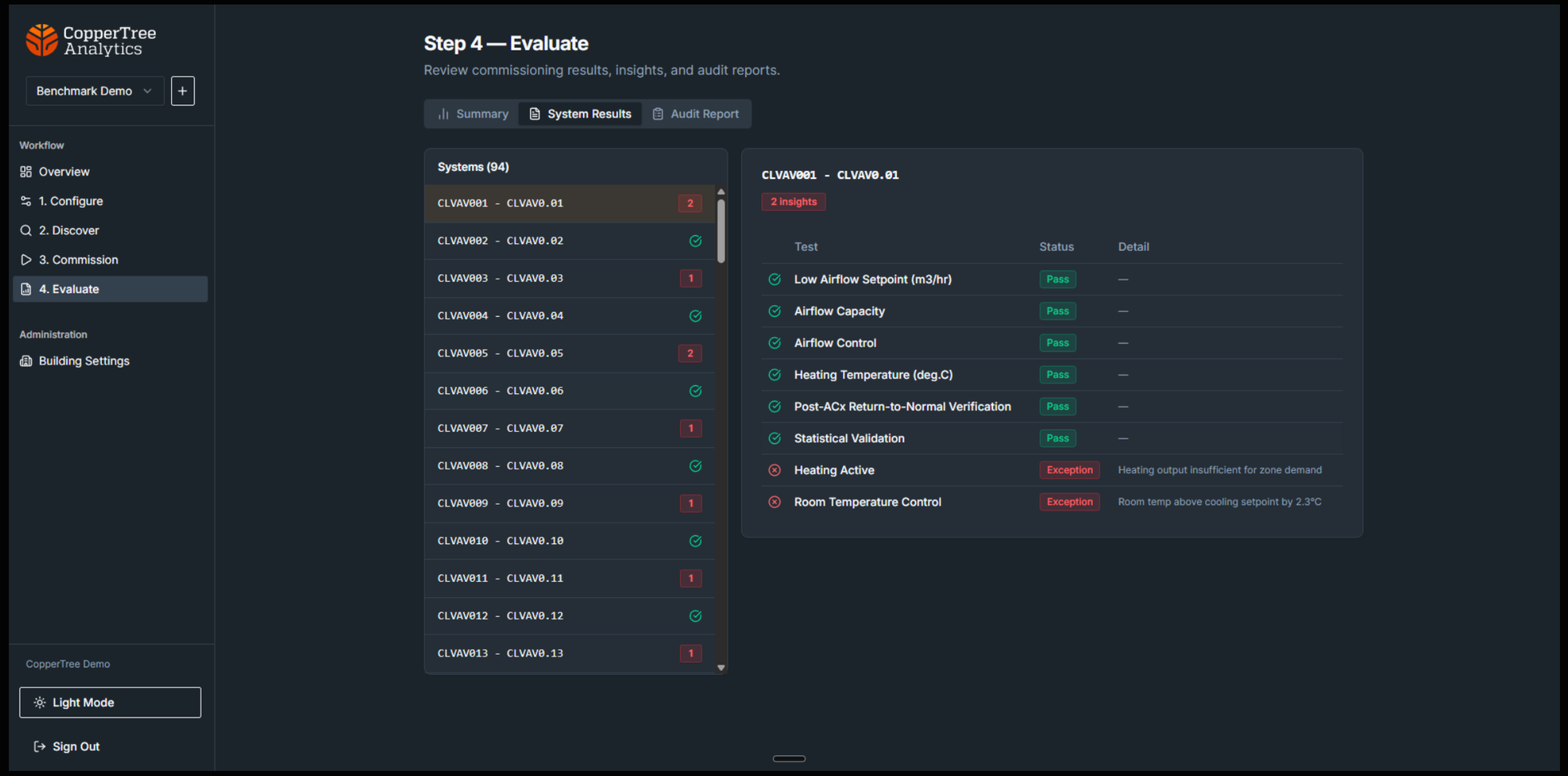
Analytics Application Layer

Automated Commissioning (ACx) Reporting



Analytics Application Layer

Automated Commissioning (ACx) Reporting



Analytics Application Layer

Automated Commissioning (ACx) Reporting

Supervisory Analytics Application Layer

Automated System Optimization (ASO)

Why Use CopperTree's Kaizen ASO for ongoing building optimization

Kaizen ASO functions as a supervisory control layer, closing the loop from passive detection to active, real-time optimization. Unlike reactive monitoring, ASO securely pushes dynamic setpoints directly to the BMS based on continuous analytical feedback.

Advanced algorithms deploy ASHRAE Guideline 36 high-performance sequences to instantly eliminate energy waste, while rigorous protocols ensure operations remain within strict safety limits.

Supervisory Automation

Pushes optimized commands and intelligent setpoints directly to the BMS for immediate action.

Closed-Loop Control

Transforms analytical insights into automated, real-time corrections without manual bottlenecks.

ASHRAE G36 Integration

Automatically calculates and deploys high-performance Trim and Respond optimization logic.

Secure Architecture

Enforces explicit control permissions and write-priority relinquishing for absolute operational safety.

The ASO Cycle

Closed-Loop Optimization at Scale

Building Analysis

Kaizen IDL ingests real-time telemetry from BAS and IoT sensors, creating a live digital twin of operational behavior.

Setpoint Calculation

Advanced algorithms calculate mathematically optimal setpoints based on current occupancy, load, and weather conditions.

Supervisory Write

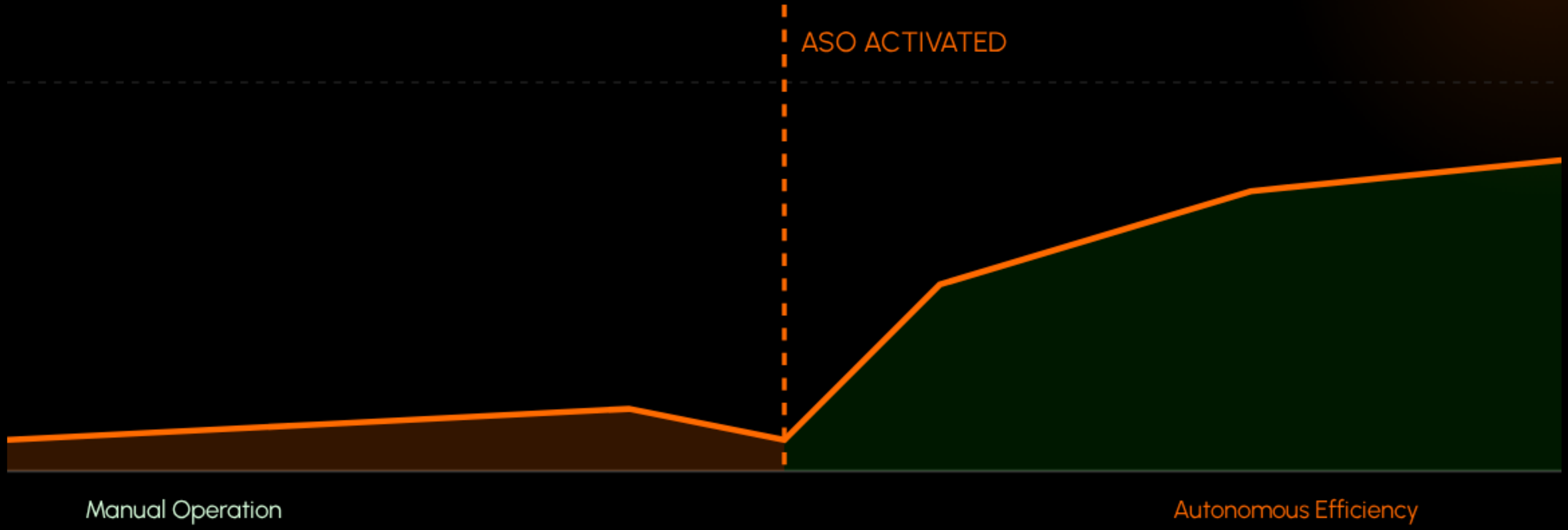
Optimized commands are pushed back to the BAS via Priority 16, ensuring design intent is actively realized.

Continuous M&V

The system independently verifies the mechanical response to every written setpoint, closing the validation loop.

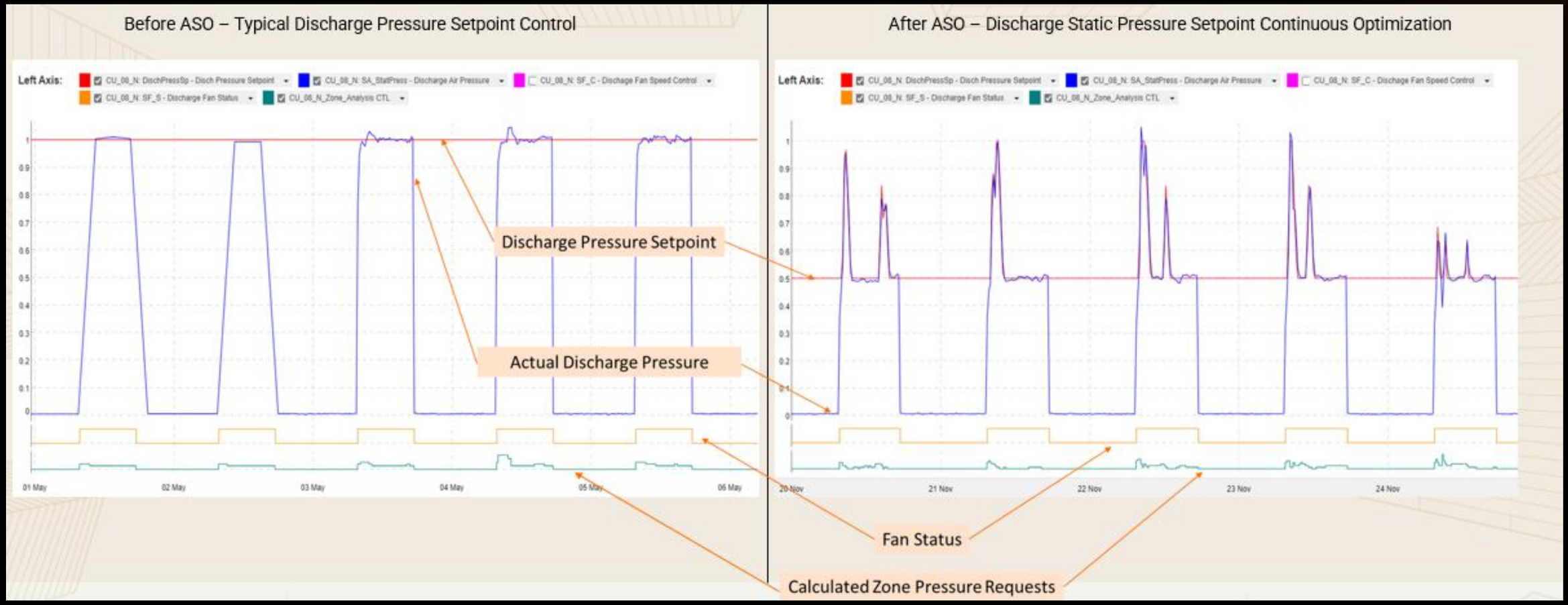
ROI Calculation

Verification of Measured Savings Continuously Performed



Comparison of Baseline energy savings vs. ASO Controlled Performance. Measured savings achieved through continuous setpoint optimization.

Example: How ASO Impacts System Operation – Discharge Air Pressure Reset



Kaizen

Case Study Building – Toronto

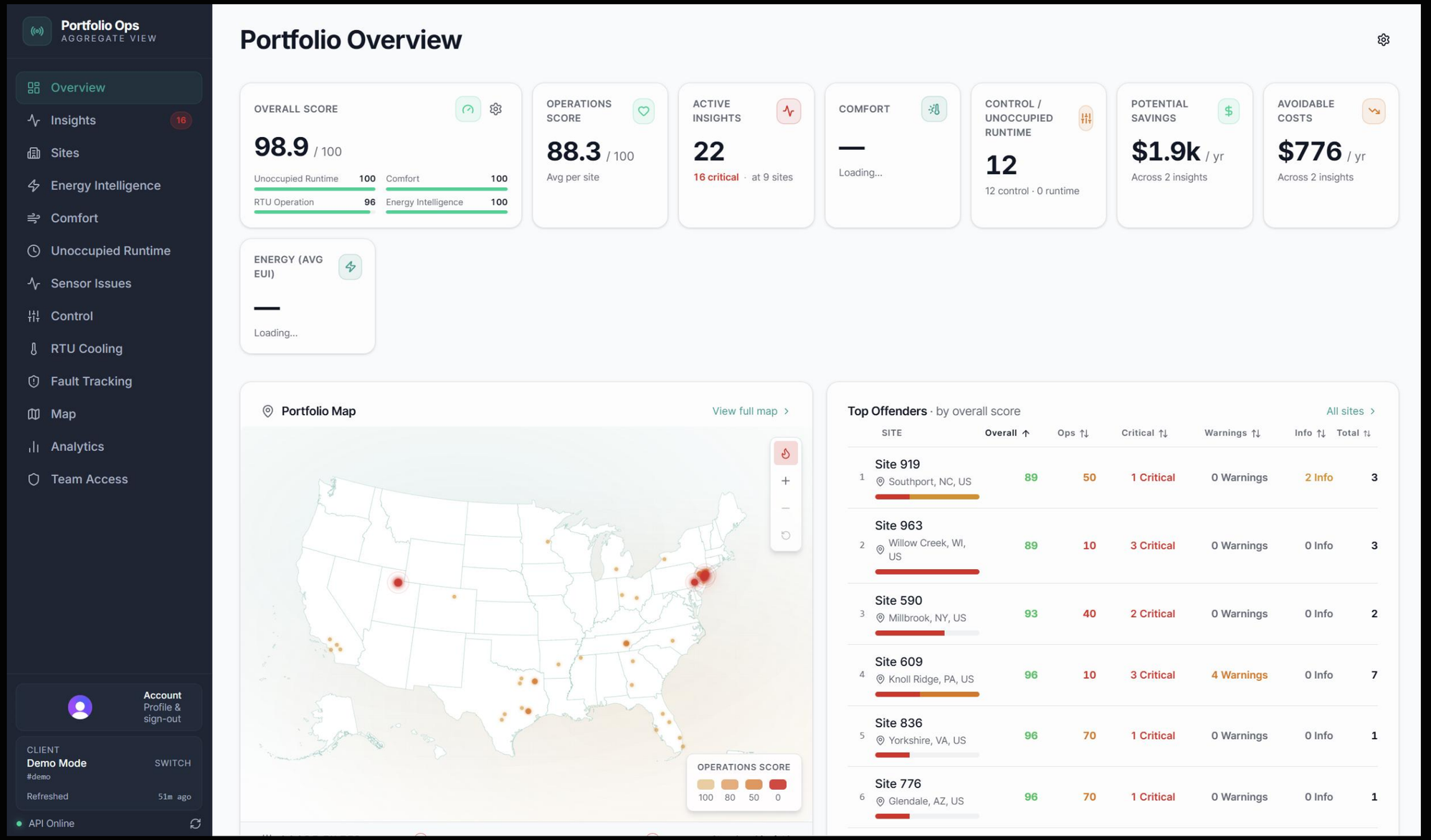
- 500,000sqft, 13 storey commercial building
- Over 30,000 data points being actively monitored
- 3 billion data samples per year

- Each item of plant is mapped to and recorded
- Assigned rules that track performance
- Proactively identifies inefficiencies in the Building Management Systems and the wider connected building
- Constant review, collection and analysis of data
- Where a data point is outside parameters detailed by the associated rules, an “insight” is created and logged on the dashboard

Component	Quantity	Component	Quantity
Air handling units	3	Fan coil units	5
Boilers	6	Humidifier pumps	2
Chilled water pumps	17	Kitchen exhaust fans	2
Chillers	3	Primary heating pumps	2
Compartment units	22	Process water pumps	2
Cooling towers	4	Radiant heating pumps	2
DHW boilers	4	VAVs	802
Entrance heaters	4	Supply Fans	9
Exhaust fans	12	Water heaters	4

Kaizen

Porfolio Dashboard



Project Lifecycles

New Construction

- Functional testing with 100% sampling
- Identification of deficiencies & verification of spec compliance
- Ongoing monitoring-based commissioning through warranty & beyond

Retrofit Application

- Retro-Commissioning (RCx)
- Optimization for non-capital or capital improvements
- Measurement & Verification of return on invested capital

Building Operations

- Data-Driven & Predictive Maintenance
- Benchmarking of energy, sustainability & indoor air quality
- Validation of operational Performance & KPIs

The Value Propositions for CopperTree

This comprehensive layered approach delivers unprecedented insight and value across the complete building lifecycle, from initial design validation through long-term operational optimization. The technology provides both immediate operational benefits and strategic advantages for future project development.

During Design & Commissioning

- ### Validate Sequences

  Deploy anomaly detection during warranty periods to identify subtle control issues missed by traditional commissioning processes

- ### Enhanced M&V

  Create highly accurate baselines of normal operation for precise measurement and verification of efficiency improvements

- ### De-Risk Handover

  Provide building owners with continuous performance validation systems rather than single-point-in-time assessments

Long-Term Operations & Retrofit

- ### Predictive Maintenance

  Detect equipment degradation patterns before they escalate to catastrophic failures or significant efficiency losses

- ### Resilient Operations

  Identify novel fault conditions that could impact critical building operations and occupant comfort as well as optimization opportunities to reduce energy consumption and carbon footprint.

- ### Design Intelligence

  Leverage operational data and learned models to inform and continuously improve future high-performance building designs

Questions?

CopperTree Analytics

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