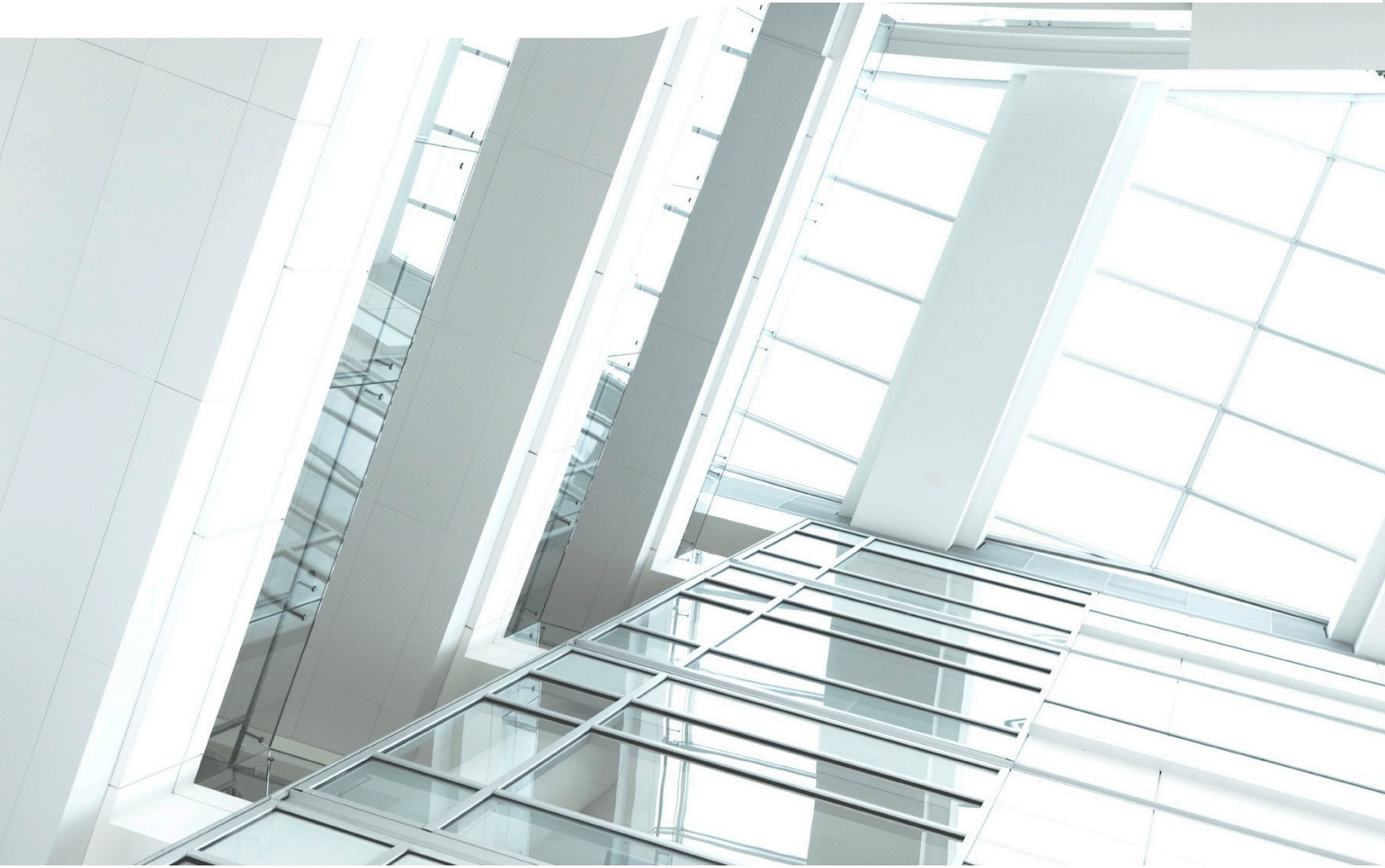




Realizing True Optimization®



## REALIZING TRUE OPTIMIZATION®

Optimum Energy partners with building owners and managers to optimize their HVAC systems, resulting in proven, sustainable outcomes: increased building efficiency, reduced energy use, and lower operating costs. As experts in delivering integrated software and cloud computing services for optimizing facility-based mechanical systems, we architect solutions that are uniquely suited to delivering the sustained energy reduction goals that our customers wish to achieve.

Optimum Energy's advanced relational control algorithms separate it from the competition. These algorithms continuously analyze the system holistically, determining the operating set points and parameters that minimize energy use across the entire plant at all times. Optimum Energy's software makes continuous, automatic adjustments to the system based on the building load regardless of facility type.

The impact of Optimum Energy's solution can be measured many ways:

- Energy Usage Savings (kWh/yr)
- Demand Savings (kW)
- Non-Electrical Savings (Therms)
- Cooling Tower Water Usage Savings (gal/yr)
- Carbon Footprint Reduction (lbs/yr)
- Power Usage Effectiveness Reduction (PUE)

However you measure it, the results are quantified, predictable and sustainable for the long term.

## THE FOUNDATION OF OPTIMUM ENERGY'S APPROACH: THE THREE LAWS OF OPTIMIZATION

Optimum Energy architects True Optimization solutions for its customers by implementing the Three Laws of Optimization.

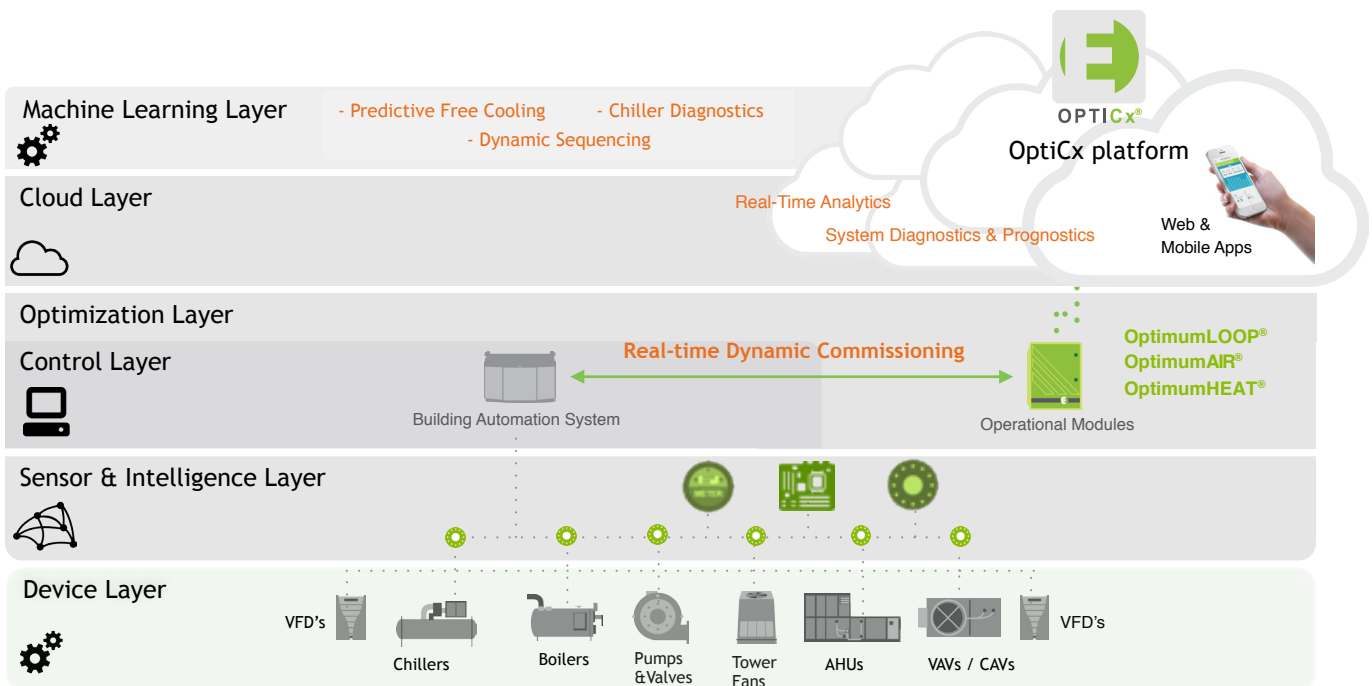
**1. You cannot optimize what you cannot measure.** Without an accurate measure of energy use by each piece of equipment in the system, it is impossible to accurately predict the impact of varying conditions on the system.

Optimum Energy provides overall system metering, precise measurement and verification of plant energy savings, detailed real-time performance data, and historical trend analyses to verify plant optimization performance.

**2. Optimize systems, not just individual components.** If an optimization plan focuses only on installing the most efficient pieces of equipment—without regard to how to maximize performance of the whole system—it will fail to capture the total available system efficiency. Holistic automatic optimization of HVAC systems typically increases energy efficiency by an additional 10%-25% over new equipment alone.

Unlike other energy efficiency solutions that focus on specific elements of the HVAC system, Optimum Energy's approach holistically orchestrates real-time plant operations through its networked control algorithms.

## A Systems-Level Approach: The OptiCx® Platform



3. Optimization must be automatic, dynamic, and continuous for maximum efficiency. Optimization should be a real-time dynamic process, not a static process. If a plant's operational control is not based on real-time inputs, it cannot be fully optimized.

Optimum Energy continuously measures and verifies operating conditions and cooling requirements at its customers' plants, and dynamically adapts system equipment in real time to maintain peak efficiency. This is Real-time Dynamic Commissioning (RTDC).

#### TRUE OPTIMIZATION STARTS WITH A REAL-WORLD BASELINE

To prepare the right energy optimization solution for a customer's central plant, Optimum Energy conducts an Engineering Site Analysis (ESA). The ESA is a step-by-step process that enables our engineers to gather and analyze detailed plant configuration and operational information. We use sophisticated software algorithms and modeling techniques to produce a real-world baseline for the plant, and an accurate and quantifiable energy efficiency model for the optimized end state. An ESA delivers the technical detail that operators need to develop and implement the optimization plan best suited to their specific facilities—the detail that is necessary to achieve maximum plant optimization without sacrificing reliability and comfort.

The 8760 Report is a core component of the ESA. This report is an annualized hour-by-hour model of building load, weather data, and equipment performance for every hour (8760 in total) in a year. Two separate 8760 reports are created: the first accurately models current performance, and the second report provides an optimized view, based on completion of necessary plant remediation and implementation of the Optimum Energy solution. The difference between the two reports details the financial basis for implementing an optimization project.

Using clearly defined steps that identify project roles, deliverables and milestones, each ESA engagement is managed by a dedicated team of energy engineers. This analysis provides an in-depth view of a customer's current plant operations and provides a clear understanding of the scope of work needed to implement our optimization platform, as well as the estimated total cost of the implementation, expected energy savings, and cost savings. Typically, the ESA process takes three to six weeks, depending on the size and complexity of the HVAC system.

Three Operational Modules are available:

**OptimumLOOP®** delivers continuous, automated, system-level optimization of centrifugal chilled water plants. Its patented relational control algorithms calculate the most efficient operation of an entire chilled water system and automatically and continuously optimize plant performance in real-time.

**OptimumAIR®** provides automated, continuous, system-level optimization of direct digital controlled (DDC) variable air volume air handlers to yield peak efficiency and performance in the most effective manner.

**OptimumHEAT®** holistically optimizes the HVAC system boiler. Demand-based relational control algorithms calculate the most efficient operation of boilers automatically and continuously—dynamically optimizing performance in real time.

After an ESA is complete and a customer has agreed to move forward with an optimization implementation, Optimum Energy installs its patented, state-of-the-art OptiCx platform, which implements the second law of optimization: the focus is on the entire system.

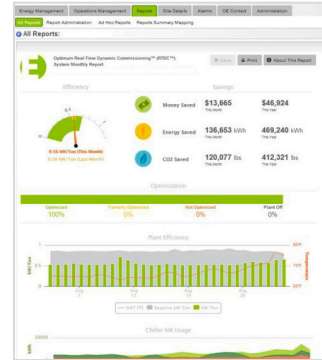
## ENSURING OPTIMIZATION SAVINGS FOR THE LONG TERM

The OptiCx® platform is an enterprise-grade platform that provides cloud-based measurement, verification, and management of HVAC systems. The OptiCx Platform delivers Real-Time Dynamic Commissioning (RTDC), which fights performance drift and enables automated, continuous commissioning through dynamic adaption of the entire cooling system. Acting as a continuous feedback loop (the third law of optimization), the OptiCx platform provides operators with detailed, real-time and historical performance data. The OptiCx platform allows Operators, Facility Managers and Engineers to quickly detect, diagnose, and resolve HVAC system faults as they occur (the first law of optimization).

The OptiCx platform provides three key benefits:

- **Plant operational transparency:** Full access to real-time building operating and performance data, with graphical representations of plant operations that can zoom out for a multi-site aggregate view, or zoom in on a specific system for greater detail. Energy managers can customize a broad range of plant performance reports, and produce dynamic, customizable dashboards and data visualizations.
- **Immediate issue resolution:** Real-time alarm notification enables operators to identify problems and track them to resolution. Trend charts enable fast analysis and diagnosis of system faults. Continuous verification reduces performance drift—consequently saving energy and maintenance costs.

- **Enterprise-grade scalability and security:** Role-based functionality tailored for the unique needs of operators and energy managers. Customizable views of plant operations and efficiency metrics. Seamless access from smartphones and tablets in addition to laptops / desktops via a standard web browser. A scalable platform that allows energy managers to institutionalize a repeatable program that effectively contains energy and operational expenses.



## THE THREE LAWS COMBINED: TRUE OPTIMIZATION

### You cannot optimize what you cannot measure.

Without an accurate measure of energy use by each piece of equipment in the system, it is impossible to accurately predict the impact of varying conditions on the system.

1

2

### Optimize systems, not just individual components.

If an optimization plan focuses only on installing the most efficient pieces of equipment—without regard to how to maximize performance of the whole system—it will fail to capture the total available system efficiency. Holistic automatic optimization of HVAC systems typically increases energy efficiency by an additional 10%-25% over new equipment alone.

### Optimization must be automatic, dynamic, and continuous for maximum efficiency.

Optimization should be a real-time dynamic process, not a static process. If a plant's operational control is not based on real-time inputs, it cannot be fully optimized.

3

As discussed above, the Three Laws of Optimization include precise measurement and scope, a system-wide approach, and a real-time dynamic approach and process. We view the implementation of each of these laws as critical requirements in an overall optimization solution.

We've taken it one step further and created a Fourth (unwritten) Law: Fulfill all three laws simultaneously. The three laws are complementary. By ensuring that our software, services and process deliver on all three laws, we repeatedly deliver scalable True Optimization for our customers.