Hawaii Department of Transportation
State of Hawaii
CASE STUDY

Preserving paradise: Unprecedented steps to improve Hawaii's airports, harbors and highways

At 2,500 miles from the nearest landmass, the islands of Hawaii are the most remote in the world. Sun, wind and rain are in abundance here, creating a tropical paradise that lures visitors from every corner of the globe.

As tourism and the economy continue to grow in Hawaii, so does the demand for energy. Hawaii imports more than five billion dollars worth of oil every year, and today the state relies on fossil fuels for 90 percent of its energy.

The majority of Hawaii's consumption of fossil fuels is tied to transportation —moving tourists, residents, goods and services around and between islands, and to the mainland. For that reason, airports, highways and harbors were a logical first focus when Governor David Ige created his Hawaii Sustainability Plan, with the goal to develop 100 percent renewable energy by 2045.

The goal is well on its way to being achievable. The Hawaii Department of Transportation (HDOT), which has jurisdiction over airports, highways and harbors, has partnered with Johnson Controls to initiate a ground-breaking set of projects to reduce energy consumption and create a more sustainable transportation infrastructure.

Hawaii DOT Project
AT-A-GLANCE:

Scope: $245M in energy improvements to airports, harbors and highways—the largest single-state energy savings performance contract in the U.S.

Primary Goals: Reduce reliance on fossil fuels and cut energy costs; Hawaii's energy costs are two to three times the national average

Guaranteed Savings: $680M over the life of the contracts

Johnson Controls

"If we truly want to be a clean energy community, then we need to address the challenges of transportation head-on in terms of making a significant difference."

– Governor David Ige

The Plan: Extraordinary Scope, Guaranteed Return on Investment

The multi-phase project is massive in scope: $245M in energy improvements, designed to deliver a total of $680 million in savings guaranteed by Johnson Controls. It's the largest single-state energy savings performance contract in the U.S., and encompasses energy-saving improvements made to airports, harbors and highways.

Airports

The first phase of the project focused on 12 airports operated by the Airports Division of the Hawaii Department of Transportation. The two-year construction project, completed in 2016, involved:

- Replacing nearly 75,000 lighting fixtures with high-efficiency Light Emitting Diode (LED) and other energy-efficient lighting
- Upgrading HVAC systems to more efficiently keep spaces cool and comfortable
- Installing 9,100 solar photovoltaic panels to generate renewable energy
- Addressing deferred maintenance, including roof repairs and equipment replacement

Bottom line: The $158M investment in airport energy improvements is guaranteed to generate savings of more than $500 million over 20 years.

"When you have a comprehensive program that ties everything together, you can create synergies and greater savings," said Engineering Program Manager Jeff Chang, P.E. "And now that the backbone is in place, every improvement we make moving forward can be tied into this whole system and optimized."

The success of the initial project has already led to a second phase of energy improvements at airports across the state, and became the catalyst for two other energy savings performance contracts: Harbors and highways.

Harbors

Harbors play a vital role in the Hawaii economy. The state imports about 80 percent of what it consumes and 98 percent of those imports enter the state through a system of harbors that operate 24/7.

Economically, the harbors are self-sufficient; they rely on tariffs and fees. But in 2015, leaders knew there were opportunities to improve operational performance, and began working with Johnson Controls to develop an energy-saving plan.

The plan centered on the development of marine-grade LED lighting designed to:

- Increase energy efficiency
- Improve safety for workers on the docks
- Minimize the impact of brighter LED lights on endangered wildlife and migratory birds

"Johnson Controls understood our needs and worked with the manufacturer to design a cargo yard light that met our standards," said Harbors Administrator Davis Yogi. "We needed a contractor that was technically smart, environmentally conscientious, and had the tact and the awareness to work with various constituencies and stakeholders to pull this thing together."

The Harbors Energy Savings Program also included mechanical, water and solar photovoltaic improvements.

Bottom line: With the $26 million investment, energy use across the harbors is expected to be reduced by 40 percent, generating cost savings of $44 million; $1.3 million in the first year and $2 million average annually over the life of the contract.

Highways

The Hawaii Department of Transportation's vision to reduce energy use and costs extended to roadways, as well.

Johnson Controls installed high-efficiency LED lighting in 20,000 light fixtures along 1,500 miles of state highways, and another 5,200 in interior and parking lot lights.

By making the switch, the project is expected to:

- Reduce energy usage and demand
- Contribute to roadway safety and visibility
- Meet Hawaii's "Night Sky" legislative requirements

Bottom line: The $60 million energy savings contract will reduce annual energy use by an estimated 43.4 percent, generating $126 million in guaranteed energy costs savings over 18 years.

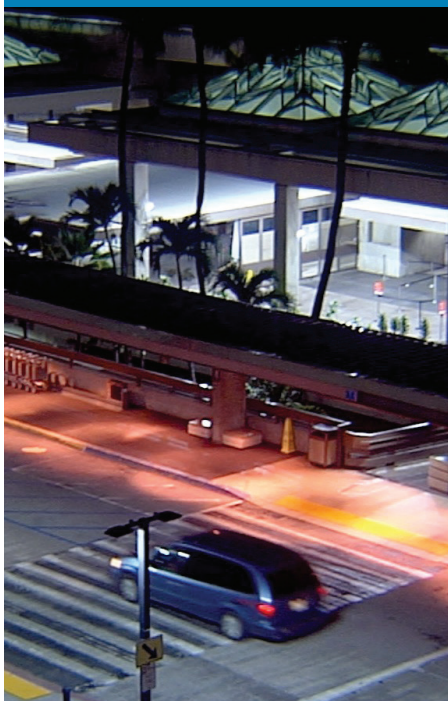
The energy improvement project is also expected to free highway department employees to focus on higher-impact projects.

"We used to have to change out the fixtures about every two and a half years. Now, with the new LEDs, the cycle will be changed to 10 years," said Construction and Maintenance Engineer Jamie Ho. "So our team will be freed up to take care of things like deferred maintenance or respond to urgent needs, like righting a light pole, for example, that's been downed in a traffic accident."

Performance Contracting Makes It Possible

"There's no capital investment and no risk for the customer. The project is funded through savings guaranteed by Johnson Controls."

– Michael Trovato, JCI Senior Account Executive



Setting the Standard for Excellence

In partnership with Johnson Controls, the Hawaii Department of Transportation is setting the standard for excellence in energy savings. Over the life of the performance contracts in place for the state's airports, harbors and highways, HDOT will recognize:

- Dramatic cuts in energy use of up to 50 percent; enough to power the equivalent of 165,553 homes for a year
- Guaranteed savings of $680 million

The initiatives continue to generate industry accolades, as well. For five years in a row, the Energy Services Coalition named Hawaii 'first in the nation' for per-capita investment in energy performance contracting.

Beyond the Contract: Protecting the Investment Into the Future

To maintain the savings guaranteed under the performance contract, Johnson Controls also developed a customized maintenance program to ensure the equipment continues to function optimally over time. The Planned Service Agreement (PSA) addresses issues such as unforeseen equipment failures, budget constraints and the desire by HDOT to perform some maintenance tasks in house, and will help HDOT protect its investment well into the future.

Together, Hawaii's airports, harbors and highways are transforming the way energy is used, reflecting an unprecedented commitment to reduce demand for fossil fuels and preserve its Pacific paradise for generations to come.

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