GENERAC®
INDUSTRIAL POWER

KAHAUIKI VILLAGE
Honolulu, Hawaii

CASE STUDY

CHALLENGE:
Create a comprehensive and resilient energy package to ensure residents have an affordable, environmentally friendly, reliable and safe energy system.

SOLUTION:
Generac 150 kW propane generator.

RESULT:
A cost effective and flexible solution that helps maximize resources to implement a long-term strategy aimed to achieve permanent homes for homeless families with children.

"We were drawn to Generac for the cost effectiveness of their product and flexibility of available solutions."

Microgid with Propane Generator Ensures Resiliency for Residents

Homelessness is not a new issue. After declining briefly after the Civil War, homelessness first became a national issue in the 1870s. According to the National Alliance to End Homelessness, there are an estimated 553,742 people in the United States experiencing homelessness on a given night. This represents a rate of approximately 17 people experiencing homelessness per every 10,000 people in the general population. In 2019, Washington, D.C. had the highest estimated rate of homelessness in the U.S. with 94 homeless individuals per 10,000 of the population. Hawai'i had the third highest rate among all U.S. states with about 45 homeless individuals per 10,000 of the population.

Dealing with Hawai'i's homeless population is a complex issue. One initiative to help the situation has been the creation of a community designed to transition people off the streets and into new productive living spaces. Kahauiki Village is a housing project in Honolulu on the island of Oahu designed as long-term housing for families in need. Kahauiki Village provides long term, permanent, affordable housing for over 600 adults and children on Oahu on about 12 acres of land.

Community leaders both public and private created a unique partnership that brought together each individual partner's resources to make Kahauiki Village a reality. Hawai'i Gas, along with representatives from across the state's major energy sector was one of the project partners that played an integral role in identifying and designing the community's energy sources and needs, to ensure a cost-effective, reliable and resilient energy system for the community. Working together the group was able to create a comprehensive and resilient energy package to ensure residents have an affordable, environmentally friendly, reliable and safe energy system.

According to Brian Yee, Hawaii Gas' project manager for this installation, "Kahauiki Village offers a number of energy sources. Each house has solar thermal for hot water, gas water heater backup, gas for cooking, a PV farm with battery storage and as a backup to the village's energy supply, a propane powered generator. Having multiple energy sources creates resiliency for the community that allows them to have power through any type of event, natural or man-made."

As an example of the unique solution deployed at Kahauiki, the village has its own independent power supply, or microgrid, that is powered by photovoltaic (PV) solar panels and a battery. The village only draws power from the utility when there is not enough sunlight and battery to meets its energy needs. Microgrids provide increased resiliency through several means. First, by locating electricity generation close to the electrical users and the needs they serve, they can more efficiently deliver the required power. Second, they provide a significant improvement in power reliability by their ability to operate independently of the utility's grid. Kahauiki Village's connection to the grid is minimal in capacity to reduce standby and demand costs. Unlike conventional grid-tied PV systems where the grid alone can provide sufficient power under all conditions, the grid is capable of only supplementing Kahauiki Village's energy needs. However, with the threat of hurricanes, mudslides and other power failures, it was important for the community to have backup power. With 144 total

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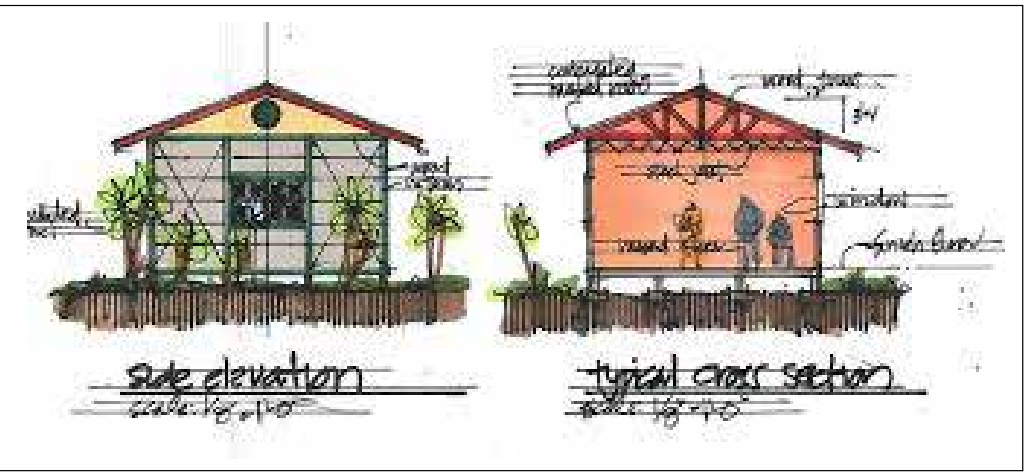

APPLICATION:
Residential Housing

MODELS:
150 kW Propane Generator

homes, a daycare center, security and other critical buildings in the community, having power at all times was essential.

"Both centralized energy storage and emergency backup power were critical to the success of the project," said Tim Johnsson, PhotonWorks. "It helps to reduce the high cost of requiring individual, autonomous energy storage and backup infrastructure in each home, and provides adequate redundancy to achieve a high level of reliability."

PhotonWorks Engineering is a construction and renewable energy company. They teamed up with InSynergy Engineering to design an integrated PV system, which in combination with a propane-fueled gas generators, handles all of the residents' daily and emergency energy needs. When looking for a backup power solution partner, the team turned to Generator & Power Systems, Generac's Industrial Power distributor for the Hawai'ian Islands.

"The original design called for three smaller generators," said Travis Tilton, Generator & Power Systems. "Two generators would cover the load while the third was for N+1 redundancy. However, after reduction in some of the anticipated site loads and evaluation of generator alternatives, we specified one Generac Industrial SG150 propane generator as it would cover all the loads as a more cost-efficient solution." Tilton added that, as the community continues to grow and expand, more generators can be added to the current system. This allowed the village to make a smaller initial investment and scale accordingly based on increased power demands.

"This was our first real experience working with Generac," said Johnsson. "We were drawn to Generac for the cost effectiveness of their product and flexibility of available solutions. Competitive products had a significantly higher cost, and due to the nature of the project where residents' rent would be paying for the generator, cost was a serious concern."

An important element to the village design was making it sustainable. The state of Hawai'i has put in place strong legislation in order to increase the amount of renewable energy sources on the islands. With a goal to generate 100-percent clean energy by 2045, the state is working to align government regulations and policies with clean energy goals, facilitate processes for developing renewable energy, deploy renewable generation and grid infrastructure, and explore next generation technologies and new applications of existing technologies. With this in mind, the design team did not want to use diesel-fueled generators to support the PV-based microgrid. They instead wanted a cleaner fuel choice. "Hawai'i Gas provides the fuel onsite and propane is already being piped in for water heaters and the propane-fueled gas cooking ranges," said Tilton. "The island doesn't have any natural gas and diesel fuel has installation challenges, leaving propane as an ideal solution for this project."

The microgrid produces its own power by capturing and storing electricity from the PV panels or the electrical grid. The generator turns on during a utility outage after the batteries have been drained. The village has already experienced several outages long enough for the energy storage batteries to drain, requiring the generator to start. The generator is actively playing a key role in the village's resiliency and it will continue to provide peace of mind to residents throughout storm season and during any other power outages.

The Kahauiki Village is a groundbreaking initiative that maximizes public and private resources to implement a long-term strategy aimed to achieve permanent homes for homeless families with children, and to provide employment opportunities within walking distance for parents. It is a project that could be duplicated around the nation in other in-need areas. "This is something special," said Johnnson. "Being able to help families with new housing, clean accommodations and breaking the cycle; we are incredibly proud to have played a role in this project."

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