INTERMOUNTAIN

U.S. DOE

CLEAN ENERGY APPLICATION CENTER

PROJECT PROFILE

Snowbird Ski and Summer Resort

2-MW CHP System

Quick Facts

LOCATION: Snowbird, Utah
MARKET SECTOR: Ski resorts
SKI RESORT SIZE: 2,500 acres, 85 runs
CHP IN OPERATION SINCE: 1987
EQUIPMENT: Three 650-kW Caterpillar engines, Q-DOT heat recovery, 235-ton Carrier absorption chiller
ELECTRIC OUTPUT: 2 MW
FACILITY PEAK LOAD: 6 MW winter/2 MW summer
USE OF THERMAL ENERGY: Steam for heating rooms, pools, restaurants, meeting spaces; snow melting on walkways; A/C in summer
PRIMARY FUEL: Natural gas
TOTAL EFFICIENCY: 75%
TOTAL PROJECT COST: $2.2 million for CHP, $3.5 million for gas line
PAYBACK: 7 years
ENVIRONMENTAL BENEFITS: Avoided emissions from coal-fired grid, plus energy otherwise required to make steam

Site Description

Nestled in the beautiful Little Cottonwood Canyon, Snowbird Ski and Summer Resort lies on 2,500 acres in the Wasatch-Cache National Forest, about 40 minutes away from downtown Salt Lake City. The resort offers 10 lifts and a tram for an uphill capacity of 17,400 skiers and snowboarders. Snowbird has grown into a year-round resort and offers an array of activities including an Alpine Slide and ZipRider, as well as 15 restaurants and a luxury spa.

Reasons for CHP

As the ski resort grew, the utility's 25k-volt power line running up the canyon to the resort became inadequately small. Faced with otherwise paying the cost of the line upgrade, Snowbird decided that on-site power and a new gas line was an attractive alternative. Other reasons also made CHP a compelling choice:

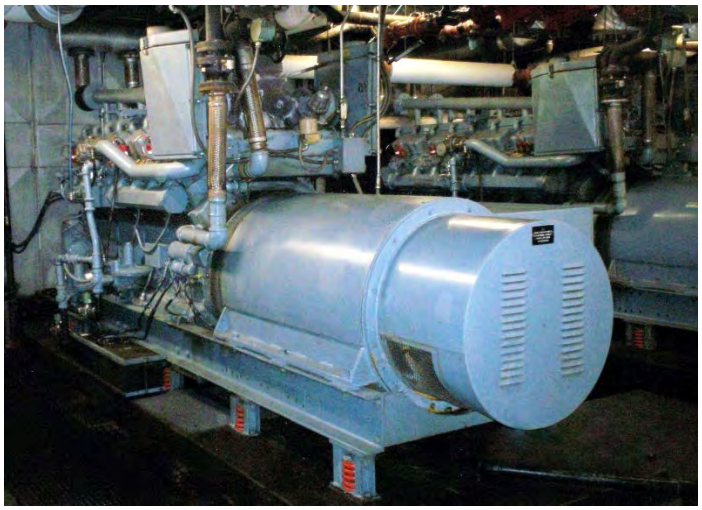
- Snowbird's steady demand for heat in the winter and air conditioning in the summer make CHP a good technical and economic fit.
- The CHP is a key component of Snowbird's commitment to sustainability and its efforts to reduce energy consumption.
- The ski resort highly values the CHP's electric reliability and prevention of power outages.

CHP Equipment and Operation

Located in the basement of the Cliff Lodge, Snowbird's CHP system has three G399 650-kW Caterpillar engine gensets that run simultaneously year-round, producing a third of the resort's winter electric load and all of its summer load.

In the winter, the excess heat from the engines is recycled in three heat recovery steam generators, with the resulting steam used for heating rooms, pools, restaurants, and meeting spaces, plus melting snow on walkways. A supplemental boiler in the conference center provides back-up and top-up heat for especially cold spells.

In the summer, some of the recycled heat still goes to pool heating and domestic hot water, while the rest runs a Carrier 235-ton absorption chiller that provides all the lodges' air conditioning. The entire system was supplied by Wheeler Machinery, which still performs some of the maintenance.



One of three Caterpillar generator sets. "The reliability has been very good for us," says Jerry Giles, Director of Village Operations at Snowbird.

Good Maintenance Ensures a Long Life

The engines, installed in 1986, have each run for an exceptionally long 250,000 hours and counting. Snowbird attributes the CHP system's longevity to two factors: its primary operator since it was built, Bill McEwan, plus the support it receives from Wheeler Machinery for periodic major and minor overhauls. "The only time we take the engines down is for oil changes and rebuilds for two weeks each year. Every third year we do an overhaul and change the pistons, rings, cylinder liners and bearings" said Jerry Giles, Director of Village Operations at Snowbird. "Although we are finally seeing some deterioration of the engine blocks, we hope to still get a few more years out of them."

Economics

"The lower the price of natural gas, the more economically our CHP can run and the more beneficial it is for the company. When we started out in 1987, gas was $1.39/decatherm; now it's a little above $5, near our break-even point. We still feel really good at what we've done," said Giles.

Cogen is a good way to go for a large facility with a heat load like ours. We've hardly ever been without power. If you want high reliability, especially in outlying areas, cogen can be a good alternative or supplement to the utility.

– Jerry Giles, Director of Village Operations

The capital costs of the project in 1987 were about $3.5 million, plus $2.2 million for a gas line. "The project had a 7-year payback, and the investors got a really good return," said Giles. Snowbird also pays about $60,000 annually for a facilities fee to be tied into Rocky Mountain Power's grid, plus about $0.08/kWh for the electricity purchased from the utility.

For More Information

U.S. DOE INTERMOUNTAIN CLEAN ENERGY APPLICATION CENTER
Christine Brinker
720-939-8333
cbrinker@swenergy.org

MORE CHP PROJECT PROFILES:
intermountaincleanenergy.org/profiles
Date produced: 2011