



Prime power

> Case History

Snow Summit Ski Resort, USA

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**Power
Generation**

Where:

Snow Summit Ski Resort,
Big Bear Lake, California

What:

Six 2 MW prime power diesel generators and two PowerCommand® digital master controllers (DMC) located at the resort base and mountaintop

Purpose:

Provide 12 megawatts of electricity to power air compressors, water pumps and fan guns that make up the resort's snowmaking equipment

Primary choice factors:

A flexible power system that balances safety, cost-control and efficiency

Power creates powder:

Snowmaking system augments Mother Nature with help from "micro-grid"

BIG BEAR LAKE, CALIF. – The Snow Summit ski resort crowns the San Bernardino Mountains, about two hours east of Los Angeles. Despite peaks that rise above 8,000 feet, average annual snowfall is a "mere" 100 inches in this semi-arid Southern California location. To maintain a solid snow base of between three and five feet throughout the ski season, Snow Summit recently installed a \$6 million upgrade to its snowmaking system that increased snowmaking capacity by 50 percent. This system requires about 12 megawatts of electricity to power air compressors, water pumps and fan guns. That's more than the electric utility can provide, so Snow Summit relies on a prime power "micro-grid" from Cummins Power Generation Inc. to make snow.

The micro-grid is a medium-voltage distribution loop with various load taps along three miles of underground power lines. It consists of an integrated system of generators, transfer switches, digital paralleling equipment and controls, all manufactured by Cummins Power Generation Inc. This system gives the flexibility not only to power snowmaking equipment, but also



The “micro-grid” system includes six Cummins Power Generation 2 MW prime power diesel generators (model DQLA) powered by 78-liter Cummins engines.

to provide resort-wide power in the event of utility failure and to allow equipment to be taken off-line for maintenance.

The system includes six Cummins Power Generation 2 MW prime power diesel generators (model DQLA) powered by 78-liter Cummins engines. Due to the relatively high operating hours, the generator sets are equipped with emissions-control equipment that employs a combination of continuously regenerating particulate traps and a selective catalytic reduction (SCR) system. These emissions-control systems meet Southern California’s stringent air-quality standards.

Make it snow!

Established in 1953, Snow Summit has used snowmaking equipment since the earliest years. These days, the resort’s goal is to have all of the 14 lifts open and up to 90 percent of the runs open by Christmas – about 18 skiable miles over 250 acres. Since the resort cannot depend on nature for snow, snowmaking equipment typically operates about 1,000 hours each year.

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Man-made snow is real snow (not “artificial”), made by “guns” spraying atomized water particles under high pressure into the cold dry atmosphere, which freeze into snow particles before they hit the ground. Half of the snow is produced by about 75 fan guns; the other half is made by compressed air-powered guns. With all guns “smoking,” maximum water consumption is 8,000 gallons per minute. Several hundred million gallons of water supplied by Big Bear Lake at the base of the mountain are converted into snow each season.



One of the snowmaking “guns” powered by the micro-grid ensures a solid snow base throughout the ski season.

Total flexibility

“One of our toughest challenges was making the generators run in whatever configuration we need at any given time,” says Sokolowski. Often, electricity is flowing from three sources: the utility; three generator sets at the top of the mountain; and three generator sets in the base area. Working with Cummins Cal Pacific, Irvine, Calif., Sokolowski was able to design a system that balances flexibility, safety, cost-control and efficiency. Almost any load can be assigned to any genset. The three generator sets on the mountaintop are there so that if the base-to-mountaintop transmission lines should fail, the resort’s five top-driven chairlifts can be quickly connected to the mountaintop generators. Those three mountaintop generators also power five pumps totaling 725 horsepower that bring snowmaking water from mountaintop holding ponds.

Total control

Integral to the flexibility of Snow Summit’s complex micro-grid are two PowerCommand digital master controllers (DMC) that communicate with each other over a mile of fiber optic cable. One of the DMC’s most important jobs is to match the voltage and frequency between the six generator sets and the utility within seconds whenever the combination of power sources must change. To do this, the DMC automatically tracks electric demand in real-time and manages input from an array of generator set sensors, paralleling switchgear and 12 automatic transfer switches. A smooth transition among generating sources is essential to avoid service interruption and equipment damage.

For more information about prime power systems or other energy solutions, contact your local Cummins Power Generation distributor or visit www.cumminspower.com.

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