Peaking power

> Case History
Tennessee Valley Authority (TVA), USA

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Cummins Power Generation

Where:
On-site at a municipal utility and a power plant near a food-processing facility, Tennessee, USA

What:
Two peaking power plants, one diesel for low-hour use and one natural gas for use 1,000 – 4,000 hours per year

Purpose:
To supply the Tennessee Valley Authority with economical peaking power, both by supplementing peak generating capacity for TVA and by reducing load on the grid

Primary choice factors:
PowerCommand® digital controls on Cummins Power Generation gas and diesel generators allow multiple generators to operate in parallel and synchronize with the utility grid

TVA projects demonstrate different technology solutions to distributed generation supply

MCMINNVILLE TOWNSHIP, TENNESSEE, USA — Small, decentralized generating systems, known as distributed generation or DG, help meet utility peak demands, reduce loads on transmission lines, and help end-users reduce costs and improve the reliability of electric service. Two recent DG installations help the Tennessee Valley Authority (TVA) meet its peak demand during hot weather while providing peaking assistance in different ways. One uses a diesel generating system; the other uses natural gas.

The first, a 20 MW diesel power plant, is operated by the McMinnville Electric System (MES) in Tennessee's McMinnville Township. Powered by 11 diesel generators from Cummins Power Generation, each producing 1,800 KW, the facility helps TVA meet its peak demand and provides emergency backup power for up to 40 percent of McMinnville's load in the event that its transmission connection with TVA fails.

MES chose diesel generation technology because it offers rapid availability, low initial cost and block-loading capabilities — the inherent ability of diesel generators to accept full load in one step.

Twelve Cummins Power Generation lean-burn gas generators are operated in an interruptible mode during peak demands, essentially removing 21 MW of load from the TVA power system when running.

The system features digital master controls and parallel operating gear from Cummins Power Generation for reliable and precise performance. Digital systems also occupy 25 percent less floor space than traditional analog-control systems.

The second system is a 21 MW peaking power plant operated by Atmos Power Systems, Inc., a subsidiary of Atmos Energy Corporation. Employing twelve 1750 kW lean-burn gas engine generators from Cummins Power Generation, the power plant burns natural gas and operates primarily during periods of peak demand on the TVA power system.

Because the units are exceptionally fuel efficient and clean burning, the Tennessee Department of Environment and Conservation has permitted the plant to operate up to 1,200 hours a year.

Two ways of meeting peaks

When the diesel generators operated by MES at McMinnville are brought online, they add 20 MW to TVA's peak generating capacity. In contrast, the gas generators operated by Atmos Power Systems operate in an interruptible mode during peak demands, removing 21 MW of load from the TVA system when running. The Atmos system supplies its power to a large food-processing facility nearby when TVA wants the facility's load removed from its system.

Because both generating systems can operate independently from the grid if there is a major utility outage, they provide emergency stand-by power and improved power reliability for Atmos and McMinnville.

Application dictates generating technology

These two applications are excellent examples of the options DG offers. The application dictates which technology is best. Diesel generators offer quick availability and low initial cost, coupled with fast starting and excellent load-following characteristics for applications that run less than 300 hours annually.

Lean-burn natural gas reciprocating engine generators offer low operating costs combined with low exhaust emissions for applications that operate 1,000 to 4,000 hours annually.

Both TVA applications employ multiple generators running in parallel. This approach improves reliability of the power system because even if one generator out of 50 fails to start properly, the remaining 49 will still come online. The other advantage is flexibility. A utility can start only the number of generators needed, which reduces operating costs.

PowerCommand digital controls allow multiple generators to operate in parallel and easily synchronize with the utility grid. In this way, practical power systems of up to 100 MW or more can be assembled and operated economically.

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

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