

• UTILITIES

AEA rolling out rural powerhouse

Modern diesel fueled plant for Perryville on the Alaska Peninsula will enable significant fuel and cost savings for the village

By **ALAN BAILEY**
Petroleum News

The Alaska Energy Authority has been putting the final touches to a state-of-the-art diesel powerhouse destined for the village of Perryville on the south coast of the Alaska Peninsula. The powerhouse, which has been constructed in Anchorage, will integrate seamlessly with a wind farm at the village. By replacing the old diesel generation system at the village, the new system will enable much improved fuel efficiency and more effective use of the wind farm. And, by transferring heat from the diesel engines to the village school building, the new system will save significant heating cost for the school.

The plan is to ship the 133,000-pound powerhouse module by barge to the village by October or November. The module, which is fitted with skids, will be moved to its site in the village using a lowboy trailer, AEA project manager Alan Fetters told Petroleum News Aug. 12.

Fetters said the new powerhouse comes as part of AEA's Rural Power System Upgrade program. With funding of about 25 percent by AEA and 75 percent by the Denali Commission, the program has been running for nearly 20 years, during which time about 50 powerhouses have been built for various rural sites. Each of these powerhouses has provided valuable lessons for AEA, enabling



Alaska Energy Authority project manager Alan Fetters in the control room of the new powerhouse for the village of Perryville. The state-of-the-art control system integrates the powerhouse's diesel generators with Perryville's wind farm and power grid, provides continuous monitoring of the power supply system and remote access for offsite monitoring and assistance.

the agency to progressively improve its approach to powerhouse design, construction and installation, Fetters said. AEA contracts out the design and construction of the modules, and the transportation of the modules to the villages. The agency oversees the projects, adopting a quality assurance and supervisory role, Fetters explained.

Automatic control system

The Perryville powerhouse has three diesel engines, one larger than the other two. The engines' electronic controls are hooked into a modern digital monitoring and control system, connected to the

wind farm and the village power grid. The control system can automatically adjust the power from the diesel generators, to balance the variations in both the fluctuating output from the wind farm and the variations in the electrical load from the village.

Just one of the diesel units could in principle supply all of the village's power needs. But three engines are needed, to accommodate the possibility of one engine breaking down, while also enabling a single engine to be shut down for routine maintenance such as an oil change, Fetters explained.

One lesson learned by AEA, as various Alaska villages have installed wind power systems, is that a wind farm must be balanced by a modern diesel generator, capable of the fluctuating power output needed to counterbalance the inevitable fluctuations of the wind power, as the wind strength varies, Sean Skaling, policy and program director for the Alaska Energy Authority, commented.

Currently, the inability of Perryville's aging diesel system to balance the wind farm effectively forces the curtailment of some wind output, thus reducing the efficiency of the farm and increasing the cost of the wind power.

Heating for the school

The diesel engines were designed for marine use. This has enabled the engines' exhaust manifolds and turbochargers to be cased in water jackets, to transfer heat

from the engines through a heat exchanger, from where the heat can be transferred by pipe to the school. This heat will save a substantial amount of diesel fuel that would otherwise need to be burned in the school's furnace.

Furthermore, an electric boiler, also connected to the school's heating circuit, will be able to capture excess power from the wind farm at times when wind power output exceeds levels at which it can be used in the village power supply grid — this will further increase the wind farm's efficiency, Fetters said.

Efficiency savings

The new diesel engines are themselves 20 to 30 percent more efficient than those in the existing powerhouse, thus enabling the saving of significant cost in diesel fuel. While savings from wind farm efficiency are difficult to quantify in advance, the savings in diesel fuel should amount to about \$35,000 per year, Skaling said. Fetters said that AEA expects the consumption of diesel heating fuel at the school to fall from 11,000 gallons to 2,000 gallons per year after the heating loop from the new powerhouse is installed.

In total, the new powerhouse will end up costing about \$3.3 million, including design, construction, transportation, installation and project management, Skaling said.

Perryville owns the new powerhouse — to protect the state and federal investment in the project, AEA insists that the village take financial responsibility for the operation and maintenance of the unit once it is in place. The agency arranged operator training, both through the AVTEC training facility in Seward, on the Kenai Peninsula, and in the powerhouse during construction of the module in Anchorage. Further training will take place after installation of the module in the village.

The design of the electronic control system enables remote monitoring, should village operators need to call AEA in Anchorage for assistance, or if they need help in troubleshooting some problem. A camera system in the module's control room will also enable the control system to be observed remotely. ●

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