



TPL EnerPak™ Energy Harvesting Power Management System Completes Two-Year Performance in Utility's Wireless Sensor Network Trial

ALBUQUERQUE, NM (Sept 24, 2010) TPL, Inc, a New Mexico research and development company, announced today that the patented EnerPak™ energy harvesting power management systems have successfully completed two years of field-testing. Several EnerPak™ systems are powering a network of wireless measurement sensors that monitor the performance of sulfur hexafluoride (SF₆)-insulated components. These components are at a power substation owned by Public Service of New Mexico (PNM), New Mexico's largest electric utility, in Albuquerque, NM. This significant milestone demonstrates the performance and reliability of self-powered wireless sensors and networks using the EnerPak™ power management system. The EnerPak™ leverages the ultra-low-power MSP430™ microcontroller (MCU) from Texas Instruments Incorporated (TI).

SF₆ is one of the worst greenhouse gases in existence. PNM developed a wireless measurement and reporting system to continuously measure the integrity of the components that use SF₆, to reduce the potential damage to the environment. When the utility first trialed their system, using conventional batteries for sensor powering, they found the batteries failing within a few weeks. PNM then turned to TPL to determine if TPL's EnerPak™ could provide reliable, long-term power for their wireless sensor network. The EnerPak power systems replaced the conventional battery power system in September, 2008.

In the two years of operation at the Albuquerque substation, the eight EnerPak™ power supplies, each integrated with a small photovoltaic array, have performed reliably and consistently. In fact, the power supplies and sensors have been operating continuously since the trial began, achieving tens of thousands of discharge-charge cycles from each of the EnerPak systems.

In addition to traditional product testing, this real-world field-evaluation continues to demonstrate the long-term performance of the EnerPak™ supercapacitor-battery power management system and TI's ultra-low-power MSP430 MCU. The sensor network includes both sensor node-to-sensor node wireless communications as well as wireless transmission of data to a central gateway processing station, both requiring sizeable power bursts. During the trial, the EnerPak™ systems have experienced heavy rain, strong winds and dust, as well as snow. Summer temperatures have exceeded 100°F, with winter temperatures dropping as low 5°F.

Steve Willard, PNM's engineer responsible for the development of the SF₆ monitoring system, said the performance of EnerPak™ "... continues to meet all of the powering requirements demanded by the sensor network." Willard added that the use of wireless sensor networks demand a long-term power management solution like EnerPak™ because of the costs associated with the frequent replacement of conventional batteries.

EnerPak™ optimizes the combined performance of supercapacitors and rechargeable batteries, in order to deliver the best power management for autonomous devices like industrial sensors, wireless gateways and video surveillance. Through a unique microprocessor/charge pump configuration, the harvested energy is either used by the sensor or efficiently stored for later use. Also, the supercapacitors very efficiently provide high pulse power. The rechargeable battery, because of its high energy density, serves as the primary energy storage source, acting as a reserve when the energy harvesting source is not able to provide enough system power.

Using TI's MSP430 MCU for system control, the EnerPak™ delivers the most harvested energy for each application load. The system is also capable of extracting energy from a variety of energy harvesting devices such as photovoltaic arrays, thermoelectric generators, vibration harvesters, and other generator devices.

“The energy harvesting market is poised for explosive growth as customers push the boundaries of expected battery life,” says Adrian Valenzuela, Texas Instrument's MSP430 product marketing manager. “Thanks to innovations like TPL's EnerPak and TI's ultra-low power MSP430 microcontrollers, wireless sensor networks are a prime candidate for next-generation, perpetually-powered systems.”

In addition to TPL pursuing the commercialization of the EnerPak power management circuit, Physical Acoustics, Inc., Princeton, NJ, a part of the Mistras Group, has licensed the SF₆ monitoring technology from the electrical utility. They recently deployed their first commercial product, incorporating this monitoring capability in a New York utility location as a beta test site. While the beta monitoring package is utilizing a heavy-duty package of conventional batteries as its power supply, Physical Acoustics will evaluate the need for energy-harvesting and the EnerPak™ in their second generation SF₆ monitoring product line.

TI enables innovation with broad range of microcontrollers

From general purpose, ultra-low power MSP430 MCUs, to Stellaris® Cortex™ M3-based 32-bit MCUs and high performance, real-time-control TMS320C2000™ MCUs, TI offers the broadest range of microcontroller solutions. Designers can accelerate time to market by tapping into TI's complete software and hardware tools, extensive third-party offerings, and global technical support. For more information on TI's MCUs, please visit www.ti.com/mcu.

TPL's EnerPak™

TPL designs, develops and manufactures innovative low- power management systems for applications using energy harvested from the surrounding environment. The EnerPak™ products uniquely realize the potential of energy harvesting systems for meeting the power needs of wireless sensors and other autonomous devices. TPL's design uses energy harvesters to provide continuous low-level power while simultaneously charging energy storage systems that provide back-up and pulse power capabilities. For further information please contact Trista Mosman at (505) 342-4439 or mosman@tplinc.com, or visit the company's web site, www.tplinc.com.