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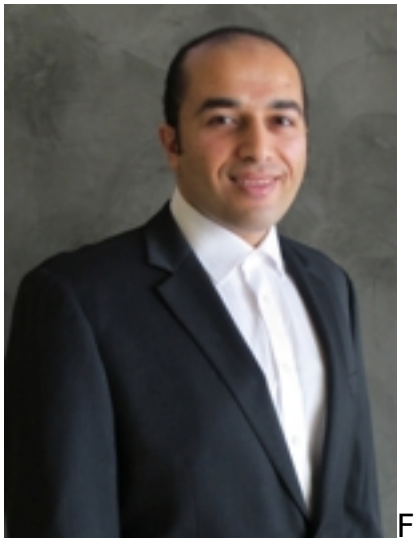
Jacob Borgeson, Texas Instruments, www.ti.com [1]

The greatest ROI in green technology is undoubtedly in the manufacturing sector. First, “green” technologies provide great branding and a competitive advantage. Taking advantage of advanced low-power electronics is one major way to do this. With the added intelligence of programmable devices, manufacturing becomes more efficient, faster, and more flexible at the same time. For example, through a small investment in wireless sensors with integrated microcontrollers and radios, a production line could gain many new points of feedback while also becoming more flexible. Through a simple wireless update, the entire assembly line could focus on different products by enabling each sensing module to have multiple sensing capabilities. Manufacturers can take this benefit even further by focusing on the lowest possible power consumption in these sensors. This could allow them to harvest the waste energy from their own production processes to power these sensors. There are microcontrollers, power management ICs, sensors, and radios available today that can run from energy produced by a few degrees of heat, some small mechanical motion, or even indoor lighting.

Bill Kutsche, Murata Americas, www.murataamericas.com [2]

Green technologies are a relatively new concept among consumers and compete with past behaviors, comfort levels, and the status quo. One of the many areas in which people are now seeing a good ROI is home energy management. With the home energy management systems (HEMS) available via retail channels and utility programs, home-owners can monitor their energy usage in real time. This capability allows them to judge if and how to adjust their energy usage behavior and can reduce costs significantly. Some of the actual devices enabling this capability are smart meters, in-home-displays (IHDs), and intelligent connected thermostats. All are made possible through various software and hardware innovations intended to introduce connectivity and intelligence to previously mundane and disconnected household appliances. Among the many new hardware implementations facilitating the connectivity and intelligence in the smart meters, IHDs, and thermostats are wireless modules. These modules are sub-assemblies of the most advanced technologies available in materials, mounting, and software and pack a large amount of function into a small space. Everything from advanced ceramics, silicon, and GaAs packaging technologies to customer-specific configurations of hardware and software ensure the form, fit, and function of the modules meet individual requirements and the latest standards such as IEEE802.15.4, ZigBee, SEP2.0. They can even be FCC-certified



Farris Bar,Silicon Labs, www.siliconlabs.com [3]

Solar-powered parking meters are being deployed widely because they're self-sustaining and offer an excellent ROI. Solar-powered parking meters with credit card readers are being installed throughout the United States and in other regions to replace the traditional electro-mechanical parking meters that operate solely on coins. They offer parking meter operators a significant and immediate ROI because they have nearly the same manufacturing and installation costs as coin-based meters but require only a minimal amount of maintenance and upkeep once deployed.

Solar-powered parking meters have added benefits that enhance ROI for their owners, typically municipalities. The added convenience of paying by credit card encourages compliance. Since they are implemented using the latest MCU technologies, they can support smart features such as detecting the presence of an automobile in a parking space and keeping track of the time each vehicle actually stays in the parking spot. The City of San Diego, for example, has used this new metering technology to ticket users who overstay their allotted parking time and increase revenue from parking violations. In many cases, the new technology can be a deterrent to non-compliance.

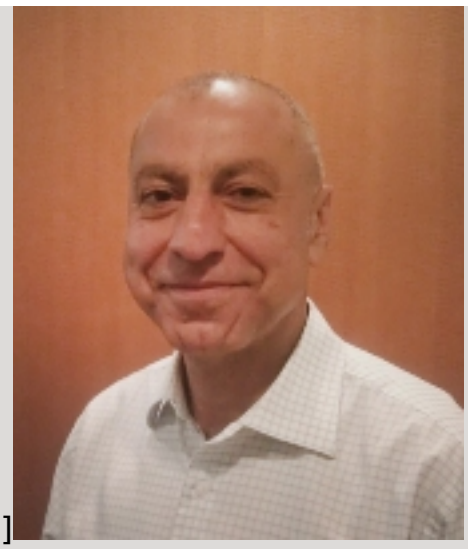
Joe Tillison, Avnet Electronics Marketing, Americas, www.avnet.com [4]

One of the most intriguing green technologies is the growing use of energy harvesting to collect wasted energy. ROI comes from reduced labor costs and the elimination of maintenance downtime. With an energy harvesting power source, it's possible to supplant traditional disposable batteries to provide a completely wireless and maintenance-free sensor node. New thin-film materials have enabled smaller transducers, capable of scavenging energy in the form of heat or vibration, to provide milliwatts of useful electrical power. Coupled with today's power-sipping microcontrollers and power efficient wireless protocols, they make it not only possible, but very achievable to design sensor nodes permanently powered by energy scavenged from the environment. Like most green technologies, an upfront investment is necessary. Transducer costs are still too high for most applications, especially versus the cost of disposable coin cell batteries. But in applications where downtime is expensive, they provide a longer term tradeoff against operating costs, and could eliminate a source of outage from high availability systems. They can also eliminate the necessary disposal of dozens of batteries.

Mark Cerasuolo, Outback Power, www.outbackpower.com [5]

Consumers can expect payback from all renewable energy sources: solar, wind and hydro. However, it varies depending on the source. Wind systems require high initial investment and regular maintenance and management, which pushes payback out. Hydro installations face high upfront installation and compliance costs, even in private uses. Neither works everywhere and both require a transmission path from point of generation to point of use.The earth gets 86,000 terawatts of solar energy daily, and you don’t have to be near the equator or desert to use solar. Solar has the advantage of being solid-state (without moving parts), usable at the point of generation, and without the aesthetic or compliance concerns of wind and hydro turbines.

Prices and payback on residential solar installations vary, depending on incentives, locations and technologies, but studies indicate solar energy system owners can recoup up to 97 percent of investment at resale plus homes with solar systems can sell twice as fast as homes without. Owners can add ROI to a renewable energy system by dual-purposing it for energy savings and backup capability. Grid-interactive systems with battery backup, unlike typical grid-tied systems, continue delivering power during outages or emergencies, and during normal times provide benefits beyond net-metering, like backup power at night to save money by taking advantage of smart metering and lower utility prices.



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Advances in power conversion, management, and supply technology are creating and accelerating ROI opportunities in applications ranging from lighting and smart metering to enterprise network power management. For instance, the latest LED driver solutions for solid state lighting are enabling more economical streetlights, building fixtures, retail lighting products, and solutions for supermarkets and industrial kitchens where the lower radiated heated also reduces cooling costs for perishable items. Power harvesting, management, switching, and monitoring solutions are also creating ROI opportunities thanks to a new generation of FPGAs, bypass diodes/switches, MOSFETs, FREDs, IGBTs, DC-DC converters and pulse-width modulation (PWM) modules. One example is today's ultra-thin photovoltaic bypass diodes, which can now be integrated under the glass, eliminating costly junction boxes. The latest flash-based FPGAs enable smaller, more efficient inverters for power management and control, and are also available as customizable Systems-on-Chip (cSoCs) that integrate a flash FPGA core, hard ARM Cortex-M3 processor, and programmable logic in a single solution for control, temperature/power sensing, management and communications in smart metering applications. The next cSoC evolution is to include an RF subsystem for Machine to Machine short range wireless sensor applications in PV inverter and smart appliance applications.

Power-over-Ethernet solutions are putting power and data onto the same Cat5-or-better cabling, and enabling WLAN access points and other powered devices to be turned on or off at pre-determined times during low traffic periods, reducing power consumption by 70 percent. These and other advances are generating significant ROI opportunities for end-users across a diverse set of green technology applications.

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