

in 1992 and now has more than 1.5 megawatts of the modules producing electricity in its portfolio. According to SMUD, these solar arrays are performing at or above projected power outputs. Europe has also embraced the low-cost advantages of deploying utility-scale thin-film solar arrays, with more than 10 megawatts of capacity deployed in the last five years. Almost every reputable module manufacturer seeks International Electrotechnical Commission and Underwriters Laboratory certification for photovoltaic components, meaning the components must pass an arduous set of tests designed to accelerate the aging process to determine whether day-night temperature cycling, humidity or other stress conditions will cause them to fail.

Finally, solar has faced an obstacle of being too small a solution to truly make a difference in addressing the world's energy needs. Not anymore. As module factories increase in size, high-productivity tools and automation and factory process management continue to advance stride-for-stride to support growth. In addition to increasing the output of factories, scaling up the size of a manufacturing facility provides tremendous opportunities for materials cost reduction, utility cost savings, and improved efficiencies in logistics planning – all of which further help to reduce the cost per watt.

Applied Materials is currently ramping 11 thin-film photovoltaic factories for customers in six countries on two continents. Increased production around the globe is helping to transform solar photovoltaics from a cottage industry to a key long-term solution for alleviating the world's energy crisis with an affordable, clean source of energy.

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(GUEST OPINION)

Where T&D Automation Is Headed

2009 AND BEYOND // BY CHARLES W. NEWTON

THE FINANCIAL ENVIRONMENT AND ECONOMIC OUTLOOK darken many segments of the national and global economies. Will the electric power industry significantly scale back planned capital expenditures and operations and maintenance spending on transmission and distribution automation? To find the answer, we conducted a global study of capital-expense budgets.

Several key reasons underpin the continued relatively strong investment in transmission and distribution of electricity planned for 2009 and 2010. Regulatory pressure and mandates for service reliability improvements require investment. Smart-grid initiatives aimed at modernizing the power grid infrastructure and enabling energy efficiencies need funding. Obsolescence of existing equipment and systems obliges utilities to buy replacements. And finally, a long-term investment view is necessary to accommodate long-term growth in electricity consumption. Many utility capital projects are complex and require years to complete, so project deferrals are often impossible, despite a poor economic outlook.

Charles W. Newton



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A market segment that includes distribution management software and energy management systems, such as supervisory control and data acquisition, is nearing global sales of \$500 million annually, excluding turnkey control center projects. Some uptick in spending is possible for new applications software and better visualization tools to compensate for aging, installed systems. Sales of the closely aligned outage management technology will grow. Sales of outage management software and platforms are nearing \$100 million, led by Oracle Utilities, Intergraph and MilSoft.

The market for substation intelligent electronic devices for new communications implementations and integration has grown to nearly \$500 million. Multiyear programs aimed at upgrading, integrating and automating an existing global base of a quarter-million transmission and primary distribution substations have been under way for some time. Some programs launched in 2008 will continue into 2011. Spending growth will continue more slowly for critical substation automation and integration programs. High-voltage transmission substations

will have the first priority for upgrades and the addition of more intelligent electronic devices.

Many industry observers, utility officials and regulators in the United States, Canada, Australia and Western Europe see automated meter reading as the smart grid's lynchpin. Nearly 93 percent of 1.5 billion electricity meters installed worldwide are electro-mechanical; thus, smart metering interests utilities in Indonesia, Russia, Honduras, Malaysia and

Thailand. The prepayment smart meter is taking hold in some developing nations. The combined resources of Itron, coupled with its Actaris acquisition, make it the global-share leader in sales and installations of AMI and AMR systems and meters.

The global market for protective relays, the foundation for protection and control, has climbed well above \$1.5 billion. Spending in 2009 for protective relays is unlikely to drop, because these devices continue to expand in capabilities and undertake additional functions, such as sequence-of-event

recording, fault recording and analysis, even acting as a remote terminal unit. The North American leader in relay sales to utilities is SEL, while GE Multilin holds a slight edge serving industrial markets.

The Institute of Electrical and Electronics Engineers defines distribution automation as "a system that enables an electric utility to remotely monitor, coordinate and operate distribution components in a real-time mode from remote locations."

Today, distributed automation can encompass any aspects of a distribution network automation scheme, from the control center-based SCADA and distribution management system to the substation, where remote terminal units, programmable logic controllers, power meters, digital relays, bay controllers and myriad other communicating devices help operate, monitor and control power flow and measurement in the medium-voltage ranges.

Nonetheless, the primary and secondary network is where we find reclosers, capacitors, pole-top RTUs, automated overhead switches, automated feeders, line reclosers and associated smart controls. These new smart devices are the basic building blocks for distributed automation. The objective will be achieved with the ability to detect and isolate faults at the feeder level, and it will enable ever-faster service restoration. With spending approaching \$1 billion worldwide, distributed automation implementations will continue to expand during the coming decade, nearing \$2.6 billion in annual spending by 2018.

The transmission and distribution automation market won't go away in 2009, nor will it shrink, based on our firm's latest electric utility budget studies. When telecommunications infrastructure developments are included, about \$5 billion will have been spent in 2008 for global T&D automation programs. T&D automation spending growth is likely to be subdued in 2009 and perhaps 2010. However, the global market for T&D capital-expenditure investment will approach \$105 billion. Capital spending is likely to remain at or near current levels of spending for 2009 and part of 2010, benefiting from the continued regulatory-driven momentum for advanced metering infrastructure, renewable portfolio standards and demand response initiatives. By 2012, we should once again see healthier capital expenditure budgets, prompting overall T&D automation spending to reach about \$6 billion annually while total investment reaches well over \$100 billion.

Charles W. Newton is president of Newton-Evans Research.

NewsFlash

INTEL GOES SOLAR

Intel plans to develop a solar electric installation in New Mexico, according to the *Albuquerque Journal*.

The solar panels will be placed on a carport-like facility and produce 10 kilowatts. Intel has invested \$200,000 in the effort.

"You can actually park your vehicle under this array and when we have electric cars in a few years, you'll be able to plug in your car and charge it directly from the sun," a project official said.

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