

Energy

Traversing The Valley Of Death

Evan Mills and Jonathan Livingston 11.17.05, 4:00 PM ET

BERKELEY, CALIF. -Americans will spend about \$850 billion this year to power their homes, businesses, transportation and industries. This amount would have been twice as high without energy efficiency improvements and structural changes made since the energy crises of the 1970s. The energy savings achieved over the past decade are four times greater than new energy supplies.

A new generation of emerging technologies could again double our efficiency. Government and corporate research and development have produced a stream of energy-efficiency technologies. Local and federal programs and policies have also driven end-use efficiency market expansion. These market interventions range from mandatory appliance standards to broad-based and voluntary incentive programs that are utility funded.

The key to this process lies in transitioning from R&D to the market--a stage in business development so perilous that it's often called the Valley of Death. Transversing it requires an intelligent blend of public and private sector investment, targeting the most promising innovations.

In California, for example, state policy ranks energy efficiency ahead of new power plants in plans for meeting future electric-load growth. Funding for the statewide Emerging Technologies (ET) program will increase in 2006 to \$10 million out of a total budget of \$581 million for utility energy-efficiency programs. The ET program helps in demonstrating, debugging and creating successful pathways from R&D to commercialization. This complements energy-efficiency R&D funding of \$25 million provided by the California Energy Commission's Public Interest Energy Research Program (PIER).

Meanwhile, existing research institutions are being joined by new contenders seeking to grow the supply of emerging energy-efficient technologies--a reflection of increased concern about global climate change. The presidents of two of the world's most entrepreneurial universities--Stanford's John Hennessy and MIT's Susan Hockfield--have independently launched initiatives addressing global energy and environmental issues: the Stanford Institute for the Environment and the MIT Energy Research Council.

Building on these research efforts, clean energy and energy efficiency investor gatherings such as November's 18th Industry Growth Forum organized by Marty Murphy of Colorado-based National Renewable Energy Laboratory, as well as new players like the California Clean Energy Fund and the Green Wave initiative of the California Public Employees' Retirement System (CalPERS), are highlighting ET investment opportunities.

Some examples of energy efficient emerging technologies include:

Smart Stairwell Lighting. Stairwell light fixtures in commercial buildings normally operate 24/7, using large amounts of energy to illuminate mostly unoccupied stairs, alcoves and landings. Utilities are evaluating new fixtures incorporating occupancy sensors that bring dimmed safety lighting up to full levels only when someone enters the stairwell. ET assessment results are confirming the efficacy and user-acceptance of these systems.

Improved Power-Supply Design. The growing use of consumer and business electronics is projected to provide vast savings opportunities. To address this, electronic power-supply and microprocessor designers are adding energy efficiency to their product specifications. Innovative efforts like the national 80 PLUS Power Supply Program are accelerating introduction of these ETs.

Efficient Labs, Data Centers and Cleanrooms. The high-technology sector is ripe for efficiency improvements. As indicators of their energy appetites, a rack of servers can use enough energy each year to power a hybrid car across the country 337 times. Cleanrooms can be up to 100 times more energy intensive than typical office buildings. In laboratories, a single 4-foot-by-6-foot fume hood uses as much energy each year as three or four houses; working prototypes proposed for ET assessment have cut this by up to two-thirds while maintaining and even improving worker safety conditions.

Integrating better component and system designs can yield 50% savings in many of these facilities, along with high-value non-energy benefits such as improved reliability.

Advanced Off-Grid Lighting In Developing Nations. Nearly 2 billion people worldwide rely on liquid fuels, such as kerosene, for lighting--achieving only 1% of the efficiency of even "inefficient" incandescent lighting. Recent advances in white light-emitting diodes, or LEDs, offer an opportunity to leapfrog the efficiencies prevailing in wealthy nations. Coupled with paperback-novel-sized solar collectors, these light sources could save \$40 billion a year in fuel costs, equivalent to 1.3 million barrels per day of oil consumption (half of Iraq's pre-war production). All of the components are in the market, but affordable integrated systems and solid business models are still emerging.

What drives the markets for these and other emerging energy-efficiency technologies? First, consumers need to see a combination of benefits that may include productivity and labor savings as well as energy-cost reductions.

Second, innovators often import technologies from other applications into new market segments. For example, new traffic signals replace inefficient incandescent lamps with LEDs first developed for automotive use. Finally, many emerging technologies fall under the "long tail" of the bell curve--market application niches that are not intuitively obvious, revealed only by studying specific market needs.

Energy-efficient technologies and practices save more than money. They cost effectively curb energy-import dependency, reduce local air pollution and address pressing global environmental problems such as climate change. Success hinges on properly nurturing emerging technologies as they move from the lab to the marketplace.

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[80 Plus Computer Power Supply Program](#)

[The Specter of Fuel-Based Lighting](#)

[High-Performance Buildings for High-Tech Industries](#)

[California Energy Commission Public Interest Research Program \(PIER\)](#)

[California Clean Energy Fund](#)

[Industry Growth Forum](#)

[U.S. Department of Energy, Energy Efficiency and Renewable Energy: R&D and Deployment](#)

California Investor Owned Utility Energy Efficiency Programs:

Pacific Gas and Electric

www.pge.com/biz/rebates/

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Sempra Energy Utility

www.sdge.com/business/bus_energy_efficiency.shtml

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