Connect the Green Dots for Fun and Profit

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Abstract

Texas Instruments is receiving a good deal of attention for the sustainable practices employed at its newest wafer fab facility, RFAB, in Richardson, TX. While there were several innovative ideas employed at RFAB, the real beauty of the facility is that it has significantly raised our own baseline and increased our awareness of other opportunities available using the integrated design process. We learned not to discount an idea too quickly or stop too early in a payback analysis. There are related savings and connections associated with any issue and they have often been left out of the equation.

As Paul Hawken, Hunter Lovins, and Amory Lovins pointed out in their book "Natural Capitalism" there is another industrial revolution coming. The first revolution utilized machines to increase people productivity. The next industrial revolution involves increasing resource productivity. Resources such as power and water will likely be constrained for most areas of the planet. Imagine being the first company to get 10x the productivity out of a drop of water or a unit of electricity. Think about the ramifications of getting 10x the productivity out of every drop of chemical used in the process.

We should no longer accept rules of thumb and standard practices as immovable objects. In a system as complex as semiconductor manufacturing everything is connected. Everything comes from or goes to something else. Working on any issue individually provides a sub-optimum solution. Only by solving for the whole equation can significant breakthroughs be achieved. It's a complex and challenging game of "connect the dots." The winners will reap tremendous benefits.

We made some good connections on RFAB, but by no means have we come close to a fully optimized solution. Like a developing brain, each connection between synapses brings us to a higher level of problem solving. We learned how optimizing the floor space reduced capital cost. Less space reduced operating cost and construction time. This reduced complexity and the amount of support equipment, which further reduced space needs. The solution then looped back around again. It's iterative optimization and it works – very well.

No one would have paid for our smart office lighting system based on the simple payback of one fixture vs. another. The key was recognizing that in addition to direct power use lighting produces a good deal of the internal cooling load. The cooling reduction from lighting alone wasn't enough to eliminate one of the chillers, but aggregating reductions from dozens of systems did the job. Spending a little more to improve the efficiency of dozens of systems reduced the cooling load enough to eliminate one large chiller. We spent the same amount of capital – just toward a different application. We then enjoyed the perpetual operating cost savings. If recognized early in the project, the space for the additional chiller can be eliminated and another iteration of space reduction and its subsequent benefits will be recognized. It's all connected.

Biography

Paul Westbrook is a LEED Accredited Professional and a Member of the Group Technical Staff (MGTS) for Worldwide Construction at Texas Instruments in Dallas, Texas. Since joining TI in 1983, his positions have included Facilities Project Manager and Fab Facilities Manager. In 2002 Paul took on the role of Sustainable Development Manager for TI's newest facility, RFAB. He received a B.S in Mechanical Engineering from Louisiana State University in 1982.