

**Testimony**

**of Bruce S. Klafter**

**on behalf of Applied Materials, Inc.**

**Before the Senate Environment and Public Works Committee**

**August 14, 2007, San Jose, California.**

Honorable members of the Committee, Senator Boxer, Senator Inhofe, my name is Bruce Klafter. I am Head of Corporate Responsibility and Sustainability for Applied Materials, Inc., and am based in our Santa Clara, California, headquarters. Applied Materials is the global leader in nanomanufacturing technology solutions with a broad portfolio of innovative equipment, service and software products for the fabrication of semiconductor chips, flat panel displays, solar photovoltaic cells, flexible electronics and energy efficient glass.

Founded in 1967, Applied Materials creates and commercializes the nanomanufacturing technology that helps produce virtually every semiconductor chip and flat panel display in the world. The company recently entered the market for equipment to produce solar arrays and energy efficient glass. To support our customers, Applied Materials employs approximately 14,000 people throughout the world (8,000 in the United States). In fiscal year 2006, Applied Materials recorded net sales of U.S. \$9.17 billion. We are pleased to offer this testimony to the Committee and hope that an explication of Applied Materials green business strategy will be instructive to the Committee's understanding of the tremendous opportunities created by taking action on global warming.

## **Green Means Growth**

Applied Materials is making significant investments of capital and other resources into developing and growing substantial new lines of business focused on “green” technology. By “green” technology, we are referring to a variety of equipment, products and services that enable generation of energy from renewable sources, help our customers use energy as efficiently in their operations and that prevent or minimize the greenhouse gases generated in those same operations. Our new Energy and Environmental Solutions Group reflects our view that “going green” creates jobs and economic opportunity.

It is also our view that the United States Congress has an important role to play in crafting legislation that promotes development of innovative, advanced green technologies, that encourages businesses and consumers to employ those technologies and that creates conditions favorable to the domestic manufacture and distribution of green products. As one of the leading high-technology companies in Silicon Valley and the world, we have long worked with Congress and federal agencies to help fuel the amazing job creation engine that high tech has become. Green jobs are a natural extension of the high-tech job phenomenon with the added benefit of making direct and important contributions to addressing some of the most pressing problems facing the world today. Applied is involved in several green technologies:

**Photovoltaics.** Photovoltaics, or more commonly, direct conversion of sunlight to electricity, has long represented a great opportunity for the world to access clean, renewable energy. Solar energy generation produces no pollution and requires little or no

maintenance. It can be distributed throughout the grid, and offers the most power during peak demand periods. By alleviating peak power demand, solar energy lowers the number of conventional power plants needed, and reduces strain that causes transmission failures. Despite these advantages, solar currently generates a very small fraction of total energy generation in the United States.

As worldwide energy demand continues to rise, the overall solar equipment market is expected to grow from approximately \$1 billion in 2006 to more than \$3 billion in 2010, according to industry estimates. Just last week, one analyst predicted the thin-film PV market could grow to \$7.2 billion by 2015. Notably, these estimates do *not* include additional opportunities for service-related growth, so the real economic impact will be a much larger number. Applied Materials intends to capture and accelerate this growth by dramatically lowering the cost to produce solar cells, thereby allowing widespread generation of this clean, renewable energy.

**Glass Coatings.** Collectively, buildings in the United States consume 68 percent of all electricity. Direct energy purchases for household and vehicle use constitutes approximately one-third of the energy demand in the United States. Our Glass Coating Products Group aims to make a dent in those demands, window by window.

We design and manufacture equipment that coats architectural glass (the kind seen commonly in homes, offices, as well as commercial and industrial buildings) with “low emittance” (Low-E) materials. Low-E materials are high-quality metal/oxide films on glass that reduce the flow of heat into and out of buildings. Low-E glass improves

efficiency of buildings heating and cooling while still allowing light to pass through the windows (solar gain).

Our Low-E glass coating equipment, manufactured in North America and Europe, has contributed to reducing the cost of energy-efficient glass 10-fold over the last decade, bringing new building technology to many consumers for whom costs have previously been prohibitive. These high-quality films on architectural glass have facilitated energy efficiency improvements in buildings worldwide.

Today our installed base of this equipment in glass manufacturing plants has enabled the application of energy efficient films on more than 20 *billion* square feet of architectural glass. The savings in energy enabled by our films and equipment is roughly equivalent to the oil contained in 57 large oil tankers. Stated another way, the total energy saved through installation of windows coated using Applied Materials technology equates to the amount of energy it would take to heat 30,000 homes for one year.

In developing economies such as China and India, our equipment was the first of its kind installed in architectural glass factories that are making the Low-E glass used in buildings and in areas where extreme temperatures are the norm. More than 100 Applied Materials employees work in Fairfield, California, manufacturing our glass coating equipment. More than 80 percent of these systems are exported to Asia and other markets through the Port of Oakland. These regions represent important markets for exports of American equipment. While these export success stories are good news, it is important to note that

these factories are *not* being built in the United States. We believe this can change if the right mix of public policies is put in place.

**Automotive Glass.** In addition to providing technologically advanced solutions for lowering energy demands in buildings, our Glass/Web products increase energy efficiency in hundreds of thousands of automobiles. Known in the automotive world as Solar Infrared Reflective glazing, or SIRR, coated automotive glass reflects more than 60 percent of the sun's thermal heating potential from the car interior. This improves fuel consumption and comfort, by reducing the need for air conditioning without reducing visible light. This translates into a savings in vehicle tailpipe emissions and greater fuel economy.

Our aim is to improve market access to SIRR glass for automobiles and Low-E glass for buildings. As energy conservation becomes more important to society and regulatory initiatives develop, our technology will enable integration of these important technologies in buildings and cars.

### **Economic Impact**

Applied formally announced its solar strategy in September, 2006 and in the space of just 10 months the company has entered into seven contracts worth over \$500 million dollars and representing over 200MW of annual thin-film PV production. Within Applied Materials, approximately 10 percent of Applied's global workforce of 14,000 employees is involved in the production or servicing of our green products. Throughout Silicon

Valley, hundreds of jobs are already tied to solar and more are added all the time. It is worth noting that the business will generate a wide variety of well-paid jobs requiring different skills and experience: design engineers; engineers optimizing the production process itself; engineers designing the factory layout; installation teams; service technicians; and a wide variety of jobs such as sales and account teams, marketing, etc. Distributed solar energy always involves local distribution and installation and Applied Materials' customers will establish partnerships with many PV integrators and installers, each of whom will employ technicians and many others.

Externally, green products drive economic development and jobs as well. For example, a newly announced plan to build a new 40-megawatt facility in Bielefeld, Germany, to become operational by mid-2008, would add 150 long-term jobs (and this does not include the construction jobs). Our own internal analyses for operation of a 60-MW thin-film fab estimate 160 employees per fab. The economics of producing solar power collectors favor manufacture close to the market, which means there could be dozens of these plants in almost every region of the country. If the right set of policies are in place to stimulate demand by commercial and residential customers, solar demand will drive this investment.

Estimates of the job-generating impact of just PV vary, but all are significant. According to the Solar Energy Industry Association, for example, extending the solar tax credit could bring 55,000 new American jobs and more than \$45 billion in economic investment. According to a study by Dr. Roger H. Bezdek of Management Information Services, Inc.

and the American Solar Energy Society, US private-sector employment in photovoltaics last year was approximately 7,000 direct jobs and 16,000 indirect jobs. Depending on the public policy environment for PV technology, this sector could grow to anywhere from 200,000 to 750,000 employees by 2030. These are significant numbers and involve mostly high-paying jobs.

Similarly, a recent paper from the IC2 Institute at the University of Texas in Austin cites research showing “renewable energy generates more jobs in its construction and manufacturing sectors, per megawatt of installed power capacity, than does fossil fuel generation. Specifically for PV generation, far more jobs are produced constructing PV facilities than are produced by the construction and operation of coal and natural gas-fired plants.”

At this point, it is instructive to compare the United States with the world leader in renewable technologies – Germany. Germany has about one-fourth the GDP and population of the United States, yet renewables employ 20,000 more workers than in all of the United States (approximately 214,000 there vs. 194,000 here).

Applied is intent on leading others to make investments in solar photovoltaic energy. Earlier this year we announced our plan to install a 2.0 megawatt (mW) system on our main R&D campus in Sunnyvale, California. This will be one of the largest PV installations on an existing corporate campus in the United States, if not *the* largest and involves a multi-million dollar investment. In addition, Applied has already installed a

28 kW system at our manufacturing facility in Austin, Texas. The Austin installation is one of the largest commercial PV systems to date. Our plans are an illustration of how policy can influence decision-making – we were able to make the California installation substantially larger because there are financial incentives in California that scale to the output of a system. The incentives in Texas, by contrast, are minimal. With action by Congress, hopefully solar and renewable policy nationwide can be enhanced.

### **Policy Recommendations**

First and foremost, Applied urges the extension and expansion of a robust solar investment tax credit. Although the Senate’s energy bill did not include tax provisions, the House did include tax provisions in its bill and we hope the Senate-House conference report will include a tax title. We would like to see a combination of the best elements from both chambers, which would include an eight-year extension of both the residential and commercial investment credits and a removal of the \$2,000 residential cap. Importantly, the solar tax credits should be able to offset fully any AMT (alternative minimum tax) liability.

Although it benefits other renewables far more than solar, we generally favor a national renewable portfolio standard and would like to see inclusion of a solar “set-aside” or triple credit for solar in any RPS scheme. This would be a temporary measure that would disappear as the industry matures and achieves commercial viability.



The creation of ARPA-E in the America COMPETES Act is another welcome step forward. We would hope that at least some portion of the increased funding toward STEM (science, technology, engineering and mathematics) education be directed toward solar energy because we face a serious shortage of talent in this industry.

Moving forward, we would strongly support Senator Menendez's bill S. 1016, the Solar Act. This measure would establish national standards for the interconnection and net metering of solar energy systems, based on the most progressive state standards to date. The legislation would require utilities to credit their customers at retail electric rates for supplying excess solar power to the grid. The bill would also establish that ownership of renewable energy credits (RECs) resides with the solar system owner for purposes of selling or trading to meet a state or federal renewable portfolio standard.

On the international trade front, we strongly encourage the US Trade Representative to continue its efforts to negotiate a sectoral agreement that would reduce or eliminate tariffs on environmentally friendly goods. Such an agreement could do for "green" what the Information Technology Agreement has done for IT products.

## **Conclusion**

Applied Materials is convinced that the issues of climate, energy and environmental stewardship are serious challenges, but we are equally convinced of our ability to tackle these challenges successfully. We are confident that our technology, ingenuity and

inventiveness will turn these challenges into an economic win for the United States and that Silicon Valley will again lead the way.