Testimony
of

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on behalf of

Applied Materials, Inc.

Before the

Select Committee
on Energy Independence and Global Warming

U.S. House of Representatives

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Thank you, Mr. Chairman and members of the Committee, for providing us with the opportunity to testify today. I am Blair Swezey, senior director for solar markets and public policy at Applied Materials, Inc.

We are very pleased to present our corporate perspective on the potential of the solar industry to create domestic jobs while at the same time providing an important solution to some of our most pressing energy and environmental needs.

Applied Materials is a Fortune 500 company that ended our last fiscal year with nearly $10 billion in revenues. Headquartered in Silicon Valley, we employ approximately 14,500 workers worldwide, including nearly 8,000 here in the United States. Our primary manufacturing facilities are in Austin, Texas, with additional production facilities in

Germany and Israel. We sell more than 80 percent of our products outside the United States, making us an important positive contributor to the U.S. balance of trade.

We recently celebrated our 40th year as a company and have a proud heritage of providing productivity-enhancing nanomanufacturing tools and equipment to the semiconductor and flat-panel display industries. We have now extended this technology and manufacturing expertise to providing the tools for production of solar electric photovoltaic (or PV) modules.

We see considerable growth potential in the rapidly expanding solar market. Our technology and production scale helped reduced the cost of transistors by a factor of 20 million between 1974 and today. Similarly, the price of flat panel displays has dropped by a factor of 20 in the past decade due to scale and control of nanometer thin layers over areas the size of 60 square feet, making these technologies now ubiquitous in the marketplace.

We fully expect to have the same impact on driving cost reductions for PV panel production by a factor of two to three, which will put solar electricity prices on par with grid power prices for large areas of the world (see Figures 1 and 2). The key is getting to large-scale manufacturing by creating large markets.

The sheer magnitude of our energy supply challenges – meeting continued global demand growth while assuring economic prosperity, domestic energy security, and environmental

quality – dictates that we accelerate the development of all available energy resource options. Renewable energy resources are available in quantities that are more than adequate to meet total global energy demand many times over (see Figure 3). For example, the earth receives more energy from the sun in just one *hour* than the world uses in an entire *year*.

So the question is not one of resource availability, but of the economics of deploying the technologies to exploit these resources and how rapidly industry can ramp up the manufacturing capacity to produce the technologies.

First to economics. Electricity generation from photovoltaics is currently anywhere from two to three times more expensive than electricity generation from conventional sources in most sunny locations, depending on the application and the cost of capital. Nevertheless, global PV production has been growing at a rapid clip, rising at a rate of more than 40 percent per year over the past decade. This growth is a direct result of government policies that have been established here in the United States and around the globe to accelerate the use of renewable energy technologies in response to the ever-increasing demand for electricity, job creation, energy self-reliance and attention to the environment.

In the United States, the Energy Policy Act of 2005 (EPAct 2005) established a two-year 30-percent investment tax credit (ITC) for residential solar installations, subject to a $2,000 cap, and raised the existing business energy ITC from 10 percent to 30 percent.

The expiration date for both credits was later extended by one year in the Tax Relief and Health Care Act of 2006.

However, the business credit is scheduled to revert back to 10 percent and the residential credit to expire altogether at the end of this year, which will halt the growth in the domestic market just as the industry is beginning to attract the capital it needs to expand production and make solar energy more economic. A reduction in the credit would absolutely send the wrong signal to the investment community that is so critical in providing the capital for industry expansion.

For this reason, we favor a long-term extension of the 30-percent ITC for both businesses and homeowners. And we feel strongly that Congress should remove the utility property exclusion from the ITC because utility-scale applications offer a critical economic pathway to achieve the economies of scale that facilitate cost reduction. We believe that the development and application of utility "smart grid" technologies will play a key role in integrating large amounts of solar and other renewable energy sources. Utility-scale applications of PV would also help address critical electric grid reliability issues and defer the need for new electric transmission requirements.

We also support removing the $2,000 cap on the residential credit, or at a minimum significantly raising the dollar threshold. Furthermore, both the commercial and residential credits should be creditable against Alternative Minimum Tax (AMT) liability.

We commend the House of Representatives for its recent action in passing H.R. 5351, which includes most of these important extensions and changes.

The other key element is domestic jobs and economic development. The solar industry creates manufacturing jobs with labor readily transferable from other manufacturing industries. Similarly, renewable energy power plant development will draw from the same skilled engineering and construction labor pool as traditional power plant development. And smaller-scale solar projects can utilize much of the same labor pool as the residential and commercial construction industries. The solar industry will also generate many "standard" jobs for accountants, sales, engineers, computer analysts, factory workers, truck drivers, mechanics, etc.

The United States is already a base for solar panel manufacturers and dozens of new start-up operations. Applied Materials itself now employs about 900 employees in its Energy and Environmental Solutions group, which is just two and a half years old. There are also significant raw materials suppliers based in the United States providing feedstock materials such as silicon, glass and encapsulation polymers. And the installer networks are providing thousands of "green collar" jobs.

So while overall U.S. manufacturing job numbers continue to decline, renewable energy industries offer a whole new generation of manufacturing jobs with almost limitless potential. Solar energy is an important component of this job growth, since the solar

industry creates more jobs per unit of energy generated than any other energy source, renewable or fossil.[1]

However, the fact that companies develop the technology here in the United States does not guarantee that they will also locate production in the United States. Businesses are likely to invest and locate where a viable market exists. We only need to look at the recent experience of the wind industry, where new industries and manufacturing jobs have developed across the United States for the production of wind systems components, such as turbine blades, electronic controls, and towers.

The wind industry has seen great success but is several years ahead of the solar industry in market development. Realizing the job creation potential of the solar industry depends on continuing policy support to build the market. The Solar Energy Industries Association (SEIA), of which Applied Materials is a member, estimates that extending the current set of federal solar tax credits will create 55,000 new jobs in the solar industry and more than $45 billion in economic investment.[2] Conversely, a recent study by Navigant Consulting estimated that failure to extend the credits will ***cost*** the country nearly 40,000 jobs and more than $8 billion dollars of investment through 2009.[3]

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[1] Daniel Kammen, et al, "Putting Renewables to Work: How Many Jobs Can the Clean Energy Industry Generate?" University of California, Berkeley, January 2004. http://rael.berkeley.edu/files/2004/Kammen-Renewable-Jobs-2004.pdf

[2] Testimony of Rhone Resch, President, Solar Energy Industries Association, Before the U.S. House of Representatives Committee on Ways and Means, Select Revenue Measures Committee, April 19, 2007.

[3] Navigant Consulting, Inc., "Economic Impacts of the Tax Credit Expiration," Prepared for the American Wind Energy Association and the Solar Energy Research and Education Foundation, February 13, 2008. http://www.seia.org/Navigant_Tax_Credit_Impact.pdf

Industry will locate where production conditions are most favorable. Manufacturers are also likely to invest and locate close to where viable end markets exist. Applied's thin-film solar manufacturing technology allows production of solar modules 5.7 m^2 in size, or roughly the size of a garage door, so end-market location will be an important determinant of manufacturing location. Put simply, if the United States develops a robust solar market, manufacturing and installation jobs will follow. However, companies need to see a clear market growth pathway to commit the substantial resources needed to ramp production capacity and output.

Although the United States accounts for nearly one-quarter of the world's electricity production, it deploys only about one-tenth of global PV production. This is because other countries are leading in policy support. For example, Germany accounted for nearly half of all PV capacity deployment in 2007 – even though the quality of the solar resource in Germany is about the same as that of Alaska – because of generous incentive structures designed to jumpstart the industry (see Figure 4). And at least 64 countries have a national target for renewable energy supply, including China and all 27 European Union countries.[4] We possess some of the most favorable solar resources in the world and we should be exploiting these resources to the fullest.

Unfortunately, in the case of PV manufacturing, many U.S. companies are increasingly looking abroad to expand their production, in part because of the uncertainty over future policy support. Speaking from our own corporate experience, 100 percent of our solar

[4] Renewable Energy Policy Network for the 21st Century (REN21), *Renewables 2007 Global Status Report*, February 2008.
http://www.ren21.net/globalstatusreport/default.asp

factory orders have come from outside the United States. So, while our domestic business is advancing, the opportunity for a much larger U.S. industry platform is idle.

In summary, the PV industry is currently transitioning from one of component assembly operations to large-scale manufacturing, which will dramatically increase the scale and throughput of PV module production in the coming years. Solar photovoltaics is following a well-documented pattern of cost decline but with new technology approaches, such as the use of thin-film semiconductor materials, is poised to create an accelerated cost reduction path (see Figure 5). The roadmap to achieving these cost reductions borrows from the tool set and production experience of the semiconductor industries.

New market entrants are bringing the necessary capital, technology and manufacturing experience from established and successful industries. Similarly, large established companies are investing in the capacity to provide specialized materials to supply this new industry. Cost reductions will come rapidly if the market grows to support the production scale required. The biggest risks to the industry are the availability and continuity of government policies to support the necessary market scale.

With our abundance of solar and other renewable energy resources, we are presented with the opportunity to manufacture our way toward domestic energy security and sustainability. As a nation, we need to seize this opportunity.

Applied Materials will do its part to make America competitive in this important and growing industry, and we stand ready to work with policymakers to develop a sound policy framework that will enable us and other innovative U.S. companies to lead the way.

Figure 1 — Extending Cost Reduction Capability from Semiconductor and Display to Solar

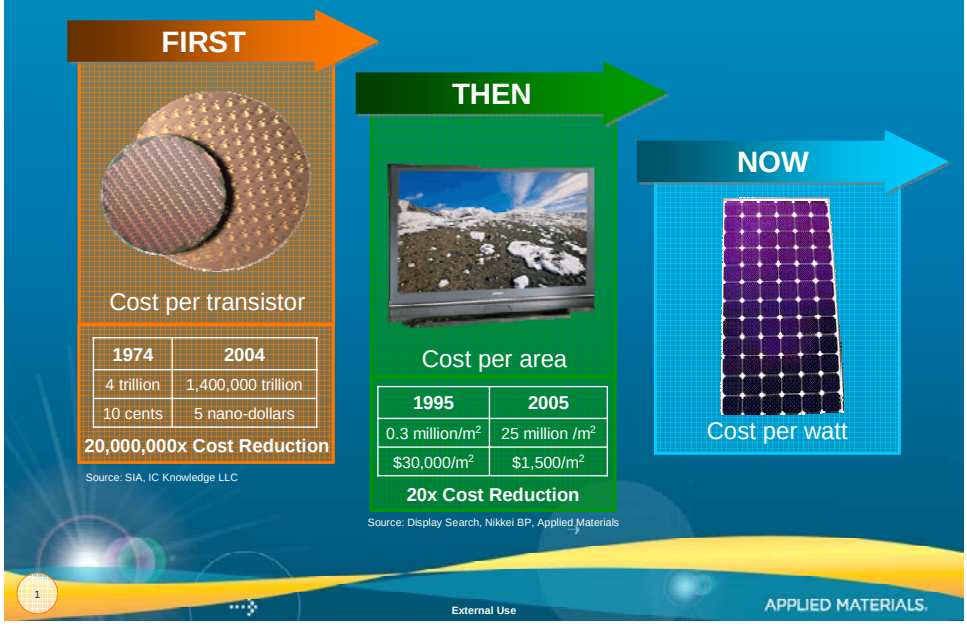

Figure 2 — The Path to "Grid Parity"

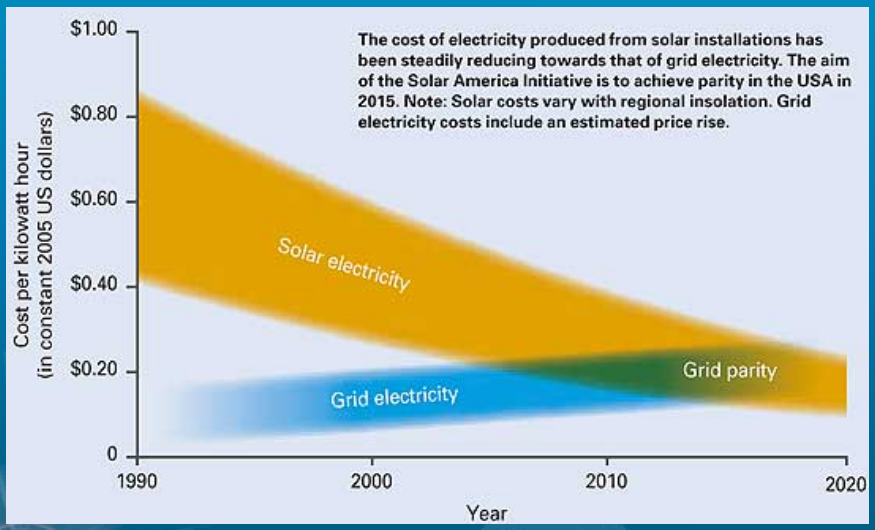

Figure 3 — Yearly Supply of Renewable Energies

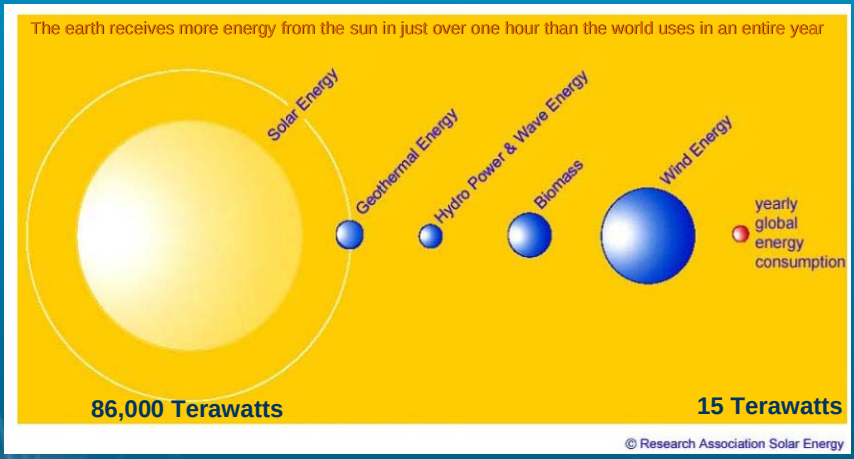

Figure 4 — Comparison of the Solar Resource in Germany and the United States

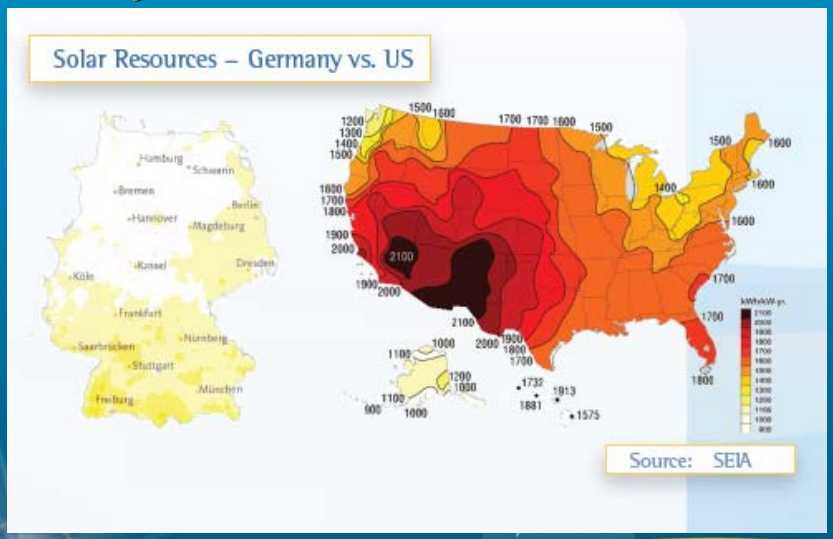

Figure 5 — Historical Price Reduction for PV Modules and Thin-Film Price Shift