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Statement of Kate Maracas
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Before The U.S. House Committee on Science and Technology
Subcommittee on Energy and Environment hearing on
Utility-Scale Solar Power: Opportunities and Obstacles

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Mr. Chairman, Vice Chairman Giffords, Members of the Committee, thank you for the opportunity to testify today. I am the Vice President of Arizona Operations for Abengoa Solar Inc., a U.S. division of Abengoa, which is based in Madrid, Spain. Abengoa employs over 23,000 people worldwide, with presence in more than 70 countries. Abengoa Solar has a team of approximately 40 people in the United States and Spain dedicated to researching, developing and improving solar technologies. In December 2007, the U.S. Department of Energy selected Abengoa Solar for three research and development projects to improve solar parabolic trough technology. And recently, we announced an agreement with Arizona Public Service to build, own and operate a 280 Megawatt (MW) Concentrating Solar Power, or "CSP" plant in western Arizona. APS will purchase all of the output of the plant, known as the Solana Generating Station. If in operation today, Solana would be the largest solar power plant in the world.

With over 500 MW of large-scale solar power plants in operation, development, and construction stages in the U.S., Spain, Morocco, and Algeria, Abengoa Solar is notably one of the world's leading providers of large-scale solar technology solutions today. With that position in mind, we are especially grateful for the opportunity to be a part of this important dialogue about the role that CSP and other large scale solar technologies can play in our nation's energy resource portfolio, and the opportunities for removing obstacles that could prevent us from leveraging our very abundant and sustainable solar resource.

I have been asked to address a few topics today, and they include:

(1) The efficacy of large-scale solar power as a significant component of the U.S. generation fleet, and barrier reduction opportunities for achieving this potential;
(2) Near and long term economic impacts of large-scale solar deployments; and
(3) The role of government in advancing solar thermal technologies.

I will attempt to address these topics, in that same order.

On the subject of large-scale solar generation as a viable option for providing significant contributions to our nation's power needs, my view is that large-scale solar power facilities not only have the potential to become a meaningful part of our national resource portfolio; they are also among the smartest options we can exercise – particularly in a business-wise context. Further, I see today's family of CSP technologies as an important "mainstream" option for utility resource plans. I will explain the reasons for those thoughts momentarily, and before I do, a brief discussion about the distinction between large-scale solar generation and CSP in particular is worthwhile.

The family of solar thermal and CSP technologies is growing rapidly. An increasing number of technology approaches to solar thermal generation is advancing in the market place. I would like to clarify that there are two very basic categories of solar electricity generation. One is the category of photovoltaic, or "PV" technologies – those that convert the sun's energy directly to electricity by virtue of a photo-electric reaction that occurs on a semi-conducting material. When a concentrating mechanism such as a lens is used in conjunction with PV cells, the technology is known as High Concentration Photovoltaics, or "HCPV". Because the lenses add great efficiency to the PV cells' production capacity, HCPV is currently being developed as a utility-scale solar option.

The solar thermal category is a bit different, in that it uses the sun's heat to produce steam, which in turn becomes the working agent in a conventional Rankine Cycle – the very familiar thermodynamic process that converts heat to energy in a common steam power plant. The significant difference is that a solar thermal plant requires no fossil fuel combustion or associated carbon emissions to create the mechanical energy that spins a turbine, which in turn transfers mechanical energy to an electric generator.

Most of my remarks today contemplate thermal CSP technologies, although Abengoa Solar also views HCPV as a very promising technology in the near horizon.

Returning to my comment that CSP is a "business-wise" decision, I can offer that Abengoa Solar Inc. holds discussions with many utilities in our sunny western and southwestern states, and an increasing number of our utility contacts articulate that they no longer view CSP as *just* an option for Renewable Portfolio Standard (RPS) compliance, or as an experimental R&D endeavor. Rather, our utility colleagues consider their future resource planning options in the context of advanced coal technology and emission constraints, natural gas price volatility risks, and the increasing likelihood of carbon emission costs in the form of externalities or direct taxation. Although there is a slight premium today above conventional generation costs for CSP-generated electricity, the cost gap is closing as fossil fuel prices increase and carbon regulation becomes more imminent. With today's promise of dispatchable solar plants made available through advanced commercialization of Solar Thermal Energy Storage (TES) technology, utilities increasingly view CSP as a wise bet against fuel price volatility and open-ended carbon liability.

Arizona Public Service, our first large-scale CSP customer in the U.S., has in fact been very forward thinking about the role of CSP in their future resource portfolio. APS is a leader among a group of proactive utilities in our nation who very definitely view CSP as a viable part of a low-risk resource portfolio, and as a mainstream element of their growing generation fleet.

The final portion of this topic that I have been asked to address relates to those barriers that may stand in the way of large-scale solar deployments. There is no question in my mind that technology is not a barrier. While there is room for cost and performance improvements that will occur with technology advancements, economies of scale, repetition and associated learning curve improvements, the greatest barrier to increased deployment of solar generating facilities is indeed political rather than technical. While federal support of R&D must continue, the single most significant hindrance to broader deployments of CSP facilities in the U.S. is the lack of an enduring tax credit which is essential to the financial viability of CSP installations today. The 30% federal Investment Tax Credit, or "ITC", has been in place since passage of the Energy Policy Act 2005. But since its enactment it has been kept on life support with one or two year reauthorizations at a time. The short lifespan of the ITC does not stimulate the deployment of large, capital-intense solar generating stations, which require three to four years to build. Further, the large institutional entities required to provide construction and operating capital for these projects cannot operate with the uncertainty of an expiring tax credit whose duration is shorter than a project development period.

In summary, are there technology improvements to be achieved for large-scale solar through R&D? Absolutely. Are the barriers to meeting more of our nation's energy needs through solar energy production related to technology? Absolutely not. The single most important barrier to achieving our solar potential is the lack of a policy framework that is sufficiently robust to stimulate solar deployments in a meaningful way. We, our industry colleagues, and our consumers urge Congress to extend the federal ITC for an eight year period through bipartisan support of the Renewable Energy and Energy Conservation Tax Act of 2008 that passed in the House last month.

On the subject of near and long term economic impacts of large-scale solar deployments, I can draw observations from a large body of credible research that has been done over the last several years. As a member of the Western Governors Association's Solar Task Force, I participated in a comprehensive effort to analyze the role that solar energy could play in helping the governors meet their goal of deploying 30,000 MW of clean energy in their 19 states by the year 2015. Our task was to understand the resource potential, the market potential, the industry's capacity, the barriers to deployment, and the economic impacts that would result. On the latter topic, we examined over a dozen economic studies conducted since 2004 by credible investigators such as universities, national laboratories, and state governments. In fact, three of those studies, supported by the National Renewable Energy Laboratory (NREL) examined the economic impacts that could be expected as a result of increased deployment of CSP plants in particular. The studies contemplated a variety of CSP plant growth and scale scenarios, and the changes to

be expected in terms of job creation, net Treasury gains, Gross State Product, and private investment.

We convened an expert panel of economists to generalize these impacts across different state economies, and across different assumptions used among the studies. Our findings were that for every 1 Gigawatt (GW) of CSP added to a state's economy, the deployment would yield[1]:

- $3 - $4 billion private investment in state;
- 3,400 - 5,000 construction jobs; up to 200 permanent solar plant jobs, many in rural areas;
- $1.3 - $1.9 billion 30-yr increase in state tax revenues; and
- $4 - $5 billion increase in Gross State Product.

Those figures represent net effects, even after any tax credits or economic incentives are utilized to stimulate industry development. Clearly, the findings show that broader incorporation of large-scale solar plants into the U.S. generation fleet not only produces the benefits of sustainability and energy independence, it also pays back in very significant, positive economic impacts.

Finally, on the role of government in advancing solar thermal technologies, it is clear that the private sector cannot achieve a "Grand Solar Plan" alone. The market penetration of any new technology, product, or service traditionally follows a pattern of growth in market adoption, followed by declining prices and higher margins that result from economies of scale. Large-scale solar generation is no different in that regard. What is different, however, is that the capital commitments required to bring large-scale solar plants to market are very large, and the risk of investing in such markets with the hope that demand will follow is too high for private sector entities to bear alone. This condition describes the very traditional role that government has played in numerous examples of infrastructure development and market stimulation actions.

The government's role in solar power thus far has been both push and pull. By that I imply that the creation of demand for clean solar energy in the market place must come from both mandates and incentives. Twenty six states, including Arizona, now have Renewable Portfolio Standards that require increasing portions of delivered electricity to be derived from renewable energy resources. The RPS frameworks are a very good start, but only speak to half of the push-pull equation. Governments must also step up to the plate to incentivize market activity, and so I repeat here that a vitally important role for the federal government will be to extend the ITC for eight years so that large solar power plants can be financed and be economically viable. Recalling my comparison to other new technologies, products, and services in the marketplace, CSP will also grow up and learn to walk on its own.

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[1] The assumptions here are:

- A state economy (GSP) of $250B (a median range across states);
- Only direct jobs – no manufacturing or other indirect jobs are considered here;
- Investment represents only direct capital associated with the plant and assets;
- GSP increase includes indirect and induced effects.

On a final note, I will comment that we are very pleased to see the serious commitment to solar energy R&D that both the President and Congress have demonstrated in recent years. While I noted earlier that technology itself is not a barrier to large-scale solar power production, the efficiency and performance improvements that will be accomplished through R&D will continue to be an important part of ongoing cost reductions that will help large-scale solar generation to walk on its own. In fact, we hope it learns to run.

Thank you very much for the opportunity to share our perspective on this important topic.