

**James B. Nelson Testimony, 5/16/2012**  
**Subcommittee on Regulatory Affairs, Stimulus Oversight, and Government Spending**

The government's green energy policy includes two parts: (1) supporting basic research, with the aim of developing new green energy technologies; and (2) making loan guarantees that promote the adoption of green energy technologies. Supporting basic research is an important role of government, but the loan guarantee program is a wasteful mistake because it doesn't work.

Having spent most of my career developing strategy for companies large and small, I have learned one very important thing: economics drives behavior. It is economics, not government policy, which will drive enthusiastic adoption of green energy.

My company, Solar3D, Inc., is a technology development company in Santa Barbara, California. We are developing an advanced technology — a new three-dimensional solar cell (“3D Cell”) that could reduce the cost of solar energy by as much as 50%. Our objective is similar to that of ill-fated Solyndra — to develop a new solar technology that can change the economics of the industry. However, our manner of execution is very different.

We have been supported by private investment in our company since its establishment in August of 2010. We are not depending or dependent on government funding. We certainly do not expect that such support will be necessary to facilitate the commercialization of our new technology.

Our go-to-market strategy will be to partner with a company that has the know-how to manufacture products similar to ours. While the 3D Cell is a unique concept, our engineering approach has been to design the product with existing equipment, methods and facilities in mind. We lease our facilities, and we are able to pay the University of California at Santa Barbara for the use of its higher-level clean rooms and labs for our initial work in developing our designs and prototypes. These measures keep our capital costs low.

We keep our staff lean, hiring key personnel to do the full-time work and paying experts as consultants to help us with specialized aspects of our development. This keeps our operating costs low, and allows us to use a variety of experts who bring broad experience at a fraction of the cost of hiring them full-time.

By contrast, Solyndra's unique technology attracted a \$535 million loan guarantee from the government to take it commercial. Mistakes and excess in the process were legion:

1. Solyndra's manufacturing strategy required all new machines that had never existed before — making it vastly more expensive to tool up than if the equipment had been proven.

2. A brand new 300,000 square-foot state-of-the-art tech building, complete with whistling robots, was constructed in Silicon Valley, an area with some of the most expensive industrial real estate in the world.
3. During the process of awarding the guarantee, it became clear that things were not going that well at Solyndra — the product was not economically competitive and could not be priced above cost. But the loan was made anyway, on the hope of generating 1,100 jobs.
4. Bonuses were reported to have been paid to executives despite the dismal outcome of the project.

The Department of Energy's loan guarantee to Solyndra was an embarrassing example of the malfunction of the current system. The investment was undoubtedly scrutinized and rejected by the Silicon Valley-based venture capital firms — organizations abundantly more qualified to identify good investments than government committees. There was no urgent strategic need for the U.S. to have Solyndra rush its product to market. The decision to fund Solyndra's attempt to commercialize does not stand up to reason.

However, politics ultimately trumped reason. The bureaucrats awarding the financial aid were beholden to political masters, who had promised Americans that they were going to fix the U.S. economy by creating green jobs — something that could not possibly happen in any timeframe worthy of consideration. The price of the Solyndra failure was borne by the American people.

At Solar3D's current level of development, our company has a much better chance than Solyndra ever did of creating a game-changing technology. We have reached this point based on the free enterprise principles of risk and reward, without the use of government aid. In the end, we will become commercial for less than \$10 million and change the landscape of solar energy. It will be an example of the amazing American economic system at work.

Government has a legitimate role in supporting basic research. ARPA-e, the program which awards small tranches of money for basic research and development in alternative energy, will receive \$250 million in federal funding in 2012 (half the amount lost at Solyndra alone). This program can and should be expanded. Its objective is to fund innovative technologies that will improve the economics of alternative energy — which is ultimately the only path to widespread adoption of renewable power.

The loan guarantee program should be retired permanently. The path to commercialization requires brains, discipline and grit. It is rarely aided, and often impeded, by government involvement. Our government should trust the free market forces that have made America great.

## **Economics Not Policy Will Bring About the Desired Change**

It is ultimately economics, not policy that will drive the widespread, enthusiastic adoption of renewable energy. The most powerful driver in our industry is the relentless reduction of cost and in the next decade the cost of solar projects must be cut even further. Innovation and manufacturing effectiveness that lead to low cost energy production should be the focus of industry strategy.

Government subsidies towards the installation of current solar technology are structurally flawed in that they slow the adoption of innovation that should ultimately make renewable energy more effective. By encouraging consumers to buy immature and inferior solar technology right now, they risk trapping people into inefficient, expensive solar systems that may not return the investment.

Government should abandon subsidies to technologies that do not provide economic means of energy generation. Public money should subsidize potential game-changing technologies that could bring us to grid parity. Any strategy having to do with government subsidies for installations is by definition un-competitive until grid parity is reached.

## **Promote and Support Innovative Technologies**

History shows that new technologies like automobiles or computers are followed by decades of innovative improvement that reduce cost, increase ease of use, and hasten mainstream adoption. After so many years of work, the solar industry can finally see the light at the end of the tunnel approaching grid parity and real economic usefulness. If the industry focuses on pushing key technologies to their logical conclusion, the solar industry will grow by ten fold or more.

## **The United States Must Focus on Global Competitiveness**

U.S. adoption of solar energy currently lags behind several nations, including considerably smaller countries like Spain and Germany. This should not bother us if it means that the other countries are investing in technology that is not economically viable. America is the dominant player in venture capital investments in cleantech, investing 10 times what China invested in 2010 (\$4.9B vs. \$0.48B). The willingness of the private sector to continue its investment clearly shows our leadership in innovation. Furthermore, private sector investment is focused on making money, which means that it is focused on outperforming competition. Government investment in renewable energy should follow suit and focus on subsidizing only those innovations that have a chance to make us more competitive relative to the global community.

Ultimately, our country's investment in renewable power must help us become more globally competitive. Job creation and other ancillary goals associated with

renewable energy growth are worthy objectives but they are byproducts of successful businesses. The most important reason to invest is to get control of and reduce the cost of power generation to our country.

Success in green energy will be achieved by being better at it than anyone else. That means creating a better product at a lower price. This can only be achieved by innovation, not by having government fund commercialization.

America has a long and rich tradition of innovation and is the greatest country in the world at doing it. We are what Steve Chu called “the Cradle of Innovation. Most of it still happens here.” However, as a country, we are not the greatest manufacturer in the world. And in solar technology at least we are far behind China. China is currently responsible for 50% of the worldwide photovoltaic production; the US produces 7%. In this manufacturing sector, China has a dominant position. In order to catch up, it would take many billions of dollars of investment in excess of China’s on going investment. And even then, the structure of its economy gives China a sustainable advantage in manufacturing (at least in the near to medium term), which has led many successful US industries to outsource its manufacturing to China.

There is no shame in partnering with China and other Asian countries in the manufacturing of renewable energy devices. The most valuable company in the world, Apple, manufactures in Asia, but its innovation happens in the US. As a result, though thousands of jobs are created abroad, thousands of jobs are also created in the US. And the profits from the business are primarily realized here. Technology manufacturing is often a low margin business. Innovation is a relatively high margin business. Both businesses create jobs. Unless American manufacturing becomes competitive to the point at which businesses are willing to manufacture here, partnering with Asia should be embraced as a positive way to keep our economy growing, and our products competitive and cost effective throughout the world.

The desire for more jobs and more employment is a political and social desire—not a business desire. Jobs are created by successful businesses—but job creation is a by-product of business success. Businesses are not made successful by more jobs. People get jobs by being in the competitive free enterprise system by preparing themselves to be employed—and being better than other candidates.

Renewable energy businesses must do the same. Our businesses will be successful when we produce the best product for the lowest price—each business should determine if this means that we must manufacture cheaper outside of the US. Providing governments loans to help commercialize businesses in the US bypasses the forces of American capitalism that could give them the competitive discipline to make those businesses successful. Furthermore, giving companies money to set up manufacturing in the US may doom them to failure by financing them into a strategically uncompetitive position.

Ultimately, the US will become the largest consumer of affordable solar energy. It is not universally now affordable, but it will be. Cost will drop dramatically, as the next generation products come forward, and the products supporting the green energy infrastructure continue to reduce their costs. When that happens tens or hundreds of thousands of incremental jobs will be created—but it is a long-term creation. It will not happen as a result of the desire to make our economy recover by riding green energy jobs. It cannot happen in any politically dictated time frame. It will happen in the time it takes to innovate products that will be commercially and economically viable. That happens in Basic Research.

### **Stephen Chu and The Crucial Role of Government Investment**

I agree with and support Stephen Chu's SunShot Initiative. Dr. Chu has challenged the solar industry to reduce the cost of a solar installation to \$1 per watt by 2020. Then he cut red tape and in other ways has tried to streamline the process of giving entrepreneurs access to technology from the patent office and elsewhere to begin the process of commercialization. The SunShot Initiative is an effective approach in focusing industry and public attention. It is positive government leadership. It zeros in on what needs to change—the economics of the industry—by challenging us to reduce solar energy cost by 75%. The widespread, enthusiastic adoption of renewable energy will become a reality only when it is economically viable. With the SunShot Initiative, Dr. Chu and his team are precisely on target with this objective.

Dr. Chu has said that it is innovation that will make America competitive and ultimately great in green energy. That is what we believe as well. It is innovation that is America's differentiating characteristic.

Over the years, America's federal government has expended funds in support of basic research. Much of the technology produced by national laboratories, under government grants at universities, and for the military are national treasures.

The Advanced Research Projects Agency-Energy(ARPA-E) serves basic research for energy, an area in which private funding is not abundantly available because investors are reluctant to accept the technology development risk.

Therefore, in this area government plays a crucial role in the ongoing effort to move the country toward renewable energy. Simply stated, government should be involved in funding the basic research and development for new technologies. However, it should not be involved in the commercialization of such technology.

## Private Investing

My company, Solar3D, is involved in basic research. Thus far it has been funded by private investment from the day we started. We have not taken any federal investment. When we become a commercial product, we do not anticipate using any federal money to do it. We are funded by a group of investors that believes in renewable energy, believes in our management team, and is willing to take a risk on the technology that we are developing.

Though Solar3D has done it, privately funding basic research is difficult because of the technology risk and timeframe involved. There are private investors who have a clear understanding of the importance of green energy and have an excess of capital—and are willing to make the investment. Jeff Henley, the outstanding Chairman of the Board of Oracle for example, just donated \$50MM in expanding engineering research facilities at the University of California at Santa Barbara with a focus on one of the most forward thinking and results oriented industry organizations, the Institute for Energy Efficiency. But there are few Jeff Henleys in the world who are willing to invest in that way. Government has a vested interest in the development of renewable energy technology, and should invest in the basic research that will develop new technology that can revolutionize the economics of the industry.

Once technology is shown to be economically viable, private investment will be available to take that technology commercial. But, the “gap” argument is that one has to begin manufacturing something before you can get to scale where your costs are competitive. Scale is only part of the cost reduction equation and analysts at investment firms simulate cost performance at scale production long before the products were manufactured. Ultimately, to get costs in line, production has to happen, but it does not have to happen for a good project to attract investment money.

The bottom line is that for good projects there is private money available. But just because a technology is interesting and has the hope of becoming commercial does not make it a good project. My friends in the venture capital and private equity industries have expressed the fact that it is difficult to find renewable energy projects that are commercially viable and can be backed with a reasonable hope for a timely return on capital investment.

Figuring that there is a gap between technology development and commercialization, the 1705 loan guarantee program jumps in to try to bridge the gap. This is a very dangerous time in the life of a developing product. Venture capitalists and private investors are scrutinizing these projects. They are among the smartest businessmen in the world and they are thoroughly trained to review and make judgments about the economical viability similar projects. If they reject a project, it is difficult to believe that the government could do a better job of picking a winner—given the relative training. Propping up technologies that are not

commercially viable is not a path to success. When it is done with the hope of saving jobs, it is the worst kind of naïveté.

Government should more fully trust the forces of American Free Enterprise that makes companies tough and disciplined. Those are the types of companies that earn private investment to commercialize their products.

### **A New Approach is Needed:**

Simply stated, there are three stages to introducing new technology into the market:

1. **Innovation.** Universities, government labs and some companies willingly and energetically take the technology risk of exploring new ways of doing things, and work on proving a concept. In this specific situation, we are talking about creating energy.
2. **Go To Market.** When a specific technology has been developed and its concept proven, the focus moves to figuring out the best way to develop a prototype which can be manufactured and sold in the marketplace. This stage is typically funded by angel investors and venture capitalists.
3. **Expansion.** Once a specific technology has reached the market, it needs to be developed into a real, growing product that is both used and useful, thus crossing over into adoption by the public. Venture capitalists and private equity provide investment for growth in these stages.

One of the greatest strengths in America is Innovation. It is a long and rich tradition for the US to lead the world in innovation. Government currently plays a role in providing funds to many companies in the proof-of-concept stage, as well as to national labs and universities developing new technologies. Steps two and three should be left to private investors.

It is time to make a change, and to restructure the government's broken system that currently funds agenda-driven enterprises that have little or no chance of a successful early development stage. The intent of such agenda-driven grants is to create jobs. But when taxpayer money is invested, spent, and lost, the company fails, and the jobs are lost. Government dabbling in investments beyond technology development is competitive with private funding or it involves making investments that private investors wouldn't make—both are bad ideas. Furthermore, it is conceivable in a market where government wants to invest, private investors seek to augment returns by supplementing their investment with government funds. It would be interesting to know how many projects that are currently funded with loan guarantees would be funded privately if loan guarantees did not exist. After technology is proven, good investments should be able to get private funding and

negate the need for government support. Bad investments shouldn't be funded at all.

I suggest the following:

1. Government immediately get out of the loan guarantee program and stop investing in companies at stages beyond technology development.
  - a. Making the decisions to guarantee loans is essentially making an investment decision that government bureaucracies are not equipped to make.
  - b. Bureaucracy's agenda-driven analysts do not have necessary training, proper incentives or appropriate reporting structure to make investment grade decisions.
  
2. ARPA-E should become a public/private partnership, with the mandate to invest in game-changing energy technology research.
  - a. It will be staffed with professionals accustomed to making these types of investments, and qualified to evaluate projects on their economic potential and practicality.
  - b. Government should provide the funding to the entity, but the partnership should be consistent with the long-term strategic plan of the government.
  - c. The partnership should be evaluated on the basis of the success of their investments and investment strategy.
  - d. The professional investors should be told to make the focus of their investing broader than typical venture investing in order to encourage other innovative ideas. Moreover, they should hand off their portfolio entities to private equity as they mature to ensure commercial viability.
  - e. Placed in the right hands this concept could be implemented in the first quarter of 2013.

## James B. Nelson

Mr. James B. Nelson is the CEO of Solar3D, Inc., in Santa Barbara, California, a developer of a 3-dimensional solar cell technology to maximize the conversion of sunlight into electricity.

Mr. Nelson began his executive career 30 years ago at Bain and Company, the premier business strategy consulting firm in the world, where he managed teams of consultants on four continents solving CEO-level programs for global companies. Prior to joining Solar3D, he spent 20 years working in the private equity industry as both a capital partner and operating CEO to portfolio companies. Mr. Nelson was a General Partner at Peterson Partners from 2007 to 2009, and at Millennial Capital Partners from 1991-2010. In addition to his responsibilities in acquisition and divestiture, Mr. Nelson worked as an executive in a number of portfolio companies. He served as CEO of Euro-Tek Store Fixture, LLC, Chairman of the Board of American Retail Interiors, Chairman of the Board and CEO of Panelview Inc. and Chairman of the Board of Critical Power Exchange, as well as serving on numerous boards of companies.

Prior to his years in private equity, Mr. Nelson served as Vice President of Marketing at Banana Republic/The Gap, where he managed company-wide marketing, as well as the initial international expansion of Banana Republic. He was also General Manager for the highly profitable catalog division. He also served as Vice President of Marketing and Corporate Development at Saga Corporation, a multi-billion dollar food service company.

Mr. Nelson received his Masters of Business Administration degree from Brigham Young University, where he graduated Summa Cum Laude and was named the Outstanding MBA Graduate.

Committee on Oversight and Government Reform  
Witness Disclosure Requirement – "Truth in Testimony"  
Required by House Rule XI, Clause 2(g)(5)

Name: JAMES B NELSON

1. Please list any federal grants or contracts (including subgrants or subcontracts) you have received since October 1, 2009. Include the source and amount of each grant or contract.

NONE

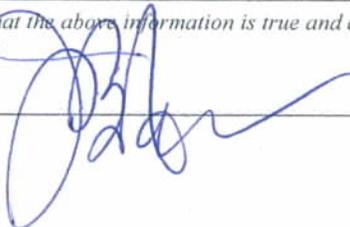
2. Please list any entity you are testifying on behalf of and briefly describe your relationship with these entities.

Solar 3D, Inc.

3. Please list any federal grants or contracts (including subgrants or subcontracts) received since October 1, 2008, by the entity(ies) you listed above. Include the source and amount of each grant or contract.

NONE

I certify that the above information is true and correct.  
Signature:



Date: 5/14/12