MINUTES OF THE
SENATE COMMITTEE ON ENERGY, INFRASTRUCTURE AND TRANSPORTATION

Seventy-fifth Session
March 12, 2009

The Senate Committee on Energy, Infrastructure and Transportation was called to order by Chair Michael A. Schneider at 8:19 a.m. on Thursday, March 12, 2009, in Room 2135 of the Legislative Building, Carson City, Nevada. The meeting was videoconferenced to the Grant Sawyer State Office Building, Room 4412E, 555 East Washington Avenue, Las Vegas, Nevada. Exhibit A is the Agenda. Exhibit B is the Attendance Roster. All exhibits are available and on file in the Research Library of the Legislative Counsel Bureau.

COMMITTEE MEMBERS PRESENT:

Senator Michael A. Schneider, Chair
Senator Maggie Carlton, Vice Chair
Senator John J. Lee
Senator Shirley A. Breeden
Senator Barbara K. Cegavske

COMMITTEE MEMBERS ABSENT:

Senator Randolph Townsend (Excused)
Senator Dennis Nolan (Excused)

STAFF MEMBERS PRESENT:

Scott Young, Committee Policy Analyst
Patricia Devereux, Committee Secretary

OTHERS PRESENT:

Carrie Cullen Hitt, President, The Solar Alliance
Julia Curtis, Director of Government Relations, Solar Energy Solutions Group, Sharp Electronics Corporation
Rose McKinney-James, Managing Principal, Energy Works, LLC
Danny L. Thompson, Nevada State American Federation of Labor-Congress of Industrial Organization
Holly D. Gordon, Vice President, Legislative and Regulatory Affairs, Ausra, Inc.

Mike Auerbach, Executive Director, Division of Earth and Ecosystem Sciences, Desert Research Institute
Jack Woodcock, Concord Blue Tower Energy USA, Inc.
Donnie Garritano, Concord Blue Tower Energy USA, Inc.

CHAIR SCHNEIDER:
There is an editorial in today's *Las Vegas Review-Journal* on how we need to start implementing renewable energy. This is timely in light of today's presentations.

CARRIE CULLEN HITT (President, The Solar Alliance):
The Solar Alliance is a national trade association with 31 members in 12 states. We represent manufacturers, installers, distributors, system integrators, financiers—the whole value stream of the solar industry. Nevada is of particular interest to us because it has all the characteristics of an environment for a good solar market. We have been thinking about the right components needed here and how we can help the State advance that effort. You have a full list of our member companies (Exhibit C), including representatives of four companies here today.

JULIA CURTIS (Director of Government Relations, Solar Energy Solutions Group, Sharp Electronics Corporation):
The Solar Alliance works at the state level with legislative and regulatory bodies to create a framework to help the photovoltaic (PV) industry grow as outlined in our handouts titled "Sun For All" and "The 10 Guiding Principles of Solar Program Design" (Exhibit D and Exhibit E). Nevada is near the bottom of the solar industry list for the United States. Given what a great solar resource Nevada should be, there is an obvious disconnect.

We have more than 31 megawatts (MW) of solar power installed in Nevada, with the largest project being the 14-plus MW SunPower Corporation's installation at Nellis Air Force Base. Suntech Corporation has a project at the Venetian Resort-Hotel-Casino, Las Vegas; and Sharp has done several residential, business, public buildings and school projects throughout the State. Uni-Solar Corporation has installations at several schools, a correctional center and an Indian reservation. First Solar, Inc. did the Nevada Solar One project in Boulder City, and Kyocera Solar, Inc. has done several projects with Bombard Renewable Energy.

Germany is the largest PV market in the world, although there is not a lot of sun there. It is the leader because it has proper incentives and diligent government policies to promote solar, achieve levelized and lower costs, and implement installations in a timely fashion. This technology came from the United States, where we would like to keep it. The only way we can do that is to create an incentive structure and foster job growth.

The Vote Solar Initiative works on a nationwide, grassroots-advocacy level to remove regulatory barriers to bringing solar into the marketplace. We have worked with the Nevada Conservation League and the Sierra Club on the environmental, economic and job-benefit aspects of PV in Nevada.

There is a policy need to bring solar installations online at varying scales: residential, commercial and large utility. Photovoltaic cells are small, square semiconductors made of silicon or thin-film material. Thin-film is less expensive to manufacture but less efficient. Many technological advances have been made in the last couple of years, and as a result, prices have dropped dramatically. There are new, innovative applications that preclude transmission lines, which are hugely problematic in the West. Photovoltaic can get reliable electricity online rapidly. President Barak Obama and U.S. Senator Harry Reid are looking at transmission changes for concentrated solar power plants.

A major application for PV in Nevada is residential, including NV Energy Corporation's SolarGenerations Program, which, regrettably, has a high applicant-dropout rate and limited saturation. There are commercial rooftop installations on the customer and utility sides, but commercial applications in Nevada have been small compared to neighboring states because of unfavorable incentives and economics. Given the intensity of energy needs in Las Vegas, there is a tremendous PV opportunity on its many flat-roof spaces.

Southern Nevada's sunshine and solid economic foundation have enabled PV plants in North America, with the Nellis project and Boulder City's Nevada Solar One known as entities committed to renewable energy. These two projects have taken up the bulk of Nevada's renewable-energy portfolio standard for solar. Nevada needs a wide array of solar applications, from the angle of distributed generation and job creation. The job-creation rate for PV is higher per MW than for any other energy source as outlined in our handout "Creating Solar Jobs in Nevada" (Exhibit F). When discussing energy security and hedging of volatile natural gas prices, PV has straight, up-front costs with no volatility.

The United States is fourth in the world in solar power use. Photovoltaic power is expected to increase 47 percent in the next year, resulting in 6,000 new jobs, 265 MW of energy and more than $2 billion in investments, outlined in "The Solar Bet, Job Creation, Energy Export Revenues, Leveraging Federal Funds" (Exhibit G). Without a strong incentive structure, Nevada will not attract necessary solar manufacturing. While PV provides a wide array of jobs, without long-term market certainty, there will not be manufacturing here.

It has been determined 100 MW of distributed PV would support 1,500 to 3,000 direct jobs and 6,692 to 13,380 indirect or induced jobs in Nevada. These amounts depend on the in-State manufacturing level, long-term market certainty, a serious revision of the renewable-portfolio standard and SolarGenerations, and a commitment from the Legislature and Governor.

Sharp Electronics Corporation does its manufacturing in Tennessee in a union shop. I know that unions are very important in Nevada; not all members of The Solar Alliance are union. It is easier to hire local state labor and keep them trained and certified in place. From a market-certainty and business model, we would like to have steady projects that keep people employed. Photovoltaic offers jobs at all education and salary levels, including technicians, cell designers, engineers, financiers and project managers.

Nevada gets half of its electricity from natural gas, coal and other fossil fuels, and, according to *The Wall Street Journal*, imports 60 percent of its fuel. Photovoltaic requires no purchased fuel to operate, and is a one-time investment that delivers decades of predictable energy pricing. By locking in a percentage of electricity supplied from customer-supplied renewable resources, Nevada can insulate itself against the real risk of future primary-fuel cost run-ups.

Deploying PV and other customer-side generations can mitigate price spikes in peak-demand periods. The prime time for solar is when everyone turns on their air-conditioning. Solar can change the energy-importing equation. Nevada spends more than $6 billion annually on energy from neighboring states. California is pursuing a 33-percent renewable-portfolio standard by 2020. This is a tremendous opportunity for Nevada to become a player with other western states in the renewable-energy credit market because we could export solar power to California to help it achieve that goal.

United States Senator Reid is committed to moving climate-change legislation in a combined omnibus bill with a federal renewable-portfolio standard. Any investment in solar energy will help Nevada meets its carbon-reduction obligations.

Solar grid parity in the United States is expected to be achieved by 2011 to 2015. According to Morgan Stanley, the solar industry will have reduced its costs by 50 percent by 2012. Photovoltaic costs have dropped substantially, particularly in smaller installations, primarily as a result of the reduction in nonmodular costs. This change is attributable to policy changes on the state level and fierce competition between solar developers.

President Obama has strongly committed to a federal renewable-portfolio standard with a 30-percent federal tax credit until 2016. This has created a great interest among utilities to go solar. The federal economic stimulus package will provide a mechanism to overcome the lack of tax liability for large-scale projects, and the investment tax credit has been extended for eight years. We did not foresee the renewables federal-funding freeze, but we are working with the U.S. Department of Energy and the Department of the Treasury on grants and loan mechanisms to unfreeze that capital for large-scale projects. Stimulus package funding for state solar projects includes a manufacturing tax credit.

The stimulus package also provides PV opportunities for residential, schools, prisons and water-treatment plants, plus solar job training and certification. Sharp is training PV installers, and the Nevada State American Federation of Labor-Congress of Industrial Organizations (AFL-ClO) has a job-training site using Sharp PV panels.

Photovoltaic modular prices are half of the system cost, which is expected to fall 30 to 50 percent by 2012. Levelized costs include the cost of fuel, tax subsidies, carbon and capital over the system's lifetime on a price-per-MW basis. This graph shows solar versus other fuels' after-tax investment/return ratio to equity holders. Fixed and variable operation, maintenance and fuel costs for natural gas, coal and nuclear are twice as high as those for solar. Almost all solar products have warranties of 20 to 25 years. Crystal and thin-film solar systems have a much lower capital cost than do traditional fuels and less than 5-percent overhead and maintenance costs.

The Solar Alliance works directly with states on issues of short-term incentives, net-metering, MW-caps removal, interconnection, utility rates and revenue policies, and decoupling. We are working with the Public Utilities Commission of Nevada (PUCN) on these issues. Distributed generation has no transmission costs and can be installed quickly—two to three days for a typical residential system, several weeks for commercial.

If you compare Nevada's renewable-portfolio standards to those of our neighboring states, we need a mature State market to streamline the process and reduce prices. Nevada should increase its renewable-portfolio standard to 30 percent by 2020 and improve the efficiency and capacity of the SolarGenerations rebate program. The 375-MW solar goal will cost Nevada $340 million, with the 10-year average on residential bills at 93 cents. The incentive-level decline per customer would be 8 to 12 percent annually. The percentage of net system costs covered by the 1-year rebate and the electricity savings are 92 percent for residential installations and 118 percent for commercial.

We would recommend as a standard practice that if Nevada uses NV Energy's line-item customer-billing approach, every component of the bill should be itemized so consumers understand the accurate costs of energy: transmission, distribution and public-benefit charges.

SolarGenerations should replace the MW capacity limits with an upper-bound figure of no more than 10 percent of the total maximum electrical demand. Marketing and customer education should be increased. The Nevada Renewable Energy and Energy Conservation Task Force should be given more authority to help tweak SolarGenerations. The 89-percent applications dropout rate for 2008 left $43 billion of unused funds, and there is no reason for this.

SENATOR LEE:
Are you saying that unless we get more federal and State abatements, we will not be able to compete? Unless we mandate a higher percentage of renewable energy, we will never be viable. If we did so, what would be the investment/return ratio?

ROSE MCKINNEY-JAMES (Managing Principal, Energy Works, LLC):
It would appear the emphasis is on incentives, suggesting Nevada solar cannot be viable. We are talking about leveling the playing field because almost every

energy resource in the United States has some sort of subsidy or support. Incentives make sense because Nevada has tremendous solar resources. We are talking about adjusting an existing policy framework to increase and enhance solar. The industry is viable and vibrant in many applications, including the space industry. We are not suggesting incentives are critical in terms of viability; rather, it has more to do with enhancing and strengthening what is already in place.

MS. HITT:
Over time, the costs of solar will dramatically decrease. With or without incentives, between 2012 and 2015, solar will be on a par with any other fuel. This is a timing issue, in terms of establishing a State market. We have economies of scale and installations that make this a market that entities want to join and will benefit the State. Incentives are needed to do that so solar can compete with subsidized fuels.

SENATOR CEGAVSKE:
When I look at the costs of solar installation, the limited application period, waiting to see if you can get on the list and how much up-front money you need to do so, it is fiscally impossible for most people. Could the Committee Policy Analyst put together a chart listing all of the renewable-energy job types, necessary knowledge, length and costs of training, and how many Nevadans already possess those skills? We will only get so much in the stimulus package, and if we have three or four renewable entities requesting those funds, how far will they go?

MS. MCKINNEY-JAMES:
I observed the testimony on SolarGenerations presented to the Committee on February 27 and was impressed by that of Dr. Jason Geddes of the Renewable Energy and Energy Conservation Task Force. We recognize when we have a rebate program and are dealing with technology that is affordable for customers, SolarGenerations will encourage participation. In concert with federal incentives, this makes the cost more viable. We would like to increase the user-friendliness of SolarGenerations and encourage those who have MW capacity to make that investment.

SENATOR CEGAVSKE:
Could you provide us with a detailed explanation of Nevada's solar projects, costs and progress to present to our constituents?

MS. MCKINNEY-JAMES:
Yes. The stimulus package issues are still being developed, but there is specific language about renewables and energy efficiency. We are anticipating how those dollars will be spent, and this Committee is trying to figure out how to allocate them. We have had solid dialogue with NV Energy, interested stakeholders and the Task Force about SolarGenerations, and we will develop specific recommendations for you.

SENATOR CEGAVSKE:
Do all of the solar jobs pay prevailing wage?

MS. CURTIS:
As you can see in Exhibit F, PV will provide a variety of jobs. The Davis-Bacon Act of 1931 prevailing-wage issue is being hotly debated on a federal level. Sharp is committed to union jobs, but not all members of The Solar Alliance are. We want to have long-term, trained workers, and the Nevada AFL-CIO has certified 1,500 PV installers.

SENATOR CEGAVSKE:
There are seven job categories here. If I were a solar lab technician, would I be able to change careers and go to another renewable-energy industry, or is this a specific degree? Does Nevada provide this type of training and degrees to get people into new jobs?

DANNY L. THOMPSON (Nevada State American Federation of Labor-Congress of Industrial Organizations):
The original set-aside was the AFL-CIO's bill, in which we required certified installers. There needed to be a standard because, early on in the industry in California, Pacific Gas and Electric Company workers were hurt while working on a line they thought was dead but actually contained a PV system. In 2003, A.B. No. 431 of the 72nd Session was meant to cover distributed PV on roofs of homes and schools, but now large projects have sucked up all of the capacity.

As a result of A.B. No. 431 of the 72nd Session, we established an apprenticeship program. We installed Sharp panels at our Las Vegas training facility and added a unit in the master-electrician apprenticeship course on PV installation. We included a provision for journeyman upgrades in which master electricians may take a refresher course to get PV-installer certification. In the

beginning, we had to send our trainers to Tennessee for instruction and to buy the curriculum.

SENATOR CEGAVSKE:
Are there other training facilities in the State?

MR. THOMPSON:
It is the only one we have. The largest PV installation in the United States was built at Nellis Air Force Base by graduates of our program. It was not necessarily a prevailing-wage job; the whole idea was to create a distributed program in which an industry was created and drive the cost down so, along with incentives, it became affordable to everyone.

SENATOR CEGAVSKE:
Are all 1,500 of your qualified PV installers working in the field?

MR. THOMPSON:
I do not know. We have the potential to train a lot more students.

SENATOR CEGAVSKE:
If the 1,500 are not working in the field, are they in training?

MR. THOMPSON:
Not necessarily. Apprentice electricians in our program are required to get the PV-installer certification to become a journeyman master electrician. We have been doing everything possible to bring solar manufacturing to Nevada. A California thin-film manufacturer, Nanosolar, Inc., was interested in relocating to North Las Vegas, but changed its mind. Those are the kind of jobs for which we need to provide incentives.

SENATOR LEE:
I built a house with 6-inch walls, extra R-value insulation, double-paned and argon-filled windows, northern exposure, 3-celled blinds and a circulating heat pump. It cost us an extra $10,000 to $12,000. That is the point where we need incentives. Energy-saving measures must be cost-effective, because when I sold the house four years later, I thought, “I’ll never do that again—what a waste of my investment.” I could have invested that money in property, with a greater return. Unless people live in houses X-amount of years, or buy houses

that already have energy-saving measures, it does not make financial sense to do this yet.

MS. HITT:
I did this, too, in a different state at a significant up-front cost. Up-front versus lifetime costs must be considered, and the cost of what is displaced over 5, 10 or 15 years. Traditional-electricity costs are only going to rise over time. Once you make the capital investment in solar, that is it. The price of solar systems and installation are dropping so rapidly, it is very viable. The point at which it can be paid off is also dropping dramatically, maybe seven to nine years, depending on financing. Solar upgrades help to increase homes' values.

There are different financing options for residential and commercial customers. Solar City offers a program in which customers lease the system for 10 or 15 years, at the end of which the homeowner may purchase the remaining value of the system, return it or get a new one. I cannot speak about the cost of the materials for the measures you took, Senator Lee, because construction costs were much higher then.

MS. CURTIS:
Many studies illustrate solar PV systems dramatically increase a home's resale value, whether it is sold soon or later. The 2009 federal investment tax credit lifted the $3,000 credit cap for residential systems, although that is not applicable to the way Nevada's state taxes are structured. Demand for homes with PV has increased.

SENATOR LEE:
I was talking about conservation measures. Maybe PV measures are more viable now.

CHAIR SCHNEIDER:
Committee Policy Analyst Scott Young read an article that said for every dollar a person reduces his power bill, the value of his home increases by $200. Ever since the price of oil skyrocketed, people have been tuned into energy efficiency, and this has impacted homes' values. The only new homes now selling in Reno have solar installations and other energy-efficiency components.

Ms. McKinney-James, what role have feed-in electricity tariffs played in Germany, and why do we not use them here?

MS. CURTIS:
Feed-in tariffs have certainly led the way in Germany and Spain. Gainesville, Florida, just approved a feed-in tariff, and there have been discussions of them in several other states.

SENATOR CARLTON:
What are feed-in tariffs?

MS. CURTIS:
A feed-in tariff is a fixed rate over time so the incentive level and cost for solar is immediately clear. That rate is established by the government. There are many models of how feed-in tariffs can work and be paid for. It has been a productive mechanism to get solar up and running in a short period in Germany and Spain. Given the structure of the United States' varying utilities, it would not be easy to do on the federal level.

MS. HITT:
Under feed-in tariffs, whoever has the solar system does not own the energy; it goes directly to the utility. That is the physical, technical difference. Homeowners are paid a fixed rate over the life of the system—end of story. In the United States, a customer may use the energy on-site and sell all or part of the excess back into the utility system. Germany and Spain have few utility companies, as opposed to the United States' 242 investor-owned utilities and 850 municipal-owner energy cooperatives. A feed-in tariff is a straight subsidy, and is thus easy to influence politically with a sole governing body. Getting the tariff right is a big challenge because you get only one shot at it. Spain overshot that number and had many systems come online very quickly that used up a lot of money. The amount the Spanish government thought it was going to spend was more than expected because the incentive was so high. Here is an example: they set the rate, expecting 300 MW of systems to be built, when in fact 650 MW of systems were built. We can learn from that experience.

CHAIR SCHNEIDER:
Does California pay for the excess generated power? Nevada just gives system owners a credit.

MS. CURTIS:
Yes, California has net metering.

MS. MCKINNEY-JAMES:
Net metering allows customers to remain connected to the grid and generate energy with wind or the sun for residential or commercial purposes. We have had net metering in Nevada since 1997. The fundamental purpose for it was to provide incentives. When you provide excess power to the utility, there should be a monetary benefit. Nevadans do not yet receive that, but utilities do provide a credit.

SENATOR CEGAVSKE:
In California, excess power goes to the utility, which then owes system owners. Why cannot Nevada have a system in which credits go toward paying off the PV system? It is a partnership: customers use the power while the utility helps pay for it.

CHAIR SCHNEIDER:
Ms. Curtis, could you address third-party financing projects? How will that work once the financial markets rebound?

MS. CURTIS:
Third-party financing is critical to developing this industry. Commissioner Rebecca Wagner of the PUCN has proposed this, and The Solar Alliance is giving testimony on the issue. Other states have used third-party financing, but no one can predict exactly when capital markets will unfreeze.

CHAIR SCHNEIDER:
With such a high SolarGenerations dropout rate, should Nevada continue to reduce its rebates? Should the rebates stay higher until more people actually install projects?

MS. CURTIS:
The rebates need to continue, but we should reduce the dropout rate. Rebates are critical for the short-term growth of distributed generation.

CHAIR SCHNEIDER:
We will now hear from Holly Gordon of Ausra, Inc., which opened a manufacturing plant in Las Vegas on June 30, 2008. It represents the kind of renewable-energy manufacturing Nevada needs.

HOLLY D. GORDON (Vice President, Legislative and Regulatory Affairs, Ausra, Inc.):
My presentation concerns the Large-scale Solar Association (LSA) (Exhibit H), of which I am president. The LSA is a new, 11-member trade association and nonpartisan solar-advocacy group supporting market penetration of utility-sale solar technologies through state and regional policy mechanisms (Exhibit I).

We develop policy to build utility-scale PV and solar thermal energy projects. Large-scale project electricity is entered into the grid, not distributed. Members of the LSA have more than 5,000 MW of electricity under contract in the Southwest. Close to half of the LSA companies have right-of-way applications filed on Bureau of Land Management (BLM) land in Nevada.

Ausra builds compact linear Fresnel reflectors, which use the sun's heat, versus PV, which uses sunlight. Parabolic-trough technology was used at the 64-MW Nevada Solar One project. Other LSA members use parabolic dish-sterling engines and power towers. Almost half of LSA's membership produces thin-film or flat-panel PV technologies. Provided to you is a photograph of the flat-panel installation at Nellis Air Force Base (Exhibit J). Large-scale solar thermal is relatively new to the United States' energy market. Solar-electric generating systems were built in southern California with 353 MW in the 1980s and 1990s. Nevada Solar One came online in 2007 with 64 MW.

The Solar Energy Industries Association's 900 members represent solar at the federal level. It covers all aspects of solar, including utility scale, distributed and water heating.

The primary focus of the LSA is regulatory and legislative issues in California, Nevada and Arizona. We are also active in Colorado, New Mexico, Texas and Utah. Our policy foci are reforming and expanding the Southwest's transmission grid, rational and environmentally sound land use, progressive pricing and tax policies, progressive utility-procurement policy (renewable-portfolio standards) and recognition of the societal value and economic benefits of climate-mitigation policies, specifically cap-and-trade programs.

Eighty-five percent of Nevada is BLM land, which is why so many companies are interested in building here. There are right-of-way applications covering several thousand acres, particularly in southwest Nevada. United States

Senator Reid has been instrumental in helping us gain access to Nevada BLM land, and there is stimulus-package money to that end.

Nevada has attractive sales and property tax abatements for large-scale projects. Those abatements expire on June 30, 2009, and we are working to reform and expand them so more projects can be built. We are preparing a comparison of tax incentives in California, Arizona and Nevada.

We are working on California's 33-percent renewable-portfolio standard, a federal renewable portfolio-standard that will be in an energy bill and with The Solar Alliance on its proposed renewable-portfolio standard.

CHAIR SCHNEIDER:
A lot of national attention is being devoted to biofuels. We usually hear about corn ethanol and soybean fuel, but another emerging biofuel technology holds enormous potential for clean fuel from an unlikely source: algae. While all emerging fuels contain some hype, there are predictions algae can produce 5,000 to 10,000 gallons of fuel per acre—versus corn's 30 gallons per acre and soybeans' 50 gallons per acre. Algae eat carbon dioxide (CO2) and clean the environment. They thrive in dirty water, and warm water, of which we have a lot in northern Nevada's geothermal areas. Algae can provide animal and human food.

MIKE AUERBACH (Executive Director, Division of Earth and Ecosystem Sciences, Desert Research Institute):
I will discuss ongoing biofuels programs at Desert Research Institute (DRI). Renewable-energy has never been a large part of DRI's research portfolio. You have a spreadsheet on our renewables research over the last two biennia (Exhibit K). We have done research in solar, wind, geothermal, hydrogen fuel cells, renewables-workforce development and biofuels.

We have three ongoing biofuels projects and two more we hope to get online soon with the signing of the omnibus spending bill. The Gridley Biofuels Project is being conducted with the Renewable Energy Institute International, which develops fuel stocks. We are investigating the thermal and chemical conversion of various forms of lignocelluloses—plant-derived materials—into fuel. This involves wood chips and, most important, rice straw, because Gridley is the heart of the California rice-growing region. Rice straw can be a feed stock to

produce synthetic natural gas (syngas) and be converted into ethanol-fueled heat and electricity.

There is a demonstrative analytical component of this project that involves collecting samples from a private thermo-conversions plant in Denver to assay the quality of the syngas, value of feed stocks as biofuels, fine-particulate matter in the syngas and composition of two large ash and wastewater streams emanating from the industrial operation. This plant reflects two areas of DRI's specific technical expertise: understanding and assessing fuel-preparation techniques and detailed analyses of wanted and unwanted byproducts of biofuel-conversion waste residue.

The second project is in conjunction with the not-for-profit Gas Technology Institute, which does fuels and fuel-conversion research; the University of Nevada, Reno, and other partners. We are looking at how different pretreatment of plant materials and their handling might improve energy conversion. The goal is to quantify the emissions from fuel, feed stocks and different hydrothermal pretreatments. We will construct a small, mobile conversion plant in northern Nevada to demonstrate these processes' value. Remote-sensing and geographic information system researchers are assessing biofuels resource availability in northern Nevada and northern California.

Professor Kent Hoekman is conducting a literature review, sponsored by the not-for-profit Coordinating Research Council, which examines auto fuels issues. He will look at biofuels as potential feed stocks for ultra-low-sulfur diesel fuels and its production techniques, composition, emissions issues, fuel performance and life-cycle costs.

There is funding in the recently signed omnibus bill for two new DRI projects. Desert Research Institute has wanted to start an algal-based renewable-energy project, which the Universities of Nevada at Reno and Las Vegas are already pursuing. The U.S. Department of Energy has been very interested since the mid-1980s in algae as an oils source; some species are 50-percent lipid by weight. Most algae want to grow in very warm water, so energy must be added to the growing medium, which disrupts the net-energy balance. Geothermal waste heat is being eyed by DRI as a potential source of free hot water for an algae culture medium.

We have maintained our own stocks of algal species for several years. Wastewater can also be used as a culture medium, instead of fertilizer or other energy-derived components. The potential production per acre of algae is unbelievable; some species can produce 50 times more energy than do crops grown in soil. Challenges are maintaining the algal streams, light input, nutrient input and growth temperatures. However, we think combining geothermal and wastewater is an interesting niche to explore, and we seem to be exciting potential sponsors in that regard. We hope to have an ongoing project within two months.

Most algal species need copious amounts of CO2, and ponds can be a novel source of C02 sequestration. Placing ponds near a smokestack of a fossil-fuel plant might be a very viable scenario. Distillation of biofuels produces a tremendous amount of undesirable glycerin. We think we have a novel use of glycerin that could resolve another environmental problem.

The omnibus bill includes funding for the Nevada Renewable Energy and Integration and Development Consortium of the State's three research universities and some community colleges. It will attempt to bring ongoing renewable-energy researchers together and coordinate efforts in applied research, development, demonstration, deployment, commercialization and job training. The effort is to move ideas to the marketplace and train people to install and maintain renewable-energy equipment and resources. Desert Research Institute will manage and coordinate the enterprise.

CHAIR SCHNEIDER:
How often do you harvest algae? I have been told it is harvested constantly because it grows so quickly.

SENATOR CEGAVSKE:
Our concentration this Session is to create jobs to help our economy. Are jobs created by renewable energy only research-based? What kind of education do workers need?

MR. AUERBACH:
Paralleling the biofuels research and other ongoing renewable-energy projects at Nevada universities, we have just completed a three-year U.S. Department of Labor-sponsored workforce development grant. Truckee Meadows Community

College is the lead agency. It involves the college developing an associate of arts degree curriculum in renewable-energy technology.

SENATOR CEGAVSKE:
Of what would that consist? What are the qualifications and educational requirements? Is it a two-year degree?

MR. AUERBACH:
The college is working on a two-year degree with placement into the workforce. They have hiring commitments from NV Energy, and DRI will provide internships and externships in its laboratories. I suspect most of these students would want to go on to more applied education.

SENATOR CEGAVSKE:
Are we just starting to put this together? Will it be at least two years before we have qualified workers?

MR. AUERBACH:
Yes.

CHAIR SCHNEIDER:
Do you see much potential for cellulosic as a spinoff of the algae?

MR. AUERBACH:
Like plant matter in general, algae can be 33- to 50-percent cellulose by content. The form and matrix of the cellulose creates the challenge of how much energy can be derived from it. There is great interest in improving cellulosic enzyme systems. I do not know how the energy content of the particular cellulose content in most algae strains compares to wood chips or switchgrass.

CHAIR SCHNEIDER:
Our final presentation is from Concord Blue Tower Energy USA, another exciting area of biomass energy production. Municipal waste can be recycled into energy. Left to decompose, municipal waste produces methane, one of the most potent greenhouse gases—21 times more so than CO2. Eliminating methane in a useful way is extremely important. Public landfills are getting full, so we need to reduce waste through conservation and recycling and use waste in productive ways.

I need to disclose that I am a longtime friend of testifier Jack Woodcock, and he was my brother's business partner.

SENATOR CARLTON:
I need to disclose that Tony Valenti is a friend of mine.

SENATOR CEGAVSKE:
I need to disclose that Jack Woodcock is a friend of mine.

JACK WOODCOCK (Concord Blue Tower Energy USA, Inc.):
We will show a movie that gives an overview of our product. In our PowerPoint presentation, you will see this is a new approach to an old technology: gasification (Exhibit L, original is on file in the Research Library). With me today are commercial landscaper Donnie Garritano and Tony Valenti, owner of First Choice Tree Service. Mr. Valenti has a contract with the U.S. Forest Service to harvest Mount Charleston's beetle-infested trees. Someone like him will be dealing with the same situation at Lake Tahoe.

The woody biomass created by that endeavor can be disposed of in the "Blue Tower." It is an ideal solution because it can be set up in a remote location then fired up with natural or propane gas before it becomes self-perpetuating by producing syngas or electricity. With a single-feed stock approach, the Tower is well suited for remote locations, although the application is usually a multiple-feed stock technology.

Concord Blue Tower has the worldwide patent for this technology, and is looking to quickly roll it out in the United States. Mr. Garritano and I just returned from India, where we witnessed a Tower test facility in operation. We intend to bring the assembly and distribution to Nevada to introduce it in the United States. We fully intend to create quite a number of jobs here.

The Blue Tower waste-to-energy solution can be for anyone who wants to create a business plan, has the feed stock and has a use for the ultimate output—bio char or syngas—to create electricity. Customers could be municipalities dealing with an existing landfill or needing a new approach to get rid of waste. Old, decomposing landfill is not quite as good as a Blue Tower fuel source, but mixed with new landfill and woody biomass, it can create as much fuel as new landfill. Las Vegas has a pig farm in the center of what has become

a residential area. A Blue Tower near the farm could use the accumulated manure to create electricity.

This is a turnkey solution that produces zero emissions, has no harmful effects and operates at atmospheric pressure with no explosion potential. It can be operated in a residential area.

As far as the actual process, the feed stock enters a vessel where pyrolization takes place then steam is introduced into the reformer and "Blue Gas" is created. Blue Gas is 50-percent nitrogen, and a chemical transition improves its hydrogen output. A plant being installed in Turkey will use sugar beet waste to output only hydrogen.

About 20-percent char is generated in the process, and it has a biofuel component. The char may be sold for $120 to $300 a ton to the agricultural industry. We are entering into a contract with the City of Hopewell, Virginia, which produces barley for ethanol. That waste will go into the Blue Tower to produce enough electricity to run the entire ethanol plant.

The secret to the gasification process is keeping the heat transfer consistent throughout the entire procedure. Blue Gas heats ceramic balls to 950 to 1,000 degrees Centigrade, and as the balls move through the Tower, the char is kept to a consistent level. Plastics are an ideal fuel source because they produce the highest amount of syngas. Syngas has 25 to 28 percent of the value of natural gas, and can be easily introduced into nitro gas and mixed with natural gas to create a more efficient burn.

The Blue Tower is cheaper to use without a wide variety of feed stocks. Sewage sludge will be one of the popular feed stocks. The Clark County Department of Sanitation will agree to have a Blue Tower installed next to their sewage-processing facility. The sludge has about 70-percent moisture content. The heat generated in the Tower could dry that to about 20-percent moisture, which makes it an ideal feed stock, especially mixed with woody biomass.

Any agriculture biomass works extremely well. The Tower would alleviate the paint-disposal problem. The char of hazardous waste may need to be reprocessed to become fertilizer. Syngas may be used in high-powered, electricity-generating motors. Hydrogen fuel has many industrial and manufacturing applications, and is being looked at for fuel-cell technology.

Once activated, the Blue Tower is self-perpetuating, generating enough on-site electricity for its own use and to send directly to the grid. Bio char is a sequestered carbon that increases the carbon credits derived from a renewable source.

Blue Gas emissions are less than those of a small car. The water extracted from the biomass can be reused. Heat-producing hot water can both heat and cool other water. The ash can be used for soil amendment, road construction and cement. There is virtually no dust emitted because the entire process is contained in a bunker next to the Tower. Trucks deliver the waste, out of which is separated the metal, glass and rocks, which can all be recycled. The rest is ground up to about two centimeters in diameter to be fed into the system.

The Blue Tower is environmentally friendly, and has the highest input-to-output ratio of any fuel: 1 ton of input can create 1.4 MW of power. A 15-MW Blue Tower plant requires a 40- by 40-square-foot footprint and 20,000 square feet of adjacent warehouse space, for a total site of 2.5 acres.

The Blue Tower is a sustainable, fully automated system with a low operating cost and high profitability. The return on investment, subject to the feed-stock type, is 3.5 to 5 years, typically about 4 years. We envision scaling Towers up from 1 MW to 4 MW to 16 MW.

The Blue Tower fulfills all federal Environmental Protection Agency emissions regulations. Carbon dioxide emissions are less than those of a car. The only emissions are from the motors that produce the electricity. No organic pollutants are decomposed in the process, and practically no components of the product gas are emitted. A plant can process 40,000 tons of input annually, and the output would be 15 MW, with 5 MW of actual net electric output, for a total of 40 million kilowatts.

The cost associated with a kilowatt of energy will be 4 to 6 cents. The Clark County Water Reclamation District suggests it might pay 10 cents per kilowatt-hour for Blue Tower electricity. We have not yet begun discussions with NV Energy. We can deliver a plant in 8 to 15 months, with a performance guarantee based on an analysis of the feed stock and on the use of the output. Productivity will be based on 7,500 hours annually, running 24 hours a day with minimal downtime and maintenance costs.

SENATOR CEGAVSKE:
What kind of jobs would this create, and with what requirements? Can cow manure be used in the Tower?

MR. WOODCOCK:
A 16-MW plant will employ 6 to 7 people: 2 engineer-types, 2 or 3 semi-skilled workers and 2 or 3 unskilled laborers to handle the input. A 24-hour operation would require 50 percent more workers. The number of assembly and distribution staff is subject to the number of orders received. We have a model employing 75 to 100 people for Tower assembly.

We are in contact with the Cattlemen's Association of Texas. There are feedlots throughout Texas, Oklahoma and other parts of the country with serious manure-disposal problems. Feedlots can be used to produce very rich syngas, and the bio char could be used as fertilizer.

DONNIE GARRITANO (Concord Blue Tower Energy USA, Inc.):
New Mexico dairy farmers have contacted us because they do not have enough acres on which to spread and compost manure. Blue Tower bio char closely resembles the amendment from their composting operation. Dairymen could process their biomass to create the energy needed for their industry and then have leftover char to fertilize their farms.

SENATOR CEGAVSKE:
Are workers with degrees and this specialized knowledge readily available in Nevada?

MR. WOODCOCK:
We hope to train people here. We just went through a training process ourselves to better understand the technology. We met our engineering and training partners, who are willing to come to the Nevada and take applications. If someone purchases a Tower and wants to run it himself, we will provide the training. Our business plan is, we will run the plant, with a nominal royalty associated with the output.

SENATOR CEGAVSKE:
Senator Carlton and I had a meeting with fire personnel about controlled burning of wildfire-fuel trees in the Lake Tahoe area. She explained to me how that waste could be used in your Tower, instead of just burning it.

MR. WOODCOCK:
The smaller plants are portable and need just a 20-square-foot poured foundation for the 40- to 60-foot-high Tower.

SENATOR CEGAVSKE:
You could be portable, but stationary would be better.

MR. WOODCOCK:
Yes, as long as there was a sustainable feed stock, Towers could be permanently installed.

SENATOR CEGAVSKE:
One of my constituents' major complaints is about whether recyclables are really reused. Your company provides an answer to this.

SENATOR CARLTON:
Senator Cegavske, thinking about Lake Tahoe, Mount Potosi, Mount Charleston and other wildfire fuels-thinning jobs, the issue is not just the jobs the Tower would provide. We get a long-term benefit from the labor of people clearing the mountains because one of these days, a fire is going to come over the rim. If the Blue Tower could help solve that problem, let us support it.

MR. WOODCOCK:
We are hoping to ensure the permitting process does not get held up. Nevada is more attractive than California because we do not have quite the same environmental concerns. We will approach two or three southern Nevada municipalities with our statistics early on in the permitting process.

We will have a demonstration plant running in 90 days in that region. People can send us two or three bushels of waste, and we will process it and give them a bottle of the resulting gas and a bag of char so they can analyze it in any way to determine the Tower's feasibility. This is a novel approach, but since we are dealing with the uncertainties of new technology, we want to reinforce it with a Nevada demonstration facility.

CHAIR SCHNEIDER:
Is anyone looking at the crushed grapes and vineyard trimmings produced by California's Wine Country? There must be tens of thousands of cubic yards of trimmings every year.

MR. WOODCOCK:
We have looked at that; there is certainly a great disposal need. That could be a place where a Blue Tower could be easily incorporated.

CHAIR SCHNEIDER:
The City of San Diego is investing in Tijuana to prevent sewage overflow onto area beaches. Would you look at selling your product there and in Mexico?

MR. WOODCOCK:
Yes, anywhere around the world, although our current emphasis is on the United States. We have had a great deal of interest from Canada and Mexico. We recently attended the Renewable Energy Technology Conference and Exhibition (RETECH) in Las Vegas, and generated a lot of interest. Between that and the demonstration, we anticipate a great many orders. We would like to open further dialogue with DRI, and Dr. Hoekman has expressed an interest in talking to us. An association with him and Mr. Auerbach would add credibility to our project.

MR. THOMPSON:
Necessity is the mother of invention. I represent the men who collect garbage and drive the trucks to haul it. I am interested in biomass because those men have huge numbers of injuries and workers' compensation claims. Southern Nevada does not recycle anything. The Apex Regional Landfill receives 9,000 tons a day, and it is constantly building a landfill. The other, huge southern Nevada landfill is full, is a mess, is the subject of a lawsuit and has a $32,000 price tag to fix its leaks. The national International Brotherhood of Teamsters is interested in cutting-edge biomass processes. Garbage should be included in the renewable-portfolio standard as biomass because there are many opportunities being missed. Recycling is important because the more pure the waste stream, the better it works. Los Angeles provides 3, 90-gallon totes into which residents sort their recycling. The garbage company has a machine that picks up the totes; men do not have to break their backs doing so. Trash pickup requires the same number of workers, but by doing away with the injuries, the company saves money.

In the 74th Session, Senator Townsend put an amendment on a bill that required a pilot recycling program in southern Nevada related to energy production from waste. The garbage company did that at Nellis Air Force Base, giving customers 90-gallon totes for garbage and recycling to be picked up

weekly. We need to do more to encourage recycling in our metropolitan areas to achieve zero-emissions landfills before being hit with federal mandates to do so.

CHAIR SCHNEIDER:
Mr. Woodcock said you can add new material to old waste in a Blue Tower and reprocess it into energy. If the old Las Vegas landfill put in a Tower and kept accepting new waste to mix with the old, the $32 million cleanup would be unnecessary.

MR. WOODCOCK:
There is a tipping fee of $17 to $19 a ton to load waste onto a truck for transport to Apex Regional Landfill. The garbage is 70-percent water and emitting noxious fumes. We have had discussions with the City of Reno landfill, which is privately owned.

MR. THOMPSON:
The national Teamsters Union Research Department has looked at these technologies, and we recommend the processing be done at the transfer point, not the landfill. The company saves money by not having to pay extra transportation fees if a recycling mandate is coupled with some type of gasification technology at the transfer point.

CHAIR SCHNEIDER:
That would also eliminate the large carbon footprint of big garbage trucks.

MR. WOODCOCK:
We hope there will be State funding for further research and development of the Blue Tower. We are here more for the educational aspect, but we hope we can secure funding to roll it out.

CHAIR SCHNEIDER:
Mr. Thompson, you often go to Washington, D.C., and have the ear of U.S. Senator Reid. Maybe you could work with Mr. Woodcock on an amendment for everything we discussed today, and we can look at adding it to the portfolio standard and making recycling mandatory.

MR. THOMPSON:
When the Las Vegas disposal company tried to implement community-based recycling, they were beaten to death by the newspapers for saying it would only

pick up garbage once a week. Once recyclables are removed from garbage, a very small amount can be kept in an airtight tote. The garbage company proposed giving residents free totes—currently, they pay a fee for them—in exchange for separating the recyclables, because it costs the company to sort them out.

CHAIR SCHNEIDER:
The public would be more receptive if it knew waste was being fully processed and the landfill eliminated.

If there is no further business to come before the Senate Committee on Energy, Infrastructure and Transportation, I adjourn this hearing at 11:11 a.m.

RESPECTFULLY SUBMITTED:

_____
Patricia Devereux,
Committee Secretary

APPROVED BY:

_____
Senator Michael A. Schneider, Chair

DATE: _____