MINUTES OF THE
SENATE COMMITTEE ON ENERGY, INFRASTRUCTURE AND TRANSPORTATION

Seventy-fifth Session
February 5, 2009

The Senate Committee on Energy, Infrastructure and Transportation was called to order by Chair Michael A. Schneider at 8:09 a.m. on Thursday, February 5, 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 Randolph Townsend
Senator Barbara K. Cegavske
Senator Dennis Nolan

STAFF MEMBERS PRESENT:

Matt Nichols, Committee Counsel
Scott Young, Committee Policy Analyst
Josh Martinmaas, Committee Secretary

OTHERS PRESENT:

Dr. Lisa Shevenell, Director, Great Basin Center for Geothermal Energy, University of Nevada, Reno
Dr. Robert Boehm, P.E., Director, Center for Energy Research, University of Nevada, Las Vegas
Ian Rogoff, Chairman, Nevada Institute for Renewable Energy Commercialization
Mike Hess, CEO, Mariah Power
Ray Bacon, Nevada Manufacturers Association

CHAIR SCHNEIDER:
Today's presentations are designed to highlight renewable-energy research programs at Nevada's higher education facilities. They are also intended to provide the Committee with the latest information on two of Nevada's most abundant renewable resources, geothermal and solar. Additionally, we will hear information on how the developments at the educational institutions can be commercialized for the benefit of Nevada's consumers and economy. All of our speakers today have distinguished careers in their respective fields.

There are currently 300 megawatts of installed geothermal capacity in the State. This represents approximately a $1 billion investment. There are 300 megawatts which produce approximately $6 million in tax revenues through property, mine, and business and use taxes. The pay scale for geothermal jobs is about $65,000 per year. A study released in September 2005 by the Geothermal Energy Association indicated that developing an additional 1,500 megawatts of geothermal energy in Nevada would result in nearly 6,400 new, full-time jobs spread across manufacturing, construction and power plants. For all these economic reasons, as well as environmental ones, we are interested in geothermal and what our institutions of higher education are doing to help develop these resources. Dr. Lisa Shevenell will elaborate on some of these topics.

DR. LISA SHEVENELL (Director, Great Basin Center for Geothermal Energy, University of Nevada, Reno):
I made this outline, "Geothermal in Nevada" (Exhibit C, original is on file in the Research Library), to highlight the geothermal work we are doing at the University of Nevada, Reno (UNR). It will cover a little bit of background, some achievements, new technologies we are developing and how we are assisting Nevada to increase the use and deployment of geothermal as related to commercialization. In the latter case, we do not have actual products; we are helping industry commercialize the actual resource. Finally, I will describe some of the education programs.

Simply speaking, geothermal needs high temperatures underground, permeability in the rock and fluid for systems to work. Where you have water to rock heat transfer is where the geothermal reservoir exists. In any system where geothermal is used, a series of wells are drilled; the water is pumped up; it is used and then the water is injected down into the reservoir some distance away

so it can reheat as it flows back to the reservoir. Reinjection is key and what makes the resource renewable.

On page 5 of Exhibit C is an outline of the Great Basin. Heat is created in this area by extension of the earth's crust. This is known because of our research done by Dr. Geoffrey Blewitt using global position satellites to measure movements on the ground with accuracies down to a millimeter. Red areas are higher extension; many of these areas are in Churchill County. Extensions do a few things. One is they open faults allowing fluid to flow through them. They also create the physiography that we look at; create permeability; and thin the earth's crust which brings this part of the country closer to the heat source within the mantle.

Page 7 of Exhibit C shows Nevada's known warm and hot springs and wells. Power plants are in triangles. This map shows there are a lot of known geothermal resources. Not all geothermal resources have springs at the surface, we are looking for ones that are hidden and concealed. We have had good luck finding these.

Next is a review of the Great Basin Center for Geothermal Energy. We initially received funding through a bill introduced by U.S. Senator Harry Reid in 2002 that stipulated $1 million for the UNR Geothermal Energy Center. Our Board of Regents sanctioned in that same year. From 2002 to 2006, we were receiving earmarks put through by U.S. Senator Reid, along with various other grants. In 2007, the U.S. Department of Energy (DOE) program we used dropped to $5 million for the entire country. We did some competitive proposals and received some money. We also did some work for the Pyramid Lake Paiute Tribe and used leftover money from previous years. In 2008, there was no money available from DOE for the type of work we do. With no DOE funding, we are starting to get funding from industry which will change the character of how we operate.

Our mission is to work in partnership with United States industry to establish geothermal energy as a sustainable, environmentally sound, economically competitive contributor to energy supplies. We have many main tasks. We conduct peer-reviewed research where we solicit proposals from UNR and Desert Research Institute (DRI) researchers. We select which proposals get funding through a panel of industry experts who are chaired by me. One area that has increased dramatically in the last year and a half is answering questions

from the industry, media and public. Geothermal is finally starting to get noticed by the public. We also conduct workshops for outreach purposes and for sharing our research results. We also develop, update and maintain databases along with a Website so we can freely share information.

Some past achievements include producing geothermal potential maps. We are working on finding undiscovered resources; determining why Nevada is so richly endowed with geothermal systems; locating blind systems, those without hot springs at the surface; and we are bringing new systems to the attention of the industry that is developing the properties. When we find a new property, we put out a press release. The industry then nominates it for lease at the Bureau of Land Management's (BLM) auctions before finally purchasing the leases.

Page 13, Exhibit C, shows a geothermal potential map for the Great Basin area. This area was developed based on using a series of geological and geophysical data sets and computer models with a geographic information system. This was one of the first potential studies done in over 20 years. Geographic information systems were a new tool at this time that had not been used in the past. From these maps we have had requests from city and county officials, U.S. Senator Reid and the Division of Minerals for a variety of different derivative maps. One such map is of White Pine County where they were proposing to put in wilderness areas. These are the large tracts of land highlighted in red on page 14, Exhibit C. They wanted to know if this was going to be impinging on any geothermal potential. From the information so far, it does not look like it would remove any high-prospect areas. The converse can be said about Churchill County. On page 15, Exhibit C, you can see a lot of yellows, oranges and even some reds within that county.

Some of the new technologies we have developed include: shallow temperature surveys, in which the industry is very interested; a variety of both satellite and airborne remote sensing; and while geological mapping is not a new technology, we have found new fault configurations which will likely significantly reduce the up-front costs of drilling.

In the picture on page 17, Exhibit C, we see a very simple system used to collect temperatures. A two-man team goes around and, depending on the hardness of the ground, puts about 30, 2-meter rods into the ground. They are then able to detect geothermal anomalies based on the temperatures.

The map on page 18, Exhibit C, is the result of a study at a place called Desert Queen. These individual dots are geothermal gradient holes drilled in the 1970s. They typically cost between $10,000 and $50,000 and the drilling program would last over several months. We returned to the same area with the shallow temperature surveys and in a week, and for probably under $30,000 including the cost of the equipment, were able to better define the anomaly with many more points. This can be seen on page 19, Exhibit C. This has attracted the interest of industry, and they have been contracting with us to do different sites. Some have even gone ahead and purchased their own equipment so they can do these surveys. You can get many points, inexpensively, with greater detail than in the past.

There are a lot of sites that do not have hot springs but have other indicators. Vegetation anomalies, shallow temperature anomalies, salt crusts and opalized sand are all indicators. Page 20, Exhibit C, shows an example at Salt Wells, which was long considered a blind system but now that we looked more carefully, it is not. One way used to evaluate these sites rapidly is by either airborne- or satellite-remote sensing. Pages 21 and 22, Exhibit C, show an example near Brady's Hot Springs Power Plant. Page 23, Exhibit C, is an example of a regional remote-sensing study done at Teels Marsh in Mineral County. The little blue marks are borate deposits, which are typical of geothermal systems. When they followed that, they did a temperature survey and it was nominated for BLM leasing.

Dr. James Faulds has been doing geologic mapping at several geothermal systems throughout the State and he is finding various configurations for getting promising, productive geothermal systems. Examples can be seen on page 24, Exhibit C. For instance, if you have a fault that suddenly steps over, it tends to be pulled apart and have greater permeability. He is finding a number of different features that will help us locate systems and improve the drilling success rate. When they first start doing production wells, they are on the order of $5 million to $10 million. A low drilling success rate can make it hard to get financing. There are other configurations he has come up with on page 25, Exhibit C, along with some of the sites.

One example of a blind system is at Blue Mountain. It was found during exploration drilling for gold mining. Components have since begun coming in for a power plant. There are many sites left to be discovered. We are seeing many

new discoveries even though geothermal exploration is just starting again after 15 years.

Page 27, Exhibit C, shows some of the new discoveries we have found. Some of the different techniques we used included geology, geophysical, temperature surveys or in the case of Blue Mountain, talking with the gold exploration companies. The locations in red were leased after the nomination process in 2007 and 2008. They have generated $7.5 million in revenue; 75 percent of which stays in Nevada. As more of these are leased, more revenue will be coming in along with royalty payments once the sites become productive.

In terms of workforce, there is a serious shortage of trained workers at all levels and disciplines as the industry booms. I receive constant calls and hear about people stealing other people's workers. One mission we have at the Geothermal Center is an educational mission. We have been training graduate students throughout the course of our research projects. We have also implemented an interdisciplinary renewable energy minor degree. Its class load is among a variety of colleges with the intent of having a person in one major being required to take classes from another. If I was to get this minor degree, I would be required to take a class in policy or economics so I would have an appreciation for the rest of the industry. As part of this minor, "Introduction to Renewable Energy" has been taught twice with about 40 students each time. Right now, "Fundamentals and Economics of Renewable and Nonrenewable" is being taught and has 17 students. This sampling of courses on page 31, Exhibit C, shows the interdisciplinary track of the minor. The students who take some of these courses are geoscience and engineering graduate students working on research projects. The renewable energy minor is for undergraduate students from four or more colleges. We are also working with Truckee Meadows Community College on technician training for power plant operators. The focus for the students taking these classes will be more local, such as at the local power plants, as well as international. I am mentioning international focus because we have had discussions with both the U.S. State Department and the Clinton Foundation about getting fellowships funded for international students to come to these institutions for training. In particular, people from Ethiopia have approached us. I also have a proposal in to the National Renewable Energy Laboratory (NREL) right now so we can do some curriculum development.

We are also forming a consortium of universities to have a national geothermal training center. It would be housed in Reno at the Redfield Campus which is adjacent to the Steamboat power plants. It would include people from Cornell, Massachusetts Institute of Technology, Stanford, University of Utah, Southern Methodist University and Oregon Institute of Technology. The University of Nevada, Reno will be the lead and the host institution. We are looking to have it as an eight-week summer course where experts from each of the participating institutions teach a one-week module for course credit. It would have a national and international focus like the other courses discussed.

Students who have completed these courses can work at geothermal exploration companies and power plant developers or operators, but there is considerable competition with the mining and petroleum industries. About one-third of the graduate students we have graduated with geothermal training have gone to the petroleum industry because they can make a lot of money. We are working with industry to not only establish internship programs but fellowships as well to attract graduate students.

We are helping the use of geothermal in Nevada in a number of ways. We are helping to deploy new technologies, locating new resources that are put up for lease and ultimately generate revenue for Nevada. We are helping find and understand systems that industry is putting into commercial production. We are educating the next generation of geothermal practitioners.

There are a variety of benefits to geothermal development that can be seen on page 35, Exhibit C. It helps diversify the economy and create jobs, particularly in rural Nevada. We are providing a clean, reliable and renewable base load of power that operates 24 hours a day, 7 days a week. With solar power and others, we could potentially be a net exporter of power. With the systems we know of and know enough about, geothermal could meet the current renewable portfolio standard by itself.

The boom in geothermal exploration and development has started. As far as the future, everything is going into enhanced geothermal systems (EGS). We are moving towards getting more funding from industry, but it is going to restrict our ability to freely and openly share information due to confidentiality considerations. Some money is still coming from the government. We are putting a contract in place with the Navy to do work at Hawthorne and Fallon. Perhaps with the new administration, DOE will expand beyond EGS and we will

be able to obtain additional funding. In any event, we need some sort of sustained, dependable public funding to ensure we are able to operate freely and to post information.

There are two types of engineered systems. Hot dry rock was in the 1970s and 1980s. This is an end member of EGS. Enhanced geothermal systems can be anything from trying to make some fractures under a well near a producing area that did not have very good permeability, to building your own geothermal system. An example of the first method can be seen on page 39, Exhibit C. The technology is to drill a couple of wells, fracture the rock, pump water down and then circulate it around. This method was used to politically sell the idea of geothermal, if drilled deeply enough, it could be used anywhere in the country. The research being worked on is to figure out how to estimate where the fracture will go and then, since this would be deep, to figure out how to keep them open. This type of work is where the DOE funding has been going the last couple years.

Other promising research at UNR deals with using hydrogen for cars and can be seen on page 40, Exhibit C. One issue with hydrogen is compressing it so it is more usable. One area being studied is thermal compression using geothermal power. If conventional power is used, we are not gaining a lot because it takes so much energy to compress it. It must be using renewable power. Another study on page 41 looks at increased efficiency in both heat transfer and condensers. There are two types of power plants. One uses the water directly to flash into steam and turn the turbine; they are typically higher temperature systems. Other systems use lower geothermal temperatures and use a heat exchanger to exchange the heat to a secondary fluid that is used to boil. If we could increase these efficiencies, we could go to even lower temperatures. In either case, condensers are needed to condense the fluid so it can either be reinjected into the reservoir or reused as a secondary fluid again.

Page 42, Exhibit C, is a scale from 40 degrees Celsius to 700 degrees Celsius. It illustrates the different geothermal uses for the different temperatures. Nevada and our whole Country are seriously underutilizing the direct-use potential of geothermal. This use could offset power by quite a bit. One example of this type of use can be seen in Elko where the district heats schools. Another includes a vegetable dehydration plant.

SENATOR TOWNSEND:
You talked about education and employment, which is critical to the debate. How do we translate these two topics into real dollar amounts? This will be important for the Senate Committee on Finance so they can understand how important the relationship between financial investments in interdisciplinary education is to students receiving marketable degrees based on market demand. There are three types of investment here. One is through the federal government, in this case the stimulus package of perhaps one-time money; our own investment from Nevada; and then through the private sector. An actual number would help us better translate the importance of this issue relative to the integration of investment in our higher education system. Do we have a similar overlay for solar at the University of Nevada, Las Vegas (UNLV)?

DR. SHEVENELL:
I would have to get back to you with a dollar amount. Right now we are operating on a small budget. When you combine that with the potential for budget cuts, it is really frightening. Most of our money has been coming from commitments from industry to pay for things like fellowships. This grant of development curriculum, if we can keep the staff in place, has interest from faculty.

SENATOR TOWNSEND:
Interdisciplinary programs are important for students. There is immense value in today's market for interdisciplinary programs. When you sit with your colleagues and the deans, we would like to know how to save these programs, the solar one in the south and the geothermal one in the north, and then what it would take to enhance it to meet demand in the marketplace. This would involve two different approaches. One would be state funding and the other would be private sector funding. We know there is a lot of pressure on the universities based on these cuts, and no one wants to speak outside of the Board of Regents or the chancellor, but we hope you can bring some numbers to help us. While we are a policy committee, these numbers help us go to the Finance Committee and promote these programs.

SENATOR CARLTON:
Can you tell me anything about the long–term environmental effects geothermal has? Have there been any studies?

DR. SHEVENELL:
I do not know if there have been specific studies, but you could just visit some of these sites. They have a footprint of the power plant itself and the pipelines. It is not a large footprint like you would get with a big solar facility. As far as discharge, most of the power plants going up in the future are going to be zero discharge; they are going to be closed loop. They are also making them quieter, and, in the example of the Steamboat Geothermal Power Plants, they are difficult to see because of the way they paint them. They are fairly benign.

SENATOR CARLTON:
I ask because I know they have been there a while so we can learn from experience. The neighbors around them know what type of impact they have on the area.

DR. SHEVENELL:
When Steamboat first went into operation, the residents complained about the sulfur smell from some of the discharge. But now, what is routinely done at any power plant is they have scrubbers.

SENATOR CARLTON:
Would you be the one to talk to about their construction and the jobs created?

DR. SHEVENELL:
I could not tell you about the exact numbers and construction of them.

SENATOR CARLTON:
There are a lot of locations where these can be put. What effect do multiple plants have on each other if you do a closed-loop system? Will they be effective if they are drawing from the same reservoir?

DR. SHEVENELL:
That is definitely something to be avoided. Steamboat is another good example because the power plant reinjects fluid and the expanded power plant is down below. It is much better now because it is now under one operator. Before, when it was under two operators it was not good because everybody claimed to not be impacting the other when they really were. Under such circumstances, the resource can be properly managed. Most of the sites we have looked at so far are not huge. They are fault controlled and contained. You can go to other areas and you will not get any hydrologic connection. We would be looking at

10 to 15 megawatt power plants, not huge developments like in The Geysers which makes 1000 megawatts. I do not see any of the systems in Nevada being like that. There will be a lot of fairly small ones.

SENATOR CARLTON:
I heard the word royalty payments. Could you elaborate?

DR. SHEVENELL:
I know a little bit about what is collected. Right now, with the existing power plants and not the new ones coming on, you are collecting around $200,000 per month in royalties. It was mentioned about 300 megawatts are permitted right now; we are poised to double what is out there.

SENATOR CEGAVSKE:
In the *Stanford News* is an article titled, "Stanford launches $100 million initiative to tackle energy issues." One comment that stuck out to me said, "Universities such as Stanford need to focus their full talent on the greatest challenges facing the world today." They are investing $100 million into the energy issue. Texas bonded for their energy resources. The energy companies that came in paid off the bonds as part of the agreements. I would like us to look at this and get more information. How many different companies are there for geothermal power? Are most of the companies doing the investing coming from other countries?

DR. SHEVENELL:
About half of the bigger ones are from other countries. There have been a lot of new startups in the last couple of years. About 12 to 15 companies are in various stages focusing on geothermal.

SENATOR CEGAVSKE:
We also need to focus on job creation, especially in these times. We must ask what we are doing with Nevada's university system to help start job creation. We also have to examine how we are bringing energy companies into the State to help us look at new energy sources. I was disappointed in the number of students involved in these programs. We need to make serious commitments to research and professors. We need to focus more on what we need in Nevada.

SENATOR LEE:
While everyone wants to put geothermal plants in places where we can get the most production, and the environmental groups agree this is the cleanest way to produce power, the same people do not want us to build the transmission lines to the plants. Whether it is the National Environmental Policy Act standards or environmental concerns from both groups, we will have problems. Could you address this?

DR. SHEVENELL:
I understand there is a Renewable Energy Tracking and Certificates committee that has been working on transmission issues and where they are actually needed. They have not gotten to the point of addressing these environmental concerns. This is news to me and I find it disappointing. You need transmission lines because most of these sites are in rural areas.

SENATOR TOWNSEND:
To give some perspective for southern Nevada where we want solar power, our geothermal plants are small and would have distribution costs that tie into expensive transmission investments. We need to work on solar development in southern Nevada. Private sector development has gone into geothermal in the north, and based on the rising costs of oil, coal and natural gas, as a commodity, geothermal is about on par with coal. The more geothermal we produce, the greater chance we have of bringing it into the system for the benefit of Nevada. Once it is developed, there is no cost to the commodity as we go forward. It is the same with solar.

We have to make investments at the universities and find the right incentives to bring in solar and technology developers. They go hand in hand, and are usually tied around a high intellectual capacity at the university system. We need to bring solar to the competitive point where customers do not have to make choices. We have geothermal to the point where it is competitive, now we want the great potential of solar. We benefit from geothermal in the north, but since we are not interconnected yet, we have not been able to wheel that power to southern Nevada. I hope we can put out a policy statement from this Committee and put into statute about where we drive these things for the benefit of 65 to 70 percent of our citizens. It is possible; let us take the next step. We want to drive solar cost down so the customer understands, “Wow, we have some other alternative here.”

CHAIR SCHNEIDER:
We will be successful with this. In Nevada, we get 250-plus days of sunshine a year. The Nevada Test Site gets over 310 days a year. We have the highest per-capita solar energy consumption in the nation; that is great. We have a 64 megawatt solar thermal plant in Boulder City that is the world's third largest, and a 10 megawatt thin-film El Dorado energy solar facility which is the largest in the United States that was just completed in 2008. We also have the 14 megawatt Nellis Air Force Base solar photovoltaic (PV) station which is the second largest in the world, the 3.1 megawatt Las Vegas Springs solar PV station installed by the local water authority, and the 2 megawatts of residential, business and public building PV installations. On June 30, 2008, Ausra Inc. opened a 130,000 square foot solar concentrating manufacturing plant in Las Vegas and employs 25 people with a capacity to produce 700 megawatt products. We have to do our part to lead the nation with all this.

DR. ROBERT BOEHM (Director, Center for Energy Research at the University of Nevada, Las Vegas):
We also have a two-track minor in renewable energy that students in any major can take. It is either technical or nontechnical, depending on the student's major, but both tracks require the same core classes. We also typically have between 30 to 35 students affiliated with our center and they range from undergraduate to graduate students. We do different things in our educational purview, but today I was going to show a cross section of the projects we are doing with solar energy.

One nice thing about solar compared to geothermal energy is that our resource is well known. It does not matter where it falls and does not, when it falls and does not fall. We are working on this issue with thermal storage. Solar can be used for both power generation and building applications, and we are working in both areas. In the past, some solar power systems tended to be expensive, but the good news is prices are coming down.

I came to Nevada in 1990 thinking this area would be an ideal place for solar power. When I arrived, there were a few pool heaters on the tops of buildings and a few remote systems for power, but not a lot of solar power usage. This is changing now, as we have a tremendous resource in Nevada. On page 3, "Renewable Energy Work at the UNLV CER" (Exhibit D, original is on file in the Research Library), you can see the red bull's-eye in the southern part of Nevada. It is one of the best solar resources in the world. The solar here also has a nice

beam component that allows more use than diffused light. Places like Portland, Oregon, can have solar use, but it is primarily diffused radiation. Our solar energy allows concentration into higher-temperature applications.

The NREL put out an illustration a few years ago that showed a region, approximately 100 miles on its side, in the central part of Nevada. If the sun's rays could be caught in that area, using existing technologies at that time, you could furnish all of the United States' electricity requirements. This is a very big resource. Since that time, the efficiencies of PV cells have been going up. This means any given area of solar cells will now harvest more energy. Commensurate with that is prices have been coming down fairly substantially. Page 7, Exhibit D, shows a little hiccup the last four or five years. Germany was buying virtually every solar panel that was made in the world. The manufacturers have now caught up and prices are going down again. This is good news; efficiency is going up and price is going down.

The projects in this presentation will give a cross section of the work occurring across the nation but particularly in our center. All these projects are externally funded. The majority of the funding is from federal sources, typically DOE or the NREL. We are totally soft-money funded. I am about the only person in the center who receives state funding, and my state money is from full-time teaching. Most of the projects you will see here are performed by graduate students, with some by undergraduate students. I had a student a few years ago who had eight technical publications as an undergraduate. We do have good students coming into this area. Virtually all of our projects have industrial or other types of partners.

One project early on was making a solar unit for the Nevada Test Site. They are out on the Test Site sampling air quality year-round. Originally they were expensive units and hard to move. We designed one that did the same job, was less expensive, and could be moved by one or two people. One of our early projects in hydrogen was a bus we converted from just electric to electric-hydrogen and was a precursor for further hydrogen work. We also had two dish stirling systems on campus. We were working on these in conjunction with companies and some federal funding. One of the units was converted to a concentrating PV system through joint work with "SIAC." We intend to refurbish this unit and use it for more work.

The Acciona Solar Power Plant in El Dorado Valley also used our assistance. We did preliminary evaluations of their trough units. We have also done work with a builder in our area. On page 14, Exhibit D, you can see a project we started with Pinnacle Homes about 4 years ago. We were given the use of one of the houses to develop into a zero-energy house. This means over a year period the house would generate as much electricity as it used. The builder was kind enough to lend us a companion house which was the base-case house. The two houses had the exact same footprint. They look a little different because the builder rotated the roof on the zero-energy house to give us a better southern exposure. Otherwise these houses are exactly the same. The next page shows the PV shakes as well as a solar water heater. We are still monitoring the data. We have a Website that we do for most of our projects, where you can see how well these systems are performing.

Another project dealt with hybrid solar lighting. We have also worked a lot with Amonix on concentrating PVs. Nevada Power has also collaborated with us. They have three of the units in southeastern Las Vegas. We maintain and monitor those systems. We also have a hydrogen production station with the Las Vegas Valley Water District. Page 20, Exhibit D, shows the solar-driven hydrogen filling station. It uses water and power from the PV unit. In all of these cases, our students are very active in working with the companies that install the systems.

We have also converted some vehicles from either gasoline or electric to hydrogen. The two vehicles on page 22, Exhibit D, have been converted for use at the Las Vegas Spring Preserve. We are currently finishing the conversion of an internal combustion engine vehicle for running on hydrogen that uses direct cylinder injection of hydrogen. A more advanced hydrogen generation system is shown on the next page. This is a more fundamental project. It is a combination of PV cells with an electrolysis unit. The four windows are where the hydrogen is being generated. This may make hydrogen cell cost only slightly more than PV cells. In the other system at the Water District, we have a whole barrage of PVs cells as well as a separate piece of equipment to generate hydrogen, this puts it all in one package. If we are successful with this, it could be a big cost breakthrough.

Our Center does not do much with wind. Nevada, in general, does not have high wind resources, although we are seeing some developments happening. We have helped out Beatty on a project to set up some wind monitors. They

received some federal money to look at renewable applications for the Nye County area. We have two in place now where we are monitoring data and a third site we are hoping to put in.

We also worked with the National Park Service and two other federal agencies within the U.S. Department of the Interior to try to make all of their southern Nevada electric needs utilize green power. To help with this, we assessed their current needs and examined locations where the PV field could be placed. We tried to give them some preliminary cost estimates. We have also done a fairly large concentrating solar power assessment for the southwest with a particular emphasis on Nevada. This was funded by the NREL. We looked at a number of factors including grid availability, what the utility perspective was in our local area, political aspects and what the state might be projected to do.

We have looked at the technical issues of dry cooling for non-PV type solar plants. The Acciona Plant in Boulder City uses water as a cooling medium, but there are dry cooling approaches that can be used. We were looking at ways that might be improved. Right now it puts a little bit of a performance negative on the plant when dry cooling is used, but it is definitely something for the future. We are also working with JX Crystals on low concentration PV. The product would replace the expensive solar cells with cheap lenses. The other PV concentration systems I have shown have 500 times concentration of sunlight. With these systems, sunlight over an area about a foot square concentrates onto a PV cell smaller than your fingernail. The other end of the spectrum can be seen on pages 28 and 29, Exhibit D. Instead of 500 times concentration it is 3 times concentration. On the lower right of page 29 are little valleys of aluminum. They concentrate and reflect the sun's rays onto PV cells. This gives a low-cost approach to power. You can get three times the power from any given solar cell with this kind of arrangement.

I want to finish my presentation with two building projects. The first one is funded by NV Energy. We are subcontractors with Pulte Homes to NV Energy on this. The attempt is to quantify the costs of taking production homes towards zero energy. The previous zero-energy house was used for the builder to learn about new technology. It was not for demonstrating the lowest cost. We were showing it could be done in a production home. We are now looking at Pulte's building costs on different options and seeing how we trade off energy conservation in homes with costs. The further you move along the energy conservation curve, the more expensive it gets. The alternative is to put PVs on

homes, but that is also expensive. There is a point where increased conservation on the home is traded off with the PVs used; this would be your minimum least cost for zero-energy operation. We estimate the initial cost versus the energy saved. This could be the basis for a rebate program from NV Energy to builders. The hope is that it will show a positive payback for the production and save more energy.

A big project funded by DOE focuses on the reduction of peak electrical demand. In Las Vegas, we pay a uniform rate for power around 10 to 12 cents a kilowatt-hour, although it could cost NV Energy between $1 to $10 during peak daytime hours. If our housing developments require less peak energy, we can get around this high cost. We intend to accomplish this goal by using energy conserving designs, PV panels on houses and working with the utility to have direct communication between the utility and homeowner so the homeowner knows the price of power. The utility would communicate to the homeowner, "Okay, here is the cost of power," and you as a homeowner would have an option of shedding load to have your least power price. This would be done by an automatic system. In idealized form, there would be a dial to help save as much as possible on electricity, or allow everything to run the whole time. The homeowner could pick a selection and it would influence their utility bill. Also, at the substation level at the Summerlin development, we could have storage batteries if other things fail in bringing down peak consumption from at least 65 percent from a code-built development, we could have some storage battery output. We would charge this at night away from peak needs. We told DOE we would diminish consumption by at least 65 percent; we think it is going to be more like 85 percent based on some preliminary numbers. This is happening at a new development by Pulte called Villa Trieste. The homes have all received the Leadership in Energy and Environmental Design (LEED) platinum rating which is the highest rating. Pulte even provides a written guarantee on how much energy the houses will use. On page 32, Exhibit D you can see the PV on the roof, it is similar to the type of system we had in the earlier PV house with the PV shake shingles. They blend in well; other than the color, they look like the roofing material.

We have a couple different future hopes and plans. Our main goal is to stimulate the solar business in Nevada. We are trying to graduate students who can work in this business, do research that will be of use to the solar industry, work very close to the marketplace and help new products into the marketplace sooner at lower costs and with better performance. We will continue to do research with

external funding for education purposes, paving the way for new products. We want to develop a business product incubator and work with the business community in trying to further their needs with the technical expertise and laboratory equipment we have available. We would also like to develop a major experimental capability. We have 35 acres of land next to the Acciona Plant in the Boulder City area we would like to use for a full-scale commercial product evaluation facility. We would like someone like the DOE to help us with it over the long term. Right now a lot of the solar systems make claims about how well they perform, but there is no central agency like the U.S. Food and Drug Administration that verifies performance.

SENATOR CEGAVSKE:
Did the builders absorb the costs when they worked with you?

DR. BOEHM:
In both housing-related projects there were some rebates from Nevada Power's Solar Generation Program used that helped supplement their cost-benefit ratio.

SENATOR CEGAVSKE:
Nevada Power had some rebates and the builder had their own money?

DR. BOEHM:
Yes.

SENATOR CEGAVSKE:
What did you supply?

DR. BOEHM:
We used federal funds to supply designs that went beyond the normal house, furnished all of the instrumentation and we also helped with the design of houses in trying to come up with the least-cost approach.

SENATOR CEGAVSKE:
As a result of this work, will UNLV profit when the house is sold?

DR. BOEHM:
No.

SENATOR CEGAVSKE:
Have you done work with private residents who want to make the necessary investment to use solar? Is there any funding available? I have heard there are federal dollars that help this type of research.

DR. BOEHM:
We have applied for everything that fits our needs, for the last few years there has not been a lot. The project with NV Energy and Pulte Homes was a big DOE offering where it was for peak-demand reduction, but by doing that we facilitated other research such as PV installation. Federal tax credits have recently been increased.

SENATOR CEGAVSKE:
Are the funds for private use?

DR. BOEHM:
Yes, but we do not do design for private use. There are companies like Bombard Electric active throughout the State that do private work. We will collaborate with them if we are needed.

SENATOR CEGAVSKE:
Could an individual apply if they wanted to in Nevada? Someone in California told me they had converted their home completely, swimming pool and everything, and their first bill was $5.

DR. BOEHM:
We have several people who get the minimum bill of $8, a metering charge.

SENATOR LEE:
Do you foresee a future when we will not need redundant power? Where, in the example of the National Park Service, would it just be solar?

DR. BOEHM:
Yes, but for now that is not plausible. It is best to be tied to the grid for large systems and use it as a battery for the exchange of power.

SENATOR LEE:
Do you see a day where you can wheel energy back onto the grid to make money but not have to live off of it?

DR. BOEHM:
Not even be tied to the grid?

SENATOR LEE:
Not tied to a generator or anything.

DR. BOEHM:
Yes, it is possible. There are houses now on Mount Charleston that operate completely off the grid. Some use propane, but others rely on solar power entirely.

SENATOR TOWNSEND:
We are trying to figure out what investment we can make to enhance what you are doing. We want to know the kinds of students and the demand from the private sector for students graduating in interdisciplinary areas. We need to know what it would take to fully fund these projects, whether that is your engineering department, renewable department or some other department. If you work with your colleague, we could figure out a way to target some initial funding that could make a difference. There are private-sector investment opportunities if we give them the right kind of public support. You know that better than anyone because of your long history. We want to be helpful where we can. This is an opportunity, and based on a lot of the members on this Committee, we want to help where we can. We may have a steep hill to climb in educating our colleagues in the Finance Committee, but we will help you with your support.

DR. BOEHM:
That is good to hear.

SENATOR TOWNSEND:
The important part of this presentation is the peak-power problem. We have a base load in southern Nevada around 2,500 to 2,600 megawatts. In August a couple years ago, because of heat and humidity, the highest use was about 6,100 megawatts. That gap between the base load and the peak requires the utility to buy short-, medium- and long-term contracts. After the contract prices, the utility is buying spot market prices between $1 to $10 and the customers get killed. When you are talking about intelligent design, the ability of the consumer to manage their own home or office usage is important. Chairman Wellinghoff of the Federal Energy Regulatory Commission will be here

and show us some products available so you can decide your energy consumption in your home without doing a lot of things; for example, to turn the dishwasher on at 6 p.m. or wait until 6 a.m. We need to help the public understand these products are available. It is crucial to success. What you and Dr. Shevenell are doing is crucial to national security and the economic success of this State.

CHAIR SCHNEIDER:
On the Pulte home, the solar shakes did not cover the whole roof; was that a cost consideration? Could they have covered the entire side of the roof and generated more electricity?

DR. BOEHM:
Yes, but it does add to the cost of the house. If you can decrease load, which those houses have done, you do not need as much PV. With a PV panel that size, at its present cost, it is a good investment. If it gets bigger, it is less of a good investment. As the cost of PV decreases, we will see bigger arrays that cover more of the total bill of the house.

CHAIR SCHNEIDER:
Another critical component of developing renewable-energy resources is translating the research and development done at our universities into practical applications. Last Session, through efforts of Senator Raggio and Senator Townsend, the Legislature authorized funding for the Nevada Institute for Renewable Energy Commercialization (NIREC). This morning we have Ian Rogoff to explain the role of NIREC. He is the cofounder and general partner at Sierra Nevada Partners, an investment management company established to buy and grow sustainable businesses located in the western United States.

IAN ROGOFF (Chairman, Nevada Institute for Renewable Energy Commercialization):
The Nevada Institute for Renewable Energy Commercialization is a public-private partnership and an Internal Tax Revenue Code section 501(c)(3) firm. Our specific charter is to combine promising renewable-energy technology with the talent, resources, market-savvy orientation and the financing capabilities of the private sector to accelerate the maturation and widespread deployment of renewable energy solutions. I have prepared a presentation to help illustrate my testimony, "Nevada Institute for Renewable Energy Commercialization" (Exhibit E, original is on file in the Research Library). The differentiation of

NIREC is threefold: 1. We do not do basic research. The previous speakers do basic research and apply some of it. We only do applied research. We have a completely market-based approach. 2. We do not accept research unless it has a market pull to it. Unless we can demonstrate some market viability to the research, either through our partnerships in the public sector or the corporate sector, we do not initiate work on the technology. 3. We have an end-to-end solution methodology.

Our approach is to integrate researchers, experienced entrepreneurs, business executives and venture capital to fund viable, cost-effective renewable energy solutions. We have four capabilities within NIREC. One is a commercialization capability. If you have a benchtop prototype, we are going to see how it works in the real world. If that is a wind turbine, we will see how it operates in real wind conditions and not just in a wind tunnel. If you have a PV system, we will see what it looks like at different temperatures. We will see how it characterizes, how we can mature it and then manufacture it in volume at a profit if we turn the technology into a company.

We have business functions. When people come to us with the technology, they really have nothing more than technology. We align them with marketing functions, business development functions, financial functions and we put together the business plan with them so they can obtain venture capital. Most of the time, we see a technology plan. We attempt to align their technology plan with our business capabilities to make it palatable and fundable. Based on our access to the private sector, we have funding vehicles. These could be angel groups or federal agencies like DOE or the National Security Agency, but also venture capital communities and private-equity groups. Finally, we would like to get to the point, although we are not there today, where we do demonstrations and some level of outreach.

A lot people ask why NIREC even exists. Unfortunately, there are significant barriers in the commercialization of clean-energy technology. One is ambiguous research directions. Most researchers' research directions follow what the next grant looks like. When they make their request for the next grant, it may or may not be the direction they want to take their research. Often, commercialization is not a direction they want or plan to go. As a result, a lot of technologies get trapped in labs. By specifically funding commercialization, we encourage them in that direction. Commercialization is a knowledge to take something from a

benchtop prototype and make a company out of it using a set of skills and know-how not easily acquired at a university or national lab.

Renewable energy has long maturation and characterization periods as well. Often, if the technology is developed in the private sector, there is short-term return on investment constraints so we partner with corporations. It is difficult for researchers to display their abilities and attract an experienced management team. Then it is a challenge to get the team to work with that researcher.

One important, underappreciated factor is incumbent technologies and fiscal regimes. Renewable energy is described like a moon shot when it is not. It would be like a moon shot if all the various airlines flying around the country were already flying to the moon. We have a very efficient competing technology. The power density of petroleum is phenomenal, it is not by accident that we have been using it for 150 years. Replacing it with innovation and the application of innovation has taken a long time and will continue to take some incubation.

Why do commercialization accelerators work in certain industries? They work because the industry has barriers to entry, incumbent fiscal regimes and existing environments. We try to synthesize the promising research with business skills and experience. When do they work? We are trying to learn from the biotech industry and some industries in electronics where incubators and accelerators have worked.

An example of one company we have helped is Mariah Power. When I first met the inventors, their business plan was about three and a half pages and the entire description had to do with the performance of the rotor as it existed in a wind tunnel. They wanted to know if we would fund them. At the time I was representing the Sierra Angels, a private-equity funding organization. Mariah Power was not fundable by a private-equity group. They had not modeled the market or looked at the internal rate of return (IRR) available to the investors. They did not know if their technology would scale, and they did not know how it would perform in the real world. There was a lot of work to be done to characterize and mature the technology and build a business plan.

We assigned an entrepreneur in residence (EIR) to Mariah Power. An EIR is an experienced, savvy entrepreneur who has previous experience and work on the staff at NIREC. We assigned an EIR from the community prior to being funded at

NIREC. His name was Mike Hess and had worked with the company for three months. He decided to become the CEO. He will tell you what it was like in Nevada to take this company all the way from incubation with a guy with a Ph.D. and a marketing guy with nothing more than a picture of a device and a garage where they had the parts. It became a company with numerous employees and a manufacturing line. He has over 3,000 orders for the device from all over the world. This is an example of how these technologies get incubated, how they start out and how we bring them forward. Without the assistance of organizations like NIREC, the state and the federal government, these types of technologies cannot become established because they cannot compete in the early days. As they get more mature, they can compete. On page 6, Exhibit E, there is a picture of the Mariah wind turbine at the United States Capital.

Our organization, NIREC, has a technology and commercialization advisory board that is chosen from members of the community based upon their various disciplines and experience. The board evaluates the responses to our requests for proposals. We might issue a generalized request for proposal, or a specific one. These requests for proposals can come from our research partners at UNLV, DRI, Sierra Nevada College, UNR or the University of California, Davis, as well as private companies if they have a worthwhile technology. Our next request for proposal will probably be in the storage sector for solid-state batteries with the storage of renewables.

When we pick the proposal, we look to establish the intellectual property rights so they are stable. The next milestone is additional funding. If the researcher wants to publish the work, that is also something we do, although that is not a priority. Our goal is to deliver a package, after they work with us, that consists of an investor presentation, business plan and financial projections. We do that because we know the technology is now ready to be commercialized. Our key success factors can be seen on page 10, Exhibit E, but principally for us is a strong collaboration with the Nevada System of Higher Education (NSHE), the institutions in NSHE and the community around us.

Page 11 outlines the “Project Outcomes.” We look for the consumer pain point, provide an opportunity to solve that problem, articulate the solution, provide the benefit and evaluate the competition and market opportunity. We decide on a go-no-go strategy. If we decide not to continue, a private investor is free to try to raise money elsewhere, but it is easier if our support is with them. They are

very motivated once they receive research and commercialization funding to meet the next milestone. We have a product review in a couple weeks for the projects we have currently funded. Some of those funded projects are on the next page.

I will now shift to economic development. Small companies make jobs and there is competition for these small companies in the United States. Seventy percent of net new jobs in the past 15 years have been created by businesses less than 5 years old. Clean energy is a high-tech business with significant job creation potential. There is a range of fields addressed by renewable energy. You start with the basics of material science, chemistry and biology, but you can also go to business functions like finance and marketing. The finance aspect of renewable energy is all about project and equity financing. The skill set there is astonishing. We need to build that capability in Reno, Carson City and Las Vegas. Most of the folks doing the finance and marketing work are from the Bay area or the other principal money centers.

Management is another field. We have an extraordinary ability in Nevada to attract management with the right companies. Green companies cause excitement. I was gratified to see the Committee appreciate the educational opportunities at our research institutions. When you see the skills for renewable energy, it is not just installation jobs, there is a lot of science, math and business functions involved in this industry and it is all innovation based.

Next is a chart of what Colorado, Missouri and Minnesota are doing in this difficult economic environment to attract jobs. The chart shows the budget cuts and the economic development proposals. These are just three examples of aggressive programs to attract jobs in renewable energy. Similar programs are in numerous other states. States see this as an opportunity and a growth strategy. The incubation of these companies is going to spawn additional companies and create an industry sector in these states. You should review what the other states are doing. If this Committee would like to explore economic development proposals, I would be eager to help and participate.

“The Economic Impact” shows the corporate piece of creating jobs in companies, and then creating jobs around certain projects. Sometimes we think too much about the project jobs of installation, transmission and distribution. There is a lot of potential for these in our State with the resources we have, but I urge you to also think about the corporate jobs. The small, medium and large

companies attracting those jobs are the base of the industry. If we have the corporate jobs, we can export technologies to different states and countries.

The principal value of NIREC is job creation. Nothing we do in the sanitized deployment of these technologies is interesting if we do not create jobs. The gap between technology commercialization in universities and large corporations with short-term deliverables is addressed by NIREC. We are trying to bring the research and development out of the university system and create jobs around it. Job creation results from the influx of technology from the universities and national labs as you accelerate that technology into the marketplace.

SENATOR NOLAN:
Your exhibit does not give a good snapshot of how Nevada stacks up nationally or regionally with regard to benefits, opportunities and incentives we offer to these types of businesses. How do we stack up to other states in your experience?

MR. ROGOFF:
I do not do consulting, but I will say that on a level playing field Nevada does pretty well, but it is not level right now. We do well in core market conditions but it is not core market conditions winning right now. Incentives placed into the market are winning. There are incentives everywhere for demand reduction, generation, building or technology. We are very aware of the incentive impacts.

SENATOR NOLAN:
This message needs to be delivered to the Finance Committee because there are two schools of thought for dealing with this budget crisis. One is to provide businesses more incentives so they do what you are talking about to incorporate here, thrive and provide jobs. The other philosophy is tax a little more to help offset this financial burden and perhaps still see them thrive.

SENATOR LEE:
Is this the only sector you work in?

MR. ROGOFF:
Correct.

SENATOR LEE:
So you manage, and then you go the angels. What is the IRR you are hoping to produce for those people?

MR. ROGOFF:
We are a nonprofit organization, so we have no IRR. We are looking for sustainable funding; we are a public-private partnership. We receive funding by state and federal agencies plus private companies. The companies themselves retain their intellectual property, then get funded. Their shareholders are the ones that benefit, we do not.

SENATOR LEE:
Do you take them to the initial public offering though?

MR. ROGOFF:
No. We try to take them to the next milestone which is fundable. That milestone for us is typically an angel round, with some angel investors separate from us; we might be an angel investor, but this round is separate from NIREC.

SENATOR CEGAVSKE:
I am most interested in job creation and training. It has been said the university system is behind the times for job creation in Nevada. They need to get onboard and start looking at the future and see what the research professors are doing and where the resources are being spent on teaching. We should look at these ideas immediately. How long would it take to get a workforce if we bring these businesses into our State? We might be pulling qualified people from out of state when we need jobs for people in Nevada. Can you give me a timeline about how long it takes to train somebody in the renewable energy sector?

MR. ROGOFF:
There are many different disciplines. The level of education to develop the new enzymes and strains of biofuels requires years to acquire that skill and develop networks for funding. The more development of centers of excellence around things like algae, the more the area will get a tremendous impact. Those kinds of technologies encourage additional researchers to attract additional funding. Our relationship with DRI and their technology has been rich and fruitful. The university should not be discounted for the progress they have made. The minor in renewable energy that was developed about 12 to 18 months ago is a remarkable achievement, it was done quickly and it is getting a lot of interest

from students. The general enrollment across the country in engineering disciplines is down in a number of disciplines but up in renewable energy. I could not give you a timeline where you will be but there are promising signs. What we are doing in the State as a result of foresight has put renewables at a baseline of interest and momentum. We are not trying to start it at NIREC, we are encouraging and continuing it.

CHAIR SCHNEIDER:
You mentioned that NIREC wants to do demonstration and outreach, but is not doing so right now. What would that be?

MR. ROGOFF:
The level of familiarity with renewable energy is remarkable since it is not exposed in any depth. What you see in the media tends to be panels on a roof or somebody working on a transmission line. But when you realize the level of skills involved in bringing a renewable-energy economy forward, it is remarkable. It is an opportunity to enhance our workforce, bring in higher paying jobs and to give our research and teaching institutions significant growth. Our outreach would be to communicate the value in transferring our energy consumption and generation from a resource-based economy to an innovation-based economy.

CHAIR SCHNEIDER:
Wind is another major renewable resource for Nevada. There are several proposed projects currently under consideration that have been in the news recently. One is a 270-megawatt project near Searchlight, another is an 85-megawatt project in northern Nevada northeast of Reno and a third is near Carson City for 192 megawatts.

Last Session, we enacted S.B. No. 437 of the 74th Session, which established a wind-power demonstration project modeled after our successful solar-generation program. This wind program is for smaller units for houses, ranches, business, schools and other public buildings. In its first year, it has 103 applicants for a total of 648 kilowatts.

MIKE HESS (CEO, Mariah Power):
Three years ago three of us, not receiving paychecks, started Mariah Power. Last November, we raised our first funding from venture capitalists. We now have 15 paid employees; 8 of those people came from Reno, Nevada; 4 of

those people have relocated mostly from Silicon Valley and 3 are on remote processes because their skill set is so hard to find I do not want to force them to move.

On the first page of "Mariah Power" (Exhibit F) is a unit we have at the United States Botanical Gardens in Washington, D.C. The unit consists of a bottom pole, rotor, generator and inverter. Our unit has the lowest cost in the world. We produce electricity in this unit at 11 cents per kilowatt-hour. That is cheaper than NV Energy. The next unit, which is bigger, will produce at 8.5 cents per kilowatt-hour. We are wind-driven power though, so we are variable. We need support like the grid or battery systems.

Pages three through six highlight some of the places our units have been or will be. This includes the Public Utility Building in San Francisco that will be built in 2010, a zero-emissions waterbus station in Dubai, the Adobe Building in San Jose where our units highlight and add to their LEED rating, and the Detroit International Auto Show where we were asked to provide recharging capabilities from both Ford and General Motors for their hybrid vehicles.

The rules in the world market have changed. It is a competitive market to keep and attract businesses. We chose Reno as our headquarters because it has some great advantages. It is a low-cost business environment, has state incentives for renewable power, it is a reasonably sized market for our units and it has strong support from the U.S. Congress with U.S. Senator Harry Reid. Reno also has some disadvantages. Talent is hard to find, it has few resources and expertise for companies trying to go international, and it is not branded for renewable energy. To that end, the CEO of AltairNano, Terry Copeland, and I are going to open an association for renewable energy in the State. We will focus on bringing the companies together to put product, technology and development into a common form we can all use and share around Nevada.

The new economy paradigm I am showing can be seen on page 10, Exhibit F. The old economy paradigm dictated to go where it was cheapest. That does not happen anymore. People are now after the knowledge workers. Knowledge workers go where they can ski, hike and have outdoor facilities. We have that in northern Nevada. It is easier to attract people here. I have just attracted the number one researcher of inverters from General Electric out of New York. Other than stock, it did not cost me any more in pay; he loves that he lives in Reno.

There are a number of reasons we chose Michigan for manufacturing. Michigan has an abundance of out-of-work people and people who have made steel products for many years. They have expertise we do not have here. When I try to build a unit in northern Nevada, it costs me four times what it costs in Michigan. They have stamping mills and steel coming from nearby Illinois. These are facilities we do not have in northern Nevada. When I started seeking a location, I interviewed eight state entities. I asked, "What do you have and what can you do?" We were offered a $1.8 million loan from the city of Columbus, Ohio. To get that loan, I had to give them a $1.8 million letter of credit. Of course, start-ups do not have money, so we could not do that. Our manufacturing plant was going to cost $4 million to build while we only had $2 million. The economic development people from Manistee County, Michigan, offered a solution to our problem. After we were initially denied money from a Michigan state program, they came up with a block grant for $400,000 which allowed them to buy a current plant and upgrade its equipment. They then found a local company who put up $1 million worth of new equipment since I agreed to manufacture theirs for the next 3 years. While this was not quite $2 million, it was not equity I had to come up with. It was free money; I do not have to pay the grant back, and the equipment gets amortized over the life of the product. This was a huge advantage. I do not see that ability or expertise in Reno. Mound House is where we manufacture everything. While we will continue to develop our new products here, they manufacture things one at a time. In Michigan, we will make a pole every seven minutes with an automatic boring machine that costs $675,000. That allows our company to build a product at a cost of $2,500 a unit; you cannot do that in Nevada.

The next aspect I have to look at is where I am getting my growth. Growth for us is overseas. Seventy-five percent of our volume will be shipped out of the United States. With Michigan, we have the ability to utilize barges, ships and rail activity at such a low cost I could not afford to pass it up.

Page 13, Exhibit F shows a mathematical formula that gives my perception on what is needed for economic prosperity. You need talent. We have some talent in Reno, but are generally hurting for it. The interim dean for the College of Engineering at UNR, Emmanuel Maragakis, and I are currently working on getting projects into the UNR system without a start-up company having to pay $100,000. To do that, the bureaucracy would have to change at the universities so there are no legal issues like patents. I am not going to let the university own my technology, but I am happy to have them help me develop it.

I would have paid for it too, whether with stocks or a limited amount of cash, since they already had the resources I needed.

The next variable is entrepreneurial activity. I did not think there was a lot of entrepreneurial activity in Nevada. I started a group called "Techstart." It is a group of people doing technical start-ups. They do not have any nonprofits or service providers in the group. It is only people doing start-ups. Some of them are pre-funding, some are pre-revenue and others are just trying to figure out what to do. We meet once a month for an hour and a half. We have 25 companies now. We use it to help one another find the systems, products or things that we do not have or understand and to help each other. The important part is that we need to create networks. When I was in Silicon Valley, my address book was big enough where if I had a problem, I could call anyone I wanted to get a solution. We need to develop that in Reno.

Ninety-eight percent of all my capital came from outside of Nevada, it was from California and Minnesota. The first thing I would get asked half the time I presented to a venture capitalist was, "Will you move back to Silicon Valley?" I would say no. Money does drive where you end up sometimes though. We are going to be fine building our headquarters here. People like living here so I do not think we will have an issue or problem. I have 15 jobs here now, and will have 28 jobs by the end of the year. In Michigan, they are going to have 140 jobs by the end of 2010.

SENATOR NOLAN:
You are right. If we stick to your formula, there is a lot more opportunity out there for us. Is the next closest steel mill to Reno in Fontana, California?

MR. HESS:
Yes.

SENATOR NOLAN:
California is handling this economic crisis by hearing a number of bills to increase taxation on businesses. Nevada is an attractive and close place to move those kinds of operations. What was your experience with Fontana?

MR. HESS:
We could not get material from Fontana because we needed small volumes when we started. It is only after we went out and started to bid materials in volume did we get the kinds of mill prices we have gotten out of Michigan. We never formally bid Fontana because we did not have the manufacturing capability in northern Nevada.

SENATOR NOLAN:
Does Fontana receive their steel from the East Coast before fabrication or do they actually mill?

MR. HESS:
They receive it from Tacoma, Washington. It comes from overseas.

SENATOR CEGAVSKE:
Are you involved in the wind project being talked about in Washoe County?

MR. HESS:
No, that is not us.

CHAIR SCHNEIDER:
Last night, the Washoe County Commission approved a wind project north of Sparks.

MR. HESS:
Yes, that is a big wind project. It is about 13 turbines at about a megawatt apiece.

SENATOR CEGAVSKE:
Some constituents were interviewed there and they were excited about the company coming, but it will start in a year. The process takes a long time.

MR. HESS:
We spent a year of failure, which is typical for a start-up. Every unit we put up did not work, meet specifications or function how we thought it should. The reason we have a technical advantage is because we have gone through that process and know what it takes to make it work. We have 12 patents that will protect us in any markets we go into.

RAY BACON (Nevada Manufacturers Association):
The Manufacturing Assistance Partnership, which was put together almost a decade ago with the university system, has been working for the last couple of years with a person in the state of Washington who has a Website <http://www.jobbait.com> that utilizes the U.S. Bureau of Labor Statistics (BLS) database and breaks it down and makes it usable. The Website shows recession-proof industries and areas. He has taken the BLS statistics for all those 1,000 job categories and then every Metropolitan statistical area and he has shown how those communities and industries performed in the 1991, 2001 and current recessions.

If you look at the period from the end of November for the prior year, Texas created 85 percent of the new jobs in the country. If you want to talk about job creation, you should talk to somebody from Texas. Four sectors create their success. Existing energy prices have been good so there has been a lot of development and expansion. Two, they are the leaders in the country in wind energy. Three, about 20 years ago, several of the high-tech companies in the electronic field decided they were done with Silicon Valley's prices and expansion, so they were looking for a new technology center. They were induced to move to Austin, Texas. A lot of money was put into the University of Texas at Austin to bring in that technology. The last sector is they have built a lot of new research hospitals. They have a basis in electronics, health care, renewable energy and existing energy. They have gained 220,000 new jobs; it is worth looking into.

CHAIR SCHNEIDER:
During this recession, we need to put our money into education. The University of Texas was well funded and that is why the Silicon Valley companies moved there. If you look at Texas, they have a fantastic university system that is well-funded. The money to fund their university system comes from their energy; they are spending huge amounts of money on their university system. That is what we need to do here in Nevada. We have been fiscally irresponsible in the past for not funding our education system better.

If there is no further testimony, I will adjourn the Senate Committee on Energy, Infrastructure and Transportation meeting at 10:42 a.m.

RESPECTFULLY SUBMITTED:

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Josh Martinmaas,
Committee Secretary

APPROVED BY:

_____
Senator Michael A. Schneider, Chair

DATE: _____