AGENDA ITEM 5

Presentation on Clean Energy Education

Alex Gamboa and Jason Geddes

The Need and Importance of Clean Energy Education for Nevada

Jason Geddes and Alex Gamboa

To improve and diversify its' economy, the state of Nevada commissioned a report called *"Unify/Regionalize/Diversify: An Economic Development Agenda for Nevada,"* a Brookings/SRI report, which identified 7 "target industries" with high growth potential, including clean energy. Subsequently, the Governor's Office of Economic Development for Nevada adopted these key industries as a focus of the State's effort to diversify the economy.

As stated in the report:

Clean Energy: Clean Energy is a high-potential target for Nevada because it capitalizes on the state's renewable resource base, its established geothermal expertise and headquarters strength, its proximity to large energy markets, and its capabilities in construction and project management. Key opportunities include: renewable component manufacturing; export of electricity; advancing and internationalizing geothermal development; and energy efficiency upgrades.

Diversify: **Set a platform for higher-value growth through innovation and global engagement.** Finally, since Nevada's regions can't "go it alone," the state needs to set the stage for broad-based growth by investing in effective innovation and commercialization infrastructure, attending to the state's global engagement, and ***working to align its education and workforce training efforts to its new economic strategy.*** Along these lines Chapter VII recommends that the state:

- Align higher education and workforce development resources for innovation and diversification

And to align higher education and workforce development to strategic economic opportunities, the state should:

- Raise STEM standards throughout the K-12 system over the longer term;
- Leverage community colleges to deliver a skilled workforce;
- Expand research universities' role in workforce development; and
- Reorganize and re-energize the state's workforce investment system.

Overall Take-Away: In order to build a sustainable and wide-spread clean energy industry in Nevada, K-12 and higher education must prepare the leaders and workforce with the skills necessary to advance this high potential and quickly growing industry.

Nevada K-12 Educational Efforts in Clean Energy

Envirolution

- A sustainability education, leadership development and career advancement organization, with a focus on developing and scaling clean energy education in Nevada
- STEM (Science, Technology, Engineering, Mathematics) education that aligns with appropriate standards, including newly adopted common core and next generation science standards
- Mainly focused on energy efficiency, solar energy, and currently developing geothermal curriculum along with other broad based sustainability modules
- In 2011 directly worked with over 100 teachers and over 1,000 students in Northern and Southern Nevada
- Early stages of scaling curriculum through professional development workshops

GreenPower

- Funded and sponsored by DRI and NV Energy, focuses on providing clean energy educational resources to teachers and schools in the state
- Schools must sign up to be a GreenPower school and then commit to certain efforts and have access to resources
- Leverage partnerships with organizations like Envirolution, Urban Roots Garden Classrooms, and Sierra Nevada Journeys

Black Rock Solar

- Installs solar arrays in schools and other facilities in the State
- Provides educational tours and interactive plays to the students to teach them about solar energy

Workforce Connections

- Has a youth green career pathways program, highlighted by their "What's It Mean to Be Green" program
- Includes an in-classroom module, with sections on clean energy, and also a green monster truck that goes to the school and teaches students about energy, electricity, efficiency and solar energy
- Program just launched this past school year in Southern Nevada

STEM Inquiry Institute

- Hosted at the Terry Lee Wells Nevada Discovery Museum, this Institute just had its first program and had 40 teachers participate and the key focus was on how to properly teach inquiry based STEM topics and the content focus was clean energy.
- With the initial success, there are plans to expand

GREENevada, Nevada Discovery Museum, USGBC, Alliance for Climate Education, Wooster High School; Sustainable Resources Academy, etc…

Moving Forward

- Next Generation Science Standards; includes elements of clean energy, but need to get teachers prepared

- State-wide support of STEM-based clean energy education; currently happening organically, but a more widespread support base will result in more students gaining higher quality education

- Funding; currently no dedicated funding from the State of Nevada or the Nevada Department of Education and a stronger financial commitment is needed

- Partnerships with Industry; build closer relationships with the clean energy industry leaders; funding, internships, presentations and other resources

- Connections with Higher Education; establish closer ties to Higher Education and align efforts more concretely

Nevada System of Higher Education
Supporting Nevada Clean Energy

Nevada Renewable Energy Consortium (NvREC) – DOE funded

- Increase RE research competitiveness of NSHE's research institutions by fostering research collaboration. Collaboration required for funding.
- Build partnerships with industry and enhance the opportunities for expanding the economic impact of renewable energy programs in Nevada.
- Increase commercialization, economic analysis, public policy and outreach capabilities in renewable energy.
- 12 Collaborative Research Projects in Biofuels, Solar, and Geothermal

Desert Research Institute (DRI)-Clean Technology & Renewable Energy Center

- Currently ~ 35 active projects from $13K to >$1.6M, building a new test facility includes Education/Outreach including GreenPower, Biomass/Biofuels, Geothermal, Hydrogen, Solar, Wind, Energy, Conservation (IBUCS), Commercialization, TTO, and NIREC.

University of Nevada, Las Vegas (UNLV)

- Solar and Renewable Energy Minor (SREM) – 98 students enrolled, 13 completed.
- Graduate Certificate in Solar and Renewable Energy - 18 credits, May count toward Masters.
- Host of National Clean Energy Summit
- One of twenty to participate in National Solar Decathlon 2013
- Center for Energy Research - 142 Research projects aligned with GOED Clean Energy Sector with $99 million over last ten years.
- Solar Power Generation, Solar Thermal Applications, Energy Conservation, Solar Hybrid Lighting, Renewable Hydrogen Generation, Vehicle Design with Fuel Cells and Alternative Fuels, and Geothermal Power Production.

University of Nevada, Reno (UNR)

- Renewable Energy Minor for engineering and non-engineering majors ~50 students
- National Geothermal Academy – 8 week course with students from around the world
- Renewable Energy Online Graduate Certificate for engineering, policies and practices
- Great Basin Center for Geothermal Research
- Renewable Energy Center – $18 million in geothermal energy, biomass, power grid, energy efficiency and storage, wind, and solar energy.
- Commercialization, Economic Studies and Outreach – Colleges of Business, Agriculture, Education, Extended Studies, Journalism, and Liberal Arts. Houses TTO experts from UNR/DRI, EDAWN, and GOED.

Nevada State College (NSC)

- Incorporated sustainability, energy and environment in curriculum for Education and Liberal Arts majors.

College of Southern Nevada (CSN)

- Certificate of Achievement – Construction Technology – Photovoltaic and/or Sustainable Construction
- AAS – Construction Technology – Sustainable Construction Technology
- AAS – Air Conditioning Technology – Natural Gas Heat Pump emphasis
- AAS – Environmental Safety and Health – Environmental Resource Technology
- Certificate of Achievement – Mechanical Technology – Power Utility

Great Basin College (GBC)

- Direct Use Geothermal Demonstration Project
- Industrial Energy Efficiency Program
- Working with Solar Reserve to develop curriculum to support workforce needs

Truckee Meadows Community College (TMCC)

- Renewable Energy Lab with wind, solar, geothermal technologies
- Energy Technologies Associate of Applied Science with solar, geothermal and wind options
- Geothermal Plant Operator Certificate funded by USDOE
- $2 million in grants supporting solar, wind, geothermal and conservation
- Red Mountain Wind project with DRI

The NSHE Board of Regents have adopted a sustainable construction policy that requires life cycle cost analysis of all new construction and major retrofits. All of the institutions have installed solar photovoltaic, solar thermal, wind, or geothermal systems and have incorporated into the curriculum.

AGENDA ITEM 6

Presentation from the Nevada Rural Electric Association

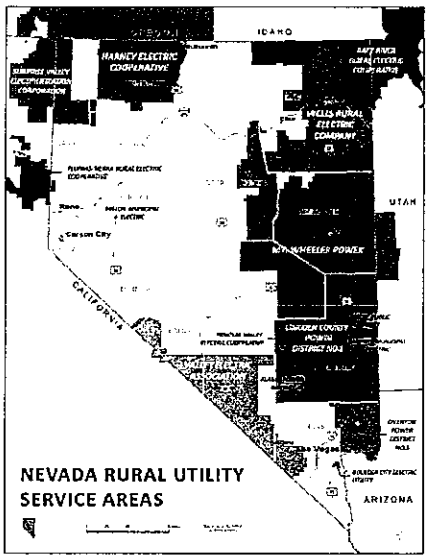
Dagny Stapleton

NEVADA RURAL ELECTRIC
ASSOCIATION

Nevada Rural Electric Association

Nevada's Publically-Owned Electric Cooperatives, Power Districts, and Municipalities

Rural Electric Utilities in Nevada



Organizational Structure

- All Non-Profit
  - Rural Electric Cooperatives
    - All consumers in co-op territories are *members* who own and govern the utility. The co-op is controlled by an elected board of members
  - Power Districts
    - General Improvement Districts – formed by a county commission, governed by an elected board
  - Municipally-owned electric utilities
    - Owned by local governments and governed by City Council

Nevada Rural Electric Association

-Harney Electric Cooperative

-Mount Wheeler Power

-Plumas-Sierra Rural Electric

-Raft River Electric Cooperative

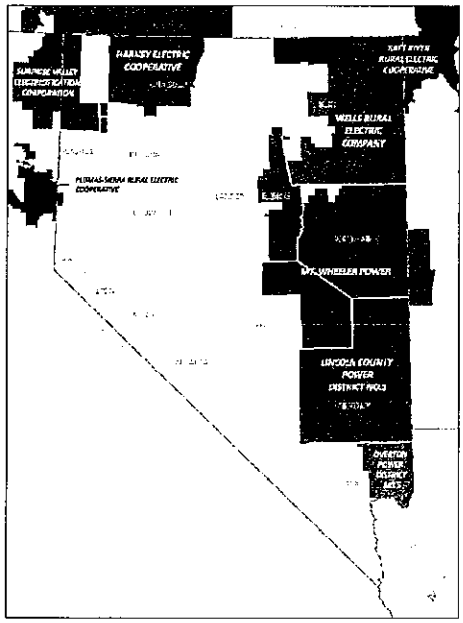
-Wells Rural Electric Cooperative

-Surprise Valley Electric Cooperative

-Overton Power District #5

-Lincoln County District#1

-Boulder City Municipal Power



History

- Rural Electrification Administration (REA) created in the 1930's to bring power to rural America. Electric Co-ops were created with financing from the REA – now called the RUS.

- Goal was to bring power to areas of rural America that Investor-owned Utilities traditionally would not serve.

In Nevada

- Rural Electric Cooperatives and Power Districts in Nevada were founded from the 1930's through the 1960's, to serve areas that were some of the last in the continental U.S. to be connected to the electric grid.

- Neighbors, ranchers, farmers and small towns in rural Nevada came together to form co-ops and power districts – today NV's rural utilities still serve many of the same entities that helped found them.

Sources of Power

- Organization of the Power Marketing Administrations in the 1940's
  - Created in conjunction with the REA to help provide power to rural America
  - Large hydroelectric projects built and managed by the PMA's: Bonneville Power, and Western Area Power Admin bring power from the Columbia and the Colorado rivers to Nevada

- Nevada's rural electric utilities have long-term contracts for hydroelectric power from the PMAs

Generation

- Most of our members own little to no generation

- Nevada's rural electric utilities are primarily distribution utilities

- This is due to size and lack of access to capital and financing

Size of Nevada's Rural Electric Utilities

- Range in size by number of meters from less than 1,000 to 22,000
- NREA members - peak loads from 20 MW to one member 114 MW
- Because of remoteness of large territories members have significant distribution infrastructure – but some with as low as 2 consumer members/mile, compared with 30 plus in urban areas/IOUs

Transmission

- Transmission owned by members is limited
- Three members working on transmission projects
  - Lincoln and Overton working with SNWA to develop - 75 mile, double circuit 230 kV transmission line
  - Plumas-Sierra 14-mile 120 kV transmission line to carry green power from Northern Nevada to their Northern California territory

Financing

- Rates for publically-owned utilities in Nevada are cost based, reflecting the cost to purchase and distribute power - any margins are either reinvested in infrastructure or returned to member consumers
- Financing for co-ops is limited to loans from RUS (federal Government) and 2 cooperative banks
- Financing for power districts is also available from RUS, as well as through local government bonds.
- Investor financing and traditional forms of capital are generally not available to publically-owned utilities

Growth

- NREA members as a whole have very low projected load growth – on average load growth historically has been small and has allowed members to maintain relatively low rates for power.
- Low, cost-based rates may be incentives for economic development in rural Nevada; however providing transmission and other infrastructure can create challenges for companies seeking to locate in rural Nevada.

HARNEY ELECTRIC COOPERATIVE, INC.

Your Touchstone Energy® Cooperative

- Headquartered in Burns OR – approx 4,000 meters. Territory includes 7,300 square miles of Humboldt County; peak demand 56MW

- Purchases 100% of their power from Bonneville Power – all hydroelectric

- Offers net metering, rebates for efficiency upgrades to irrigation equip (50% of services are ag/irrigation)

Mt. Wheeler Power, Inc

MT. WHEELER POWER

- Co-op Headquartered in Ely, NV; 13,200 square miles of territory serving 7,500 meters; peak demand 76 MW

- MWP purchases 13% of its power (hydroelectric) from WAPA; and 87% (coal) from a generation and transmission co-op in Utah.

- MWP has made a significant unrealized investment in geothermal resources

- Offer rebates for small wind and solar, and net metering

- Extensive rebates for commercial and residential efficiency upgrades, weatherization, and appliances

- Co-op financed on-bill loan program is also available for weatherization improvements, up to $15,000

PLUMAS-SIERRA
RURAL ELECTRIC COOPERATIVE
Electricity and Telecommunication Services

- Headquartered in Portola, CA; 372 services in Northern Washoe County – 8,423 total meters; peak demand 30 MW
- Generation and Transmission co-op, have built a cogeneration resource and transmission to carry geothermal from Nevada into California
- 50% of power purchased is hydroelectric; 20% market; 20% gas; 4% geothermal
- Rebates for small solar and co-op on-bill financing for ground source heating systems
- Extensive rebates available for efficiency improvements in homes and businesses

RAFT RIVER ELECTRIC

- Headquartered in Malta, ID - 2,500 square miles NV territory; 4,819 total services in Idaho & Nevada
- 95% of power purchased is hydroelectric; 5% is nuclear – long term take or pay contract with BPA
- Raft River Electric peak demand = 89MW;
- Raft is a member of a generation coop that has invested in a landfill gas plant and wave-power
- Extensive rebate program for homes, businesses and farms, includes rebates for weatherization, appliances and irrigation equipment

Wells Rural Electric Company

•Rural Electric Co-op Headquartered in Wells, NV; 5,964 meters in Eastern Nevada, Elko and Eureka Counties; 4 members/mile of line

•Wells buys 100% of its power from Bonneville – approx 80% hydroelectric, 10% nuclear, 10% other renewables; peak load 114 MW

•Wells offers extensive rebates for weatherization including lighting, manufactured homes, appliances, insulation and windows

•Partnerships and in kind donations provided to install solar PVs on schools in WREC's territory

Surprise Valley Electrification Corporation

- Associate NREA member – only 10 services in Nevada, but 2088 square miles of territory including northern Washoe County
- Headquartered in Alturas, CA, over 4,111 members
- 100% of power purchased through BPA – 87% hydroelectric, the rest market, nuclear, and renewables

OVERTON POWER DISTRICT #5
LIGHTING THE WAY
SINCE 1935

- Headquartered in Overton, Nevada, northern Clark County; 13,841 meters – Power District

- Peak demand 97 MW

- Purchase power through the Colorado River Commission - 20% hydroelectric, 40% gas, 40% coal

- Rebates are available for small solar and wind installations, as well as ground source heating and cooling

- Overton also provides energy consumption assessments for consumers

LINCOLN COUNTY POWER DISTRICT #1
Providing light since 1937

- Headquartered in Caselton, NV, near Pioche – LCPD serves all of Lincoln County – approximately 1,000 meters; peak demand 20 MW

- Lincoln County buys all of its power through CRC, including 92% of its power which is from an entitlement for hydroelectric generated at Hoover Dam; 8% power purchased is from the market predominately natural gas

- LCPD provides rebates for small scale wind and solar installations, as well as rebates for high efficiency air conditioners and heat pumps

Boulder City, Nevada

- Municipally-owned utility, serves the 15,000 residents of Boulder City; peak demand 48 MW
- In 2011 61% of the cities energy purchase was hydroelectric, the balance from market sources purchased through the Silver State Energy Association.
- In 1995 Boulder City annexed land in the Eldorado Valley upon which two large scale solar projects are located (NV Solar 1 and Copper Mountain Solar) Boulder City anticipates purchasing some of this solar energy in the future to meet the city's energy demands
- Rebates are provided for solar hot water heaters and solar screen installations; rebates are also available for commercial and residential air conditioners and coolers, swimming pool equipment, and conversion to gas hot water heaters

Development of Renewables

- Rural power has a commitment to renewable development
- NREA members have initiated some small scale generation projects as well as purchased some renewables; this is in addition to hydroelectric resources purchased by all members
- Where possible members support and try to invest in additional transmission to bring renewables to market
- Though they may not be able to build or purchase large scale generation they support renewable projects in their territories in other ways

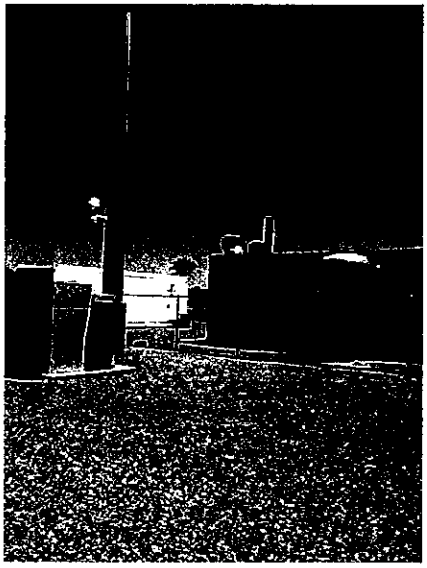
Example: Lincoln County Power

Evergreen Environmental Energy Biofuel generation plant in Lincoln County (3MW – projected 10 MW)

- Though LCPD, a 20 MW system, was already fully resourced (mostly hydro) and could not purchase power from the interested developer, they provided the following support and partnership for the project:

1. Introduction of Evergreen to SNWA – contracted for purchase
2. Sited the plant for Evergreen - located it close to LCPD facilities and on private property to avoid federal land and permitting challenges
3. Developed the interconnection substation to LCPD facilities
4. Developed an interconnection contract and a delivery contract.

Evergreen Environmental Biofuel Plant



NV Rural Electric Association

- Way for members to aggregate resources
- Mission of rural electric utilities is to provide safe and reliable power to rural America
- Principal of Co-ops helping other co-ops
- Outreach, statewide programs for youth, public service programs
- Support from National Organization the National Rural Electric Cooperative Association.

Questions?

Contact Info:

Dagny Stapleton, Member and Government Relations Director
(775) 848-8004: dagny@nrea.coop

Dave Luttrell, Lincoln County Power District, GM;
(775) 962-5121: dluttrell@lcpd1.com