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SUBMITTED BY: Gen. Mike Caldwell

Oregon Army National Guard

Net Zero Newsletter

VOLUME 1, ISSUE 2 FEBRUARY 2012

The Oregon National Guard Welcomes Assistant Secretary of the Army, for Installations, Energy and Environment.

INSIDE THIS ISSUE:

The Oregon National Guard (ORNG) welcomes the Honorable Katherine Hammack as she arrives to tour Fort Oregon's Net Zero sites. She will review our strategy, our progress towards our goals of Net Zero Energy for Fort Oregon, and Net Zero Water for Camp Rilea. She will be meeting with members of the Governor's Energy Team, the Oregon Department of Energy and ORARNG senior leadership. Ms. Hammack will be touring facilities in Camp Rilea, Camp Withycombe and Umatilla Army Depot. The Assistant Secretary will also visit the Pacific Northwest National Laboratory while here in the Northwest. The Oregon National Guard is the only National Guard entity selected to participate in the Net Zero 2020 Pilot. Through this program, the ORNG provides pioneering leadership in applying Net Zero goals in the tenth largest state in the U.S, adapting to various geographical locations with diverse renewable resources throughout the state.

The Honorable Katherine Hammack

Total Solar Renewable Energy Capacity Installed :

278.5 KW

Total Energy Produced per year

374,317 KWH/YR

% toward NZ goal of 20% Renewable Energy by FY20

2%

Net Zero Installations Conference Report

Three members of the Oregon Military Department Installation's energy team attended the Army Net Zero Conference in Chicago from January 18-20, 2012. The conference included plenary sessions with 450 attendees and break-out technical groups for energy, water, and waste. Roy Swafford and Craig Volz reported on the latest achievements of the "Fort Oregon" Net Zero Energy initiatives. Jim Arnold presented the successful implementation of the Net Zero Water projects recently completed at Camp Rilea.

Highlights of the conference included opening remarks by Major General Al Aycock, Director of ACSIM Operations, and the Honorable Katherine Hammack, Assistant Secretary of the Army for Installations, Energy and Environment (ASA IE&E). Each of the pilot Net Zero installations provided briefings on its accomplishments, scorecard metrics, strategy, and areas where additional assistance is needed.

Briefings from each of the 18 Net Zero pilot installations were insightful, covering a broad range of bases with differing geographies, missions, infrastructure, opportunities, challenges, and solu-

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Net Zero *Energy* Updates: Fort Oregon Net Zero 2020

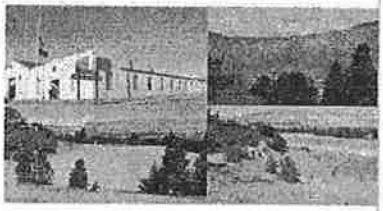
*Net Zero **ENERGY** Installations produce renewable energy equal to the energy consumed over the course of a year.*

The Assistant Secretary of the Army for Installations, Energy and Environment (ASA-IEE) has developed the Army's Net Zero Installation Strategy. The goal is for installations to reduce consumption, conserve resources and maximize renewable energy resource with the goal to be net zero, based on net zero energy, net zero water and net zero waste, all striving towards sustainable installations. We are creating a culture that recognizes the value of sustainability measures in terms of mission capability, fiscal sustainablity, quality of life, local community relationships and preserving the Army's future energy security.

- **Net Zero Conference in Chicago, January 18-20, 2012.** Presented Fort Oregon's Net Zero Scorecard. Gained valuable resources and network for future collaboration.
- **Christmas Valley Solar Project;** Completed Feasibility Study through Oregon Technology Institute. Currently in discussions with Mid-State Electric Cooperative regarding Net Metering. Gathering information from potential developers.
- **Camp Rilea Wave Energy Project:** SAIC has completed a preliminary draft feasibility study for wave energy off Camp Rilea. Oregon Military Department will be meeting with local fisheries on February 16th to discuss concerns regarding a wave energy field off the North Coast. Hosting a public meeting with the Territorial Sea Plan Commission and Clatsop and Tillamook Counties, February 17th at Camp Rilea.

- **Resource Efficiency Managers (REMs):** Welcomed Tetra-Tech's Charlie Senning, CEM, Craig Volz, P.E., and Larry Hamburg to the energy team. The REM team come with extensive experience in utilities, energy production, conservation and facilities optimization. The REMs have submitted several Energy Conservation Investment Proposals (ECIP) for renewable energy projects and are focusing on the utilities, facilities and energy reduction and production in Fort Oregon. They are preparing ESTCP proposals for several of our renewable projects
- **Energy Engineering Analysis Program (EEAP):** The team from Huntsville USACE, PNNL and MCFA will be returning to Fort Oregon to perform deep energy audits of our facilities in Camp Rilea and Fort Salem in April with final reports and proposed 1391s completed in June. NREL's team will return to Fort Oregon the week of March 19 with their proposal for renewable energy applications throughout Fort Oregon.
- **Polk County Readiness Center–** Construction for the new Readiness Center will utilize a reverse refrigerant heating and cooling system that is proven to be 40% more efficient, low E glazing and high functioning building envelope. There will be a 25KW PV array and site rainwater recovery for irrigation use.

- **Umatilla Army Depot-**The Seattle District of the USACE has produced a draft feasibility study for the production of renewable energy at the Umatilla Army Depot.



- **The Dalles Readiness Center–** A design-build firm has been chosen for the project. ECIP and ECTSP funding requests are being submitted to attain the goal of a net zero building.

- **Joint Forces Headquarters–** SAIC participated in a design charrette in January and has completed an outbrief of the process for an FY-15 MILCON Addition./Alteration of the facility that will incorporate renewable energy scope and efficiency upgrades.

Net Zero *Water* Updates: Camp Rilea Net Zero 2020

Oregon National Guard Vision

The Oregon Army National Guard (ORARNG) is committed in continuing to advance Camp Rilea as a Net Zero Water Installation. ORARNG adopted and implemented core components of this objective as early as 1978 with the design and implementation of its Wastewater Treatment Plant and effluent beneficial use with aquifer recharge. ORARNG has taken a holistic strategy in continuing this advancement to balance benefits and costs with strong efforts to limit water consumption and return it back to the original watershed.

Oregon National Guard Objectives

- Foster a Sustainability Ethic
- Strengthen Army Operations
- Meet Testing, Training, and Mission Requirements
- Minimize Impacts and Total Ownership Costs
- Enhance Well-Being

Current Activities

Our Current Activities focus on reducing consumption, eliminate municipal water import and sanitary wastewater export, utilize alternate water sources, integrate an active water management program, maximize the watershed concept, and meet mission requirements.

These objectives are met with our recently completed Water Supply System, Wastewater Treatment Plant improvements that include a Recycled Water Plant capable of converting 65% of our effluent into Class A water for non-potable uses, and Water Management and Conservation Plan.

Future Initiatives

Our Future Initiatives focus on further reducing aquifer demand by continued integration of efficiency and conservation measures, and alternate water sources. These objectives will be met by replacing aging fixtures with more efficient ones, expanding the Recycled Water Plant to convert 100% of our effluent into Class A water for non-potable uses, converting irrigated turf to native meadow, exploring rain water harvesting, and retrofitting storm water systems to utilize rain gardens which reduce pollutant loads and stabilize temperature prior to discharge.

Accomplishments:

Water Supply System – *Reduction*

Water Management and Conservation Plan completed 13 Sep 2011 and submitted to Oregon Water Resources Department for review and approval

$3.2M MILCON completed 30 Sep 2011 for new Water Supply System separating from municipal supply, installing two 200' supply wells, treatment plant (pressure-type filtration system), and one 430,000 GAL storage reservoir

Beneficial use being demonstrated in preparation for Certified Water Rights Examination

Wastewater Treatment Plant – *Reduction/Re-Purpose*

Revised operating permit issued 26 Jul 2011 by Oregon Department of Environmental Quality (DEQ)

Groundwater Monitoring Plan completed and approved by DEQ on 11 Aug 2011

$3.3M MILCON improvements completed 30 Sep 2011 converted from spray irrigation to rapid infiltration, improved effluent aeration/recirculation, new transfer pumps and force main, four RI basins, and Recycled Water Plant capable of converting 65% of effluent into Class A water for non-potable uses

Recycled Water Use Plan required by DEQ permit underway with expected completion 1 Mar 2011

Advanced Metering – *Reduction*

Initial site reconnaissance completed 6 Jan 2011 at Water Supply System

Vehicle Wash Rack – *Reduction*

Project programmed to convert existing wash rack from using potable water to using Class A water from Recycled Water Plant

Baseline Water Balance – *Reduction*

Site reconnaissance conducted 13-17 Feb 2011

Net Zero Scorecard: FORT OREGON

DoD Goal	Net Zero Area	Net Zero Goal	FY2011 Status	FY2012 Planned Actions	FY2012 Target
Energy Intensity Reduction Target: 37.5% by FY2020 Baseline: FY2003	Energy	Energy Intensity Reduction Target: 65% by FY2020 Baseline: FY2003	Energy Intensity Reduction Actual: 13% thru FY2011 Baseline: FY2003	Energy audits, advanced metering ECIP requests, ESPC projects	Reduce by 155,754 MBTU to achieve 20% reduction
Renewable Energy Use Target: 20% by FY2020 Baseline: N/A	Energy	Renewable Energy Use Target: 100% by FY2020 Baseline: N/A	Renewable Energy Use Actual: 2% thru FY2011 Baseline: N/A	PPA for PV at Armories & RCs Select utility-scale PV developer Complete wave & RE studies Select CR wind developer	Install 600 kW PV for increase to 6%
Biogas Recovery Target LF or WWTP recovery unit in place by FY2020 Baseline: N/A	Energy & Waste	Biogas Recovery: Target LF or WWTP recovery unit in place by FY2020 Baseline: N/A	Not currently tracked	No biogas potential	N/A
Green Buildings: Target: 15% of EB inventory meets HPSB MOU by FY2015 Baseline: N/A	Energy & Water	Green Buildings: Target: 15% of EB inventory meets HPSB MOU by FY2015 Baseline: N/A	Not currently tracked	Develop report to track this metric	TBD
Green Buildings Target: 100% of new bldgs meet LEED Silver	Energy & Water	Green Buildings Target: 100% of new bldgs meet LEED Silver	Green Buildings Actual: 100% of new bldgs meet or exceed LEED Silver	Develop report to track this metric	100% of new bldgs meet or exceed LEED Silver, Design (1) Net-Zero bldg

Net Zero Installations Conference Report (cont.)

tions. A number of the Energy track technical presentations focused on applications for district heating/cooling and combined heat and power (CHP). An interesting trend is the use of multiple fuel sources for district heating systems allowing flexibility to use the lowest cost fuel while enhancing energy security and resilience. Technologies discussed included: biomass/ natural gas CHP plus solar thermal hot water; biomass gasification plus CHP; absorption chillers; and ground-source heat pumps.

The U.S. Army Engineer Research and Development Center, Construction Engineering Research Lab (ERDC-CERL) gave an in-depth presentation on the Army's new design guide for central solar hot water systems capable of providing high-temperature hot water for building heating as well as supplying more conventional domestic needs.

Representatives from the Strategic Environmental Research and Development Program (SERDP) and the Environmental Security Technology Certification Program (ESTCP) provided information on funding opportunities. Fort Oregon is evaluating a number of renewable energy and environmental project opportunities at Camp Rilea, Christmas Valley, JFHQ, The Dalles Readiness Center, and Salem AASF and will submit ESTCP pre-proposal funding requests in March 2012.

Fort Oregon delegates met with members of the Energy Initiatives Task Force (EITF) to discuss renewable energy projects. The EITF was launched 15 September 2011 with a mission to assist in the planning, development, and execution of cost-effective, large-scale renewable energy projects (> 10 MW) on U.S. Army installations. The EITF provides installations with technical, business, and acquisition support to accelerate development and achieve "best value" solutions. Fort Oregon will submit EITF project briefs in February 2012 to solicit development support for renewable energy projects at Christmas Valley, Camp Rilea, and Umatilla Army Depot.

Other Energy track presentations included: Energy Master Planning; the critical role of building simulation modeling in Net

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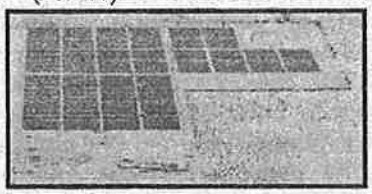
Renewable Energy Technology Grants

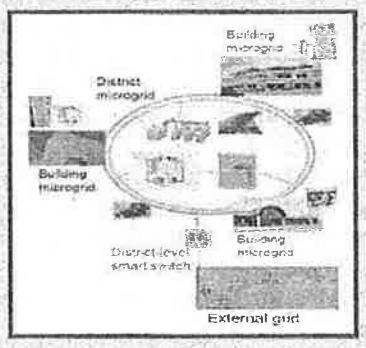
On the road to Net Zero, the ORNG strives to tap into innovative funding sources, such as the Department of Defense (DoD) Environmental Security Technology Certification Program (ESTCP). The ESTCP mission is to promote partnerships between academia, industry, military, and other Federal agencies. ESTCP demonstration projects are designed to generate cost and performance data to support rapid deployment and commercialization of innovative technologies. Funding opportunities exist in five major program areas: Energy and Water; Environmental; Munitions Response; Resource Conservation and Climate Change; and Weapons Systems and Platforms. The annual funding opportunity solicitation was issued on 2 February 2012 and pre-proposals are due 29 March 2012. The ORNG is evaluating several potential funding opportunities for ESTCP Energy & Water projects, including:

Camp Rilea – Wind, Wave, and Micro-grid with energy storage (up to 50 MW)

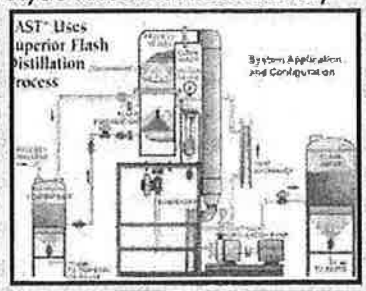
Christmas Valley – Utility Scale Solar Photovoltaic (20MW)



Umatilla Army Depot – Solar, Biomass, and other renewable energy projects



Salem Aviation Support Facility-Zero Discharge wastewater recycle-reuse with heat recovery



Net Zero Conference (cont.)

Zero design; and a case study of the first Net Zero public school in the United States. There were a number of vendor exhibits and some products that may have potential applications for "Fort Oregon," including:

1. Radiant heating & cooling panels for hangars, FMS, drill floors, and office areas
2. Geothermal heat pump design, thermal storage, equipment and controls
3. Spray Polyurethane Foam (SPF) insulation for roof and walls
4. Insulated Concrete Forms (ICF)

In her closing remarks, the Hon. Katherine Hammack noted that progress toward Net Zero goals will be emphasized in the Army Review Boards process, and each installation will need to optimize the path to Net Zero based on its unique challenges and opportunities. This concluded a very successful conference just as a winter storm advisory threatened to blanket Chicago with snow.

Energy Conservation :

A Message to Our Facilities' Tenants, Soldiers and Technicians:

Be the One!

Okay, we've all had this happen to us. Whether it was our Drill Sergeant or others, nobody likes it and nothing is really accomplished. No one really wants to be "that **ONE**"! So what does this have to do with the Oregon National Guard Net Zero Initiative? Net Zero is much more than large solar fields or rows of wind turbines. The goal of Net Zero is to produce as much energy as we consume. To accomplish this we much reduce our energy consumption, while increasing our energy production. The most cost effective means to meet our energy consumption reduction goal of 65 percent by 2020 is through conservation.

Wait a minute, you say, I'm not an engineer, I'm not a facility person, I'm just one person. That's the point! We are all one. But multiply the force and we are very powerful.

Let's get serious; energy conservation is also energy security. For example, because of the need to provide air conditioning in tents and other structures at Forward Operating Bases (FOBs) in Iraq and Afghanistan, hundreds of trucks had to transport generator fuel hundreds of miles. This exposed drivers and soldiers to attacks and IED's. However, after spraying the structures with unique foam insulation, there was an 85 percent reduction in energy needed to maintain a comfortable living environment for the troops. Thousands of trucks were no longer required thus reducing the risk to soldiers and drivers. Conservation is energy security.

Let's bring this home to Oregon. What can I do, we are not at war in Oregon? Oh yes, we are. Some of the very people who dictate world energy prices are at war with us and some of our fellow Oregonians' are currently deployed in their region.

So what to do? Very simply but rigorously applied, ONE can make a difference. Human behavior has a huge impact on energy efficiency. In fact, various studies suggest people influence building energy consumption between 12-17 percent. It doesn't take a village, it starts with **ONE**!

Turn out the lights! Are you kidding? Everyone does that. As I assess the OMD facilities, not everyone is turning out the lights. Current lighting technology is not harmed by turning them on and off. When you leave the space, turn off the light. Do the math and you'll see when ONE person at each site turns off their lights, it makes a big impact.

Be the ONE!

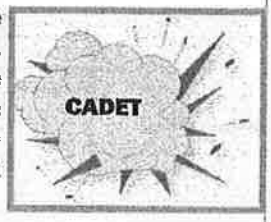
Shut the doors and windows, again very simple. How many times have we hollered at our kids, "We are not paying to condition the outside!"? Think of the heat loss thru a 32" X 84" door left open for 1 minute multiplied by 54 sites. The same applies for rollup doors and hanger doors.

Be the ONE!

Keep the thermostat within the OMD guidelines 70 degrees for heating and 76 degrees for cooling. The older I get the colder I get (snow bird anyone?). Every time we jack up the thermostat, that boiler in the basement has to fire. There are some really fashionable sweaters on the market. This is the Northwest.

Be the ONE!

Lastly, plug loads. What are plug loads you say? As my good friend Patrick MacManus says, plug loads are anything you plug in the wall. One of my favorites are those lovely electric space heaters. Typically each one has a 1500 watt element that just loves to spin the electric meter. If there is a comfort issue, contact your facility manager. If it cannot be solved, there are radiant panels that fit under a desk that only consumes 100 watts. Be the ONE!



How about your computer monitors, printers, and computers? Do they go to sleep at night or are they turned off? What about all those small electric gadgets we all have plugged in? Those blue lights staring at you in the dark are called parasitic power losses.

Be the ONE!

I haven't told you anything that you don't already know. It's just common sense and the discipline to act upon it. As we move forward, conservation is a significant part of attaining our Net Zero goals. Step up, develop the discipline, make a difference.

Be the ONE!

Energy Reduction Dynamics

The National Guard has been working towards meeting Executive order 13423 which is to reduce energy intensity by 3% each year, leading to 30% by the end of fiscal year (FY) 2015 compared to an FY 2003 baseline. Some of the quick and early payoff ways to achieve this goal is to implement lighting controls, establish plug load policies, switch to high efficiency lighting etc. More involved and costly measures needed as further efficiencies are needed include window and door replacement, new roof insulation, new HVAC systems, adding natural day lighting, etc. Ultimately existing structures can likely achieve a 30% reduced energy intensity.

Many existing buildings have an Energy Use Index (EUI) in the range of 90 to 110 kBtu/sf/yr or higher. In Oregon the State Energy Efficiency Design (SEED) program was established in 1991 and was revised in 2001 to require that all state facilities constructed on or after June 30, 2001 exceed the energy conservation provisions of the Oregon State building code by at least 20 percent. This requirement pushes the EUI down to the range of 70 kBtu/sf/yr, give or take.

However, a new building with significant focus on energy efficiency should result in an EUI that could be in the range of 20 to 40.

One of the challenges Oregon NG has had is using a 2003 baseline that was already significantly reduced due to energy policies that had occurred prior to 2003. Much of the quick and early payoff energy achievements had already been done leading to effectively a higher reduction, which is challenging but better supports Net Zero. Another challenge is the new readiness centers being built are two to three time the size of some of the old facilities being replaced thereby increasing the electrical requirement for a given building. It's not uncommon for a 12,000 SF Armory to be replaced with a 40,000 SF Readiness Center. The EUI as a metric for the baseline would overcome the changes in square footage.

The Path to Net Zero Buildings (from Better Bricks)

The path to designing and constructing a Net Zero Energy Building (NZEB) requires commitment, special expertise and collaboration in an integrated design process including all the members of the project team, the owner, the architect, engineers, contractor and the building occupants. The path to net zero can be summarized as follows:

Establish clear and aggressive energy goals and communicate them to all members of the team. All decisions affecting a NZEB need to be made in the context of their impact on energy usage.

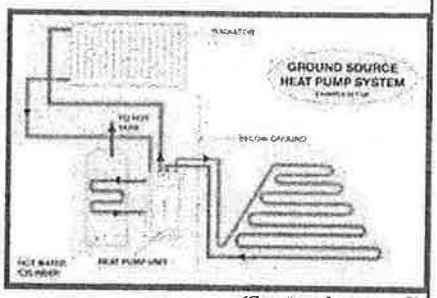
Understand the climate. Sophisticated controls, better equipment monitors and modulation, and other technology allow buildings to be in better sync with the local climate and energy demands throughout the year.

Reduce Energy Loads and Use. Architectural factors such as building orientation, massing and geometry, percentage of glazing, insulation values and daylighting have a huge impact on overall building energy use. Energy efficient equipment and controls further reduce energy use.

Utilize Natural Renewable Energy Resources. Oregon has great natural, renewable resources. The ORARNG has begun to utilize these resources with a ground source heat pump at the Ontario Readiness Center, the installation of over 275 KW of solar photovoltaic arrays throughout the state, improved building envelope and effective controls.

Ground Source Heat Pump Delivers at Ontario Readiness Center

Year-round comfort for the occupants of a building typically requires significant amounts of energy. The conventional approach to maintaining occupant comfort employs separate heating and cooling systems powered by electricity, natural gas, or heating oil. Consider that commercial buildings consume 20 percent of total U.S. energy production and roughly a quarter of that goes to heating and cooling. Energy losses of up to 70 percent resulting from the generation and transmission of electricity contribute to the total energy requirement. But significant energy consumption often presents an opportunity for energy savings. This is where the sun comes in.



The energy produced by our sun is essentially limitless. By harnessing the sun's energy, consumption of traditional sources of energy can be reduced. About 46 percent of the sun's energy striking the earth is absorbed by the earth. Available in massive quantities independent of season, the sun's energy stored in the earth does not need to be transported over long distances, as does the

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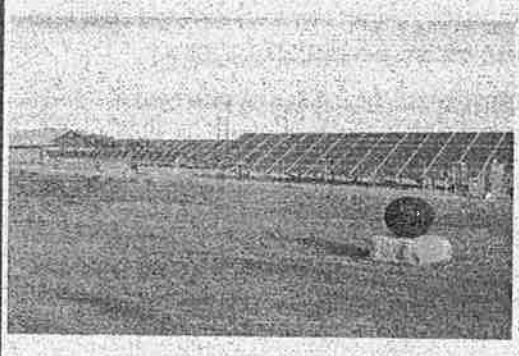
Ontario Solar Array Providing Energy and Opportunity

Jan 2011, new solar arrays came on line at Ontario Readiness Center. The state of the art system using Solar World 230 panels, was erected to support the new readiness center, and is the result of State regulation. Oregon State rules require solar technologies be applied to all new governmental construction and retrofits. The rule specifies a minimum of 1.5% of total construction cost be applied to solar technology located at the new construction site. Concurrent with the construction at Ontario were two other facilities whose location were in areas with significantly lower solar resources so legislative approval was obtained and funding transferred in support of a single array where the sun really shines.

The new system includes 5 separate ground mounted arrays installed to demonstrate the effectiveness of several technologies. Arrays 1, 2 and 3 are small tracking arrays. Array 1 is a dual tracker which changes the azimuth of the array seasonally and also tracks the sun across the sky each day. Array 2 is a daily tracker and array 3 is a seasonal tracker. These arrays are small and their purpose is research. Arrays 4 and 5 are larger arrays mounted in fixed supports and because of their size produce the bulk of the energy.

Besides using the array tracking, the panels were equipped with two different types of inverters which change the solar power from direct current to the alternating current used by our equipment. Arrays 1 and 4 use a single inverter to service their respective arrays. Arrays 2, 3, & 5 use micro-inverters integral to each panel.



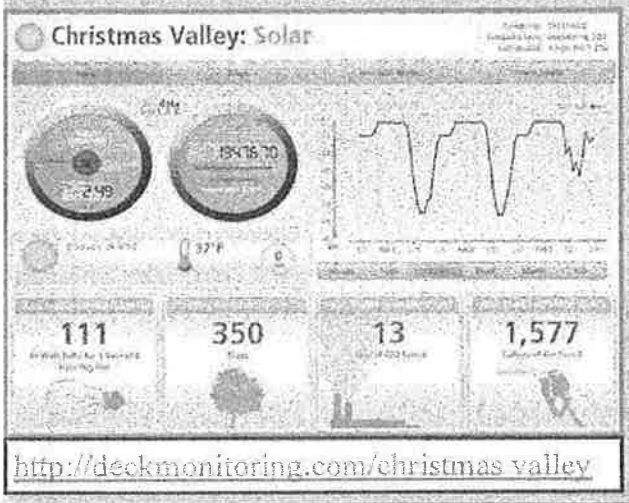
With a year's production data, the efficiency of the various arrays can now be measured. The dual tracker produced 6.08 KWh per day per KW of panel size. The daily tracker 4.90, the seasonal 4.33, and the fixed arrays 4.45 and 4.27. Of interest the single inverter of array 4 outperforms the micro-inverters of array 5.

The Ontario array serves an additional purpose by partnering with the local community college. The school is developing a solar training course and accesses the arrays for training purposes. Additionally, the micro-inverter supplier has just signed on to perform a case study to support the efficiency claims of their inverters. We will develop energy kiosks showing the production of the arrays at the armory, as well as web monitoring. Integrating leadership and education with our net zero energy mission benefits the local community as well as the guard community, and will elevate interest in the technology as well as awareness of other energy and conservation initiatives.

Project Horizon Solar Installation, Christmas Valley, Oregon

Project Horizon Turns on Sun at Christmas Valley

The Oregon Military Department turned on its largest solar array to date with 150.5 KW array of solar panels on the rooftops of the Emergency Response Center in Christmas Valley at the end of January 2012. The project was funded with ARRA funds and was completed with "made in the USA" products , utilizing made in Oregon solar panels from Solar World in Hillsboro and solar inverters made by PV Powered in Bend. The installation consists of over 700 panels of poly-crystalline panels capable for producing 206 MWH per year. The project was designed to facilitate training opportunities with 12 panels wired to a micro-inverter that will allow access to a small portion of the array for training solar professionals. The production of the solar arrays can be viewed at the website listed below.



Ontario Readiness Center's Ground Source Heat Pump (cont.)

energy required for other heating and cooling options. A heat pump connected to a ground-coupled heat transfer loop can be used harness the earth's energy to heat and cool buildings.

The ground-source heat pump (GSHP) uses a refrigeration cycle similar to the process used in window air conditioners to satisfy building space conditioning requirements in an exceptionally efficient manner. The GSHP extracts low temperature ground energy in the winter and amplifies it to a useful level. Cooling is achieved by reversing the process. Heat pump efficiency is expressed as a ratio of energy output to energy input, or coefficient of performance (COP). For each kilowatt (kW) of electricity used to operate a GSHP, the system can transfer 4 or more kW of renewable energy to or from the ground, for a COP of 4 or higher. Compared to conventional cooling and heating equipment, GSHPs produce equivalent heating and cooling capacity and present smaller electrical loads to the utility, resulting in savings of both energy and demand charges. Energy savings of greater than 50 percent is possible when compared with conventional options.

A GSHP was installed at Oregon's newest Readiness Center located in Ontario. A dual-use facility for Charlie Company, 3rd Battalion, 116th Cavalry Regiment, Oregon Army National Guard and the surrounding community, the 36,000 square foot Captain John W. Brown Armory features leading edge green technologies, including a 104 kW solar photovoltaic array. The GSHP system satisfies both cooling and heating needs with an increase in efficiency of 45% over conventional systems.

A mature technology, the primary barrier to expanding deployment of GSHPs is the relatively high initial cost. Drilling or excavating for the ground loop installation can double costs versus conventional systems. But in climates where both cooling and heating are required, the GSHP will almost certainly provide a cost advantage when life cycle costs are included in the selection criteria. Maintenance needs are relatively low since a large portion of the system is underground and typically trouble free. As the cost of energy inevitably increases, the value of savings generated by ground source heat pumps will increase in proportion.

Training is the KEY to Long Term Energy Efficiency

The ORARNG knows that training is integral to excellent performance. This is true for facilities operation as for the primary mission. Free training seminars are available through Portland General Electric (PGE) in concert with Energy Trust of Oregon. Oregon Military Department will integrate supervisory & onsite maintenance staff training with this opportunity. The intent is to begin by utilizing the instruction on heating system, lighting efficiency, controls and measurement and verification.

The energy team has hosted other technology specific training to include: Geothermal, Solar tubes, DDC controls, Thin film PV, Bio mass, LED lighting, in an effort to familiarize ourselves with the technology and it's long term energy savings potential.

There is an upcoming training, free of cost, in March by the North American Board of Certified Energy Practitioners (NABCEP) for Entry Level Photovoltaic Installation Training, a preparatory course towards becoming a certified Solar Photo Voltaic Installer. As the Oregon Military Department continues to focus on developing on-site renewable energy, trained technicians will help maximize our production and our investment in renewable energy.

Where does Fort Oregon need help?

- **Milton-Freewater**: NGB-SRM funding for energy efficiency upgrades-$1.8M
- **BIAK and COUTES:**-ECIP funding for solar PV-$750K
- **The Dalles:** MILCON supplement; ECIP project approval for GSHP-$1.4M
- **Camp Withycombe**: ECIP funding for Solar PV-$1.7M
- **JFHQ:** ECIP funding for GSHP and Solar PV-$1.1M
- **Camp Rilea:** ESTCP funding for Micro-grid with energy Storage- $2.5M; matching funding for studies; funding for pilot wave energy project; funding for electrical substation
- **The Dalles:** ESTCP funding for Net Zero Energy and Water-$3M
- **Camp Withycombe:** ESTCP funding for Energy Efficiency and Energy Security-$3.4M
- **Umatilla:** need funds for NEPA, planning and project management

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