



PV partnership

Sandia is advancing viable, low-carbon power through its collaboration on five US Regional Test Centers (RTCs) where industry can assess the performance, reliability, and bankability of large-scale photovoltaic energy systems. See the story on [page 5](#).



Putting supercomputing on the XPRESS track

Project aims to create an OS for exascale computing environment

By Neal Singer

A Sandia-led team in the stratosphere of high-performance supercomputing has been funded by DOE's Office of Advanced Scientific Computing Research to design an operating system suitable to handle the million-trillion-per-second mathematical operations of an envisioned exascale computer, and then create prototypes of several of its programming components.

Called the XPRESS project (eXascale Programming Environment and System Soft-

ware), the effort to achieve a major milestone in supercomputing is funded at \$2.3 million a year for three years and engages a team that includes the universities of Indiana, North Carolina, Oregon, and Houston; Louisiana State University; and Oak Ridge and Lawrence Berkeley national laboratories. Work began Sept. 1.

The project's goal is to devise an innovative operating system and associated components that will enable exascale computing by 2020, making contributions along the way to improve current petaflop (a million billion operations a second) systems, (Continued on page 5)

New inclement weather notification process is simple, straightforward, standardized

By Cathy Ann Connelly

Sandia has changed its procedures for inclement weather work delays, which now are set for universal, hour-specific start times for all members of the workforce.

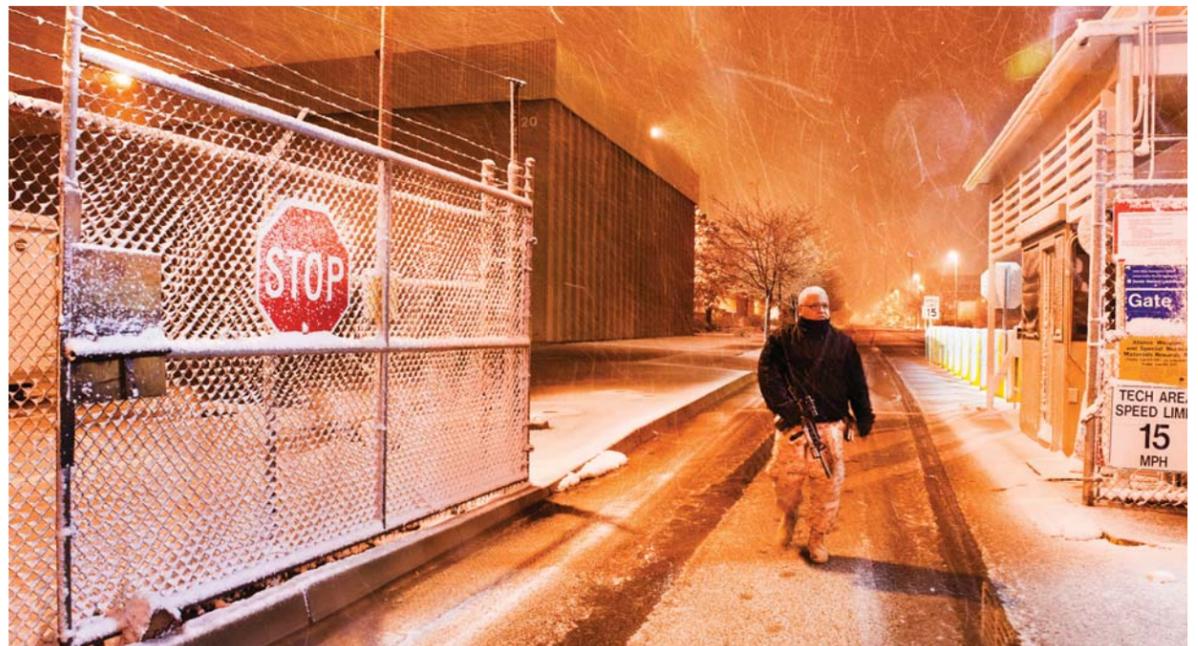
"The new approach will help all of us be safer as we drive, park, and walk into work," says Brian Bielecki, director of Security and Emergency Management Center 4200, "and it gives us clear, simple, and standardized communications about what to do, when to do it, and how to account for charging time."

Should overnight winter weather conditions make parking lots unsafe until they are cleared, Sandia Emergency Operations Center (EOC) will deliver a workforce message about the delay, including a specific time to report to work, and other details including how to charge time for the delay.

Under typical snowy conditions, messages will be sent no later than 5 a.m. the day of the delay, and will include a stipulated start time dependent on the severity of the storm — usually around 9 a.m.

Messages will be delivered in all the familiar ways, starting with Sandia email, so employees can choose

(Continued on page 4)



SHOULD OVERNIGHT WINTER WEATHER conditions make parking lots unsafe, Sandia's Emergency Operations Center will deliver a workforce message about the delay, including a specific time to report to work. (Photo by Randy Montoya)

Inside



Rachel Kolb, a Stanford graduate who has served several summers as a Sandia intern, including a productive season at the *Lab News* in 2009, has just been named a Rhodes Scholar, widely recognized as the world's most prestigious scholarship. Read more about Rachel and her remarkable achievements in a story on [page 8](#).

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A historic campaign ECP eclipses \$5 million goal for United Way

By Nancy Salem

Labs employees and retirees made history this fall when Sandia became the first company ever to donate \$5 million in a single campaign to the United Way of Central New Mexico (UWCNM).

And Sandia didn't stop there. As of mid-November, the Labs' Employee Caring Program (ECP) had collected \$5.2 million for UWCNM with total giving up 13 percent over last year's record-breaking \$4.6 million contribution. The final numbers will go even higher as more retiree donations come in during December.

"This has truly been a historic campaign," says Anthony Thornton, this year's ECP campaign chair and deputy to the VP of Defense Systems and Assessments Dept. 5220. "I have been deeply inspired by the commitment of volunteers within Sandia who tirelessly gave their time and energy to make this year's campaign the most successful in Sandia's history. We could not have achieved this milestone without their efforts."

The 2012-13 ECP campaign also set goals to increase participation in every division from the 2011 baseline and engage newer employees in the Labs' culture of giving.

(Continued on page 4)



Sandians making a difference

250 Sandians, contractors, family, retirees step up for Make a Difference Day • See page 6

That's that

As we approach the holiday season, think about this for a moment: There are kids in our community for whom the most exciting day of the year is the day they get a brand new pair of shoes of their choice. Shoes provided by the kindness of strangers, in this case, the kindness and generosity of Sandians and other members of the Sandia workforce.

You can make some child's day this year by donating something – every dollar helps – to the Shoes for Kids program, a homegrown Sandia cause that's been around for 55 years. In that time, the program has benefited thousands of children in our community, including some who have grown up to become members of our own Sandia community.

Shoes for Kids has an interesting origin story: In 1956 two scientists who had traditionally exchanged gifts at Christmas realized that there really wasn't much that they needed for themselves. Rather than doing yet another gift exchange, they thought, "How about putting that money we'd otherwise spend on each other toward something that someone really does need?" How about, for example, buying new shoes for disadvantaged kids?

As Sandia President and Labs Director Paul Hommert noted recently in a memo to employees, "This selfless gesture has blossomed into a holiday tradition that ensures children without some of the comforts many of us take for granted will have good and well-fitted shoes."

The Shoes for Kids campaign is a partnership among Sandia, area schools, Payless Shoe Source, and the Sandia Laboratory Federal Credit Union. In addition to benefiting children in Albuquerque, the campaign has grown to include children as far north as Bernalillo, and as far south as Los Lunas and Belen. Last year, Sandians generously donated nearly \$13,000 to buy new shoes for children in need.

This is a program that really makes a direct and tangible difference for kids every single day. If you care to contribute something this year to make one child's life a little better, find out how to participate at the Shoes for Kids website at <http://community.sandia.gov/images/Shoes.html>.

* * *

On page 8, we have a story about Rachel Kolb, a Stanford graduate who has interned at Sandia over the past four summers. Rachel has just been awarded a Rhodes scholarship, making her one of 32 Americans so honored this year. She was selected from a pool of 838 American candidates who had been nominated by their colleges and universities. She plans to commence her study in contemporary literature at Oxford University next October.

Becoming a Rhodes scholar puts Rachel in some remarkably fine company: President Bill Clinton. Songwriter Kris Kristofferson. Writer Naomi Wolf. Louisiana Gov. Bobby Jindal. UN Ambassador Susan Rice. Former US Rep. Heather Wilson. Supreme Court Justice David Souter. News commentator Rachel Maddow. Astronomer Edwin Hubble. I'm just skimming the surface here.

The Rhodes scholarship is widely regarded as the world's most prestigious academic award. America's Rhodes scholars are an eclectic but breathtakingly accomplished lot who have a way of rising to the very top of their chosen professions. Having known and worked with Rachel – she was a student intern at the *Lab News* during the summer of 2009 – I can tell you that she very much belongs in the august company of Rhodes scholars I listed above. She will make her mark in a big, big way.

She is a remarkable young woman who has dealt with some daunting personal challenges with grace and courage. Congratulations, Rachel.

* * *

Sometimes you just get lucky like that. Just in time for Christmas, I received the following email: "This is to notify you that you have been chosen as one of the beneficiary of a grant donation for humanitarian and your personal development. You have been awarded a grant sum of £500,000 GBP, for more details contact Mr ****@***** (Executive Secretary) with this email: *****@xxxx.com." I was admittedly a bit skeptical, given the fractured grammar, but my confidence in the legitimacy of this message soared when I noted that the contact individual is "executive secretary." This was clearly not one of those shameless phishing expeditions. Anyhow, that money will be put to good use in my personal development. My wife is going to love, love, love the new sailboat I've ordered. And I've already reserved our seats on the flight to Tahiti to pick it up. Just have to wait for that \$500,000 check to clear. I think it's being drawn on a bank in Nigeria.

See you next time.

Bill Murphy (505-845-0845, MS1468, wtmurph@sandia.gov)

Sandia News Brief

American Physical Society names Sandians Amalie Frischknecht, Mike Chandross as new Fellows

The Council of the American Physical Society has named two Sandians, Amalie Frischknecht and Michael Chandross (both 1814), as Fellows, a distinction limited



AMALIE FRISCHKNECHT

to one-half of 1 percent of APS membership annually.

Amalie Frischknecht, nominated for APS Fellowship by the Division of Polymer Physics, joined Sandia in 2000 as a post-doctoral employee. Amalie's APS Fellowship citation reads: "For outstanding contributions to the theory of ionomers and nanocomposites including the development and application of density functional theory to polymers."

Amalie received her bachelor's degree in physics and mathematics from Pomona College in 1992, and her doctorate in physics from the University of California, Santa Barbara, in 1998. She was a postdoctoral fellow at Exxon Research and Engineering Company for two years before joining Sandia.

Amalie is a staff scientist at the Center for Integrated Nanotechnologies, a DOE Nanoscale Science Research Center at Sandia and Los Alamos national labs. Her research is focused on understanding the structure, phase behavior, and self-assembly of complex fluids, particularly polymer nanocomposites, polymer brushes, lipid bilayers, and charged polymeric fluids, using classical density functional theory and molecular simulations.

Amalie has found her research experience at Sandia to be very rewarding. "The collaborative, interdisciplinary research environment at Sandia has been crucial in my professional career," she says. "We are encouraged to work with others, and for me this has led to very productive collaborations in teams using theory, computation, and experiment to understand a problem. It is possible at Sandia to tackle problems with teams of experts with diverse technical backgrounds, in a way that would be difficult elsewhere. The strong support for scientific computing at Sandia has also been extremely helpful to me."

Mike Chandross was nominated for his APS Fellowship by the Division of Computational Physics. His citation reads: "For his outstanding contributions to the development of computational physics methods and their application to tribology and the aging and reliability of nanomaterials."

Mike, who joined Sandia as a postdoctoral researcher in 1999, holds a bachelor's degree in physics with electrical engineering from the Massachusetts Institute of Technology (1990), and a doctorate in theoretical



MICHAEL CHANDROSS

physics from the University of Arizona (1996), where he studied the optical properties of conjugated polymers. Before joining Sandia, Mike spent two years completing a National Research Foundation postdoctoral fellowship at SPAWAR Systems Center in San Diego. At Sandia, Mike has had a varied research career, including the study of adsorption of small molecules in zeolites, grain growth in polycrystalline metals,

nanoimprint lithography, brazing, novel nanosolders, and nanotribology in systems ranging from micro-electromechanical systems (MEMS) coatings to metallic contacts. Mike's work has been featured on the cover of the ACS journal *Langmuir*, the trade journal *JOM* from the Minerals, Metals and Materials Society, and *Innovation Magazine*.

Mike lauds the work environment at Sandia. "The possibility of collaborating with so many world-class scientists in a variety of fields (and having them sit just a short walk away) is simply not available anywhere else," he says. "I truly appreciate the way Sandians develop a science-based understanding of a problem with direct applicability to engineering issues. This encourages exploratory work, yet keeps us grounded in reality, ensuring that we stay relevant as scientists."

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Bill Murphy, Editor 505/845-0845

Randy Montoya, Photographer 505/844-5605

Mike Janes, California site contact 925/294-2447

Michael Lanigan, Production 505/844-2297

Contributors: Michelle Fleming (Ads, Milepost photos, 844-4902),

Neal Singer (845-7078), Patti Koning (925-294-4911), Stephanie Holinka

(284-9227), Darrick Hurst (844-8009), Stephanie Hobby (844-0948),

Heather Clark (844-3511), Sue Holmes (844-6362),

Nancy Salem (844-2739), Jennifer Awe (284-8997),

Cathy Ann Connelly (284-7676), Jim Danneskiold, manager (844-0587)

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LOCKHEED MARTIN

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Employee death

Remembering Kevin Strecker

'He was one of the best and brightest, just a sponge for knowledge,' friend recalls

Kevin Strecker was a brilliant physicist with a child's enthusiasm and curiosity for science, a giving mentor, and a person who cared deeply for others. On Nov. 4, he died of a heart attack at the age of 38. He is survived by his wife of 16 years, Michelle.

"He was a once-in-a-career colleague," says Lorraine Sadler (8112). "I first heard his name when I was a graduate student. He was a pioneer in the field of cold atom physics."

Kevin earned his doctorate from Rice University in 2004. He pioneered the Feshbach resonance in lithium to create novel states of matter including matter wave solutions of attractively interacting Bose-Einstein condensates and strongly interacting Fermi gases.

That same year he joined the Combustion Chemistry and Diagnostics Department (8353) as a postdoctoral associate working with Dave Chandler (8300) on chemical dynamics research. In 2007 he was hired as a staff member and continued to contribute to chemical dynamics research at the Combustion Research Facility (CRF) and lead new technique development for nonproliferation and chemical detection with his colleagues in 8100.

"He was one of the best and brightest, just a sponge for knowledge," says Dave. "We bonded as colleagues immediately. Even though he was my postdoc, he mentored me as much as I mentored him. At his core, Kevin wanted to understand the world and make a difference. He was an extremely kind person. People gravitated toward him because of his talents and approachability. It was all about moving forward; he helped everyone he came in contact with to reach their potential."

"Kevin worked on a range of projects in both fundamental chemistry research and in nonprolifera-

tion programs. He had significant impact in both program areas in his relatively short time at Sandia," says Tom Settersten (8353), who was Kevin's manager. "I will always be impressed by his passion for tackling the most difficult problems, his knack for finding clever solutions, and his ability to see the interesting science in all that he did, even very applied projects. Kevin will surely be missed by Sandia as well as the broader scientific community."

"He was an amazing experimentalist and he loved being in the lab," says Lorraine. "Kevin followed a certain drumbeat in his head that only he could hear, and it always seemed as if he was three steps ahead. He had a way of having your back. If something was not going right, someone was not treating you right, or if he saw an injustice, he would try to fix it."

Outside of work, Lorraine describes Kevin as a bit of a Renaissance man. "He knew how to do almost anything, especially if it was hands-on. He was an avid cook and he and his wife Michelle rebuilt their entire house practically by themselves," she says. "He loved

"Kevin followed a certain drumbeat in his head that only he could hear, and it always seemed as if he was three steps ahead. He had a way of having your back. If something was not going right, someone was not treating you right, or if he saw an injustice, he would try to fix it."

— Lorraine Sadler



KEVIN STRECKER

Sandia California News

his Mini Cooper. It was just quirky enough to fit his personality."

"To me, he was a true physicist with deep insights. He had the extraordinary ability of exacting the essence of a problem from complex context quickly and accurately," says Haifeng Huang (8353). "But he was much more than an excellent scientist; he was a real gentleman. Whenever I or someone else had a problem, he was there to help. I cannot believe a person with such a kind heart passed away from a heart attack."

"I had the pleasure of working with Kevin on an atom-trapping project," says Scott Bisson (8128). "I was immediately struck by his abilities and knew that we had someone truly exceptional on our team. He was an exceptional experimentalist, and was able to improvise with just about anything. He was also very patient, and was always willing to take time to explain things. He always put the project and his team ahead of himself. Above all, he was my friend and I will miss him."

Kristi Duenas (8128) got to know Kevin about five years ago through the Dynamics of Molecular Collision Conference. "I learned firsthand not only how insanely intelligent he was on a multitude of subjects, but also what an awesome human being he was," she says. "I still find myself expecting him to saunter in and up the stairs with his faint head nod in good morning or up to my desk with the next task he needed help with because he seemed to think I could do anything. I truly appreciated the compliment and will sorely miss his presence here. The sun shines just a little less brightly with this loss."

— Patti Koning

Marillyn Hewson will become Lockheed Martin CEO Jan. 1

LOCKHEED MARTIN

Lockheed Martin has named Marillyn A. Hewson, 58, president and chief operating officer of the corporation effective immediately and chief executive officer (CEO) and president effective Jan. 1. Hewson will also retain her role as executive vice president of the Electronic Systems business area, which includes Sandia, until the end of this year.

In making the announcement on behalf of the board, CEO Bob Stevens said, "Marillyn is an exceptional leader with impeccable credentials and deep knowledge of our business, customers, shareholders, and employees."

During the same meeting that resulted in Hewson's selection as CEO, the board also confirmed Stevens as executive chairman effective Jan. 1. In that role he will work with Hewson to facilitate a smooth CEO transition.

"As board executive chairman," Stevens said, "I will remain very active and involved in our company's work, playing any role that would be of value, and I will do this throughout 2013."

Hewson joined Lockheed Martin in 1983. She has served as executive vice president of the Electronic Systems business area since January 2010. She earned her bachelor's degree in business administration and a master's degree in economics from the University of Alabama.

She also attended the Columbia Business School and Harvard Business School executive development programs. She chairs the Sandia Corporation board of directors and she serves on the board of DuPont. Hewson is a member of the Association of the United States Army Council of Trustees and the University of Alabama's Culverhouse College of Commerce and Business Administration Board of Visitors.



MARILLYN HEWSON

Alternative Fuels Challenge boosts STEM learning

More than 25 middle schools and 300 students from around the state participated in this year's New Mexico Alternative Fuels Challenge, held Nov. 17 in Albuquerque. The event was sponsored by Sandia/Lockheed Martin, Albuquerque Public Schools, and other organizations interested in advancing science, technology, engineering, and math (STEM) curriculums in New Mexico's schools.

The competition ties project-based learning with STEM. Students receive a hydrogen fuel cell and electric motor. From there, they apply their education and imaginations to create the most original and fastest hydrogen-powered cars.

In addition to racing their cars, which are built from scratch, the students submitted a short essay topic in the area of alternative fuel, and each team gave an oral presentation.

The winners this year were: Kennedy Middle School (Albuquerque) first place; Chimayo Middle School (Chimayo, N.M.), second place; and Taylor Middle School (Albuquerque), third place.

Teams won trophies for the four different competitions and overall awards. Cash awards were presented to three teachers of the top programs to assist them in expanding energy education at their schools.

Sandia's volunteer commitment was coordinated by Community Involvement Dept. 3652.



SANDIA VOLUNTEER David Samuel (2993) mans the starting gate as a timekeeper during the 7th annual New Mexico Alternative Fuels Challenge. Other Sandia volunteers included Francisco Alvarez (2614), Danae Davis (6124), Guillermo Hernandez (0424), Katrina Groth (6231), Ronald Hahn (2958), Robert A. Salazar (1653), Rebekah Sanchez (9532), Leonard Duda (5737), Robert Hughes (1714), and Grant Wells (0426). (Photo by Rachel Baros)



WHEN INCLEMENT WEATHER descends upon the Labs, Safeguards and Security personnel are on the scene to determine the work schedule and Labs closures.

(Photos by Randy Montoya)

Weather policy

(Continued from page 1)

which sources they prefer to monitor. Sources include:

- Sandia email
- Sandia Bulletin Board (Dial 845-6789 and follow the menu choices.)
- Radio Sandia, 1640 AM
- Alert banners on Sandia's external homepage, www.sandia.gov, and Sandia TechWeb
- News coverage through local television and radio stations
- Sandia Facebook, www.facebook.com/SandiaLabs, and
- Sandia Twitter, twitter.com/#!/sandialabs

"This new protocol allows Sandia response crews to be more efficient in their early morning clean up of parking lots because they'll be vacant and easier to clear and prepare," Brian says.

The fixed start time approach to delays was implemented at Los Alamos National Laboratory (LANL) a few years ago and has proven to be efficient for LANL's similar large number of personnel. LANL employees enter through even fewer access points and they experience a much higher number of inclement weather days than Sandia.

The new arrival time protocol has been coordinated with Kirtland Air Force Base (KAFB) so that gates will be fully staffed at universal access times following a delay.

Delayed arrival times at Sandia apply to the entire Sandia population, except for inclement weather response teams. This includes all off-site employees, such as those reporting for work at Innovation Parkway Office Center (IPOC), the International Programs Building (IPB), and other Sandia facilities off KAFB.

Contractors must also delay their arrival time to Sandia, but cannot bill time that is not worked and

cannot use the inclement weather charging code.

Sandia bases its inclement weather decisions on conditions within Sandia/KAFB.

A sample of a pre-approved Inclement Weather Work Delayed Start Time message follows:

"Due to hazardous weather conditions, Sandia Labs will open at ___ a.m. (today/tomorrow) for all employees. Check for schedule updates due to worsening weather conditions. Updated information will be posted as needed through the following:

- Sandia email
- Sandia Bulletin Board (Dial 845-6789, there will be a short pause before providing menu choices)
- Radio Sandia, 1640 AM
- Alert banners on Sandia's external homepage, www.sandia.gov, and Sandia TechWeb
- News coverage through local television and radio stations
- Sandia Facebook, www.facebook.com/SandiaLabs, and
- Sandia Twitter, twitter.com/#!/sandialabs

Follow any contingency plans previously developed for weather delays, including any telecommuting work arrangements made with your manager. Information regarding road conditions can be found at www.nmroads.com.

Time Charging

• Do not use the inclement weather TRC-270 if you were scheduled to be off work for vacation or travel, or if you worked your normally scheduled hours for the day.

• Charge TRC-270 for any work time you missed due to the delayed start time. For example, if you normally start at 8 a.m., and Sandia delayed opening until 9 a.m., you would charge one hour of time to TRC-270.

• By contract, staff augmentation contract associates who are impacted may not bill project(s)/task(s) for hours not worked."

Other inclement weather messages may include alerts at other times of day, such as weather warnings, early workforce releases, and Sandia closure notices.

Other Inclement Weather Considerations

When at work, as weather deteriorates, pay attention to email notices and keep in mind proactive winter precautions from Security and Emergency Management:

Emergency, Safety & Health

• Do not overload yourself with hand-carried items while walking. High winds combined with the inability to use your hands and arms to balance make you prone to falling.

• Be aware that the wind may stir up debris causing ear, nose, throat, and eye vulnerabilities. You should consider eye protection and respiratory guards/masks to mitigate any airborne debris hazards.

• Be mindful of doors blowing open in windy conditions.

• If it should snow or become icy, be aware of slipping hazards. Sandia annually averages 2-3 slips in parking lots as the result of slippery surfaces and inadequate footwear.

• Assist others if you recognize they may be compromising their safety or the safety of others. Let's look out for one another.

• Situational awareness is paramount when an unrecognized hazard surfaces. Situational awareness provides reaction time and space to recover from incidents that could result in injury.

Security

• High winds may prevent security area (i.e. Limited Area, Property Protection Area, etc.) entry/exit points from securing properly. When entering or exiting a security area, please ensure that those entry/exit points are properly secured to prevent the compromise of classified, critical infrastructure, and personnel.

• Report any facility issues that could lead to a compromise in security at: TELECON 844-4571.

Sandia's ECP campaign breaks \$5 million barrier

(Continued from page 1)

Sandia's overall participation rose to 73.6 percent from 71.8 percent the previous year, and more than 90 percent of divisions raised their participation. New employees showed a participation increase of 5.6 percent.

Deputy Laboratory Director and Executive VP for Mission Support Kim Sawyer, chair of UWCNM's 2012-13 \$28.15 million campaign, says the response from Sandians and retirees this year was "absolutely fantastic."

"It continues to demonstrate our strong culture of giving," she says. "Other companies admire the generosity of Sandians and our retirees and are envious of what we have accomplished for the good of the community year after year."

Ed Rivera, UWCNM's president and CEO, says Sandia's generosity is at the root of the agency's successful campaigns. "We talk about the culture of giving that is Sandia," Rivera says. "It's infectious. It's huge."

Rivera says Sandia's per capita giving ranks in the top among companies of its size nationwide. "We thank you for that from the bottom of our hearts and from all those who benefit from what you do," he says. "Sandians are thoughtful people who are informed about the challenges in our community. You give money and time so generously. You will change lives."

Sandia holds a special place in the history of UWCNM. Since the ECP was launched in 1957, Sandia has been the single largest supporter of the organization's annual campaign. Sandians have contributed more than \$76 million to the community.

"Think about the impact of that," says Randy Woodcock, UWCNM's vice president and chief strategic officer. "And every year it gets better. What Sandia accomplished this year is unheard of. I've never seen a company of this size increase this much in one year."

Anthony singled out Pam Catanach (3652), the Community Relations specialist who has been ECP's program manager for eight years, for special praise. "Pam is the real engine behind the campaign's success," he says.



HAIR TODAY, GONE TOMORROW — Left to right, Charlie Palacio, Anthony G. Chavez, Robert Washington, Josh Konetzni, and Rick De La Rosa (all 4853) either shaved their heads or dyed their hair as their group reached and exceeded its Employee Caring Program goals. This group's organization raised its total participation from 62 percent in 2011 to 90 percent in 2012.

He thanked Sandia's 65 ECP representatives who reached out to workforce members and planned activities within divisions. He says the ECP kickoff event on Oct. 8 raised \$5,148 for the UWCNM's Community Fund, which supports the area's most vulnerable through grants to qualifying health and human services agencies. Book fairs were well attended, with proceeds going to the fund.

Anthony passed the campaign chair torch to Kelly Westlake, senior manager of Controller Operations Dept. 10510.

"Anthony and the 2013 ECP have set the bar at an astronomical level, but I recognize how amazing Sandians are when they not only put their minds, but hearts, to task with the will to succeed in helping those most vulnerable in our community," Kelly says. "I am honored to lead Sandia to another new record in 2014."

PV partners

Sandia helps DOE bring large-scale solar systems to market

By Nancy Salem

Sandia is advancing viable, low-carbon power through its collaboration on five US Regional Test Centers (RTCs) where industry can assess the performance, reliability, and bankability of large-scale photovoltaic energy systems.

“With the trend in the solar industry toward larger systems and greater capital investment — substantial amounts of money are going into this field — the financial community is increasingly scrutinizing how well these systems operate,” says Charles Hanley, manager of Photovoltaic and Distributed Systems Integration Dept. 6120. “The RTCs will provide enhanced monitoring and improved performance prediction capabilities for new technologies being introduced to the market.”

Photovoltaic (PV) modules convert solar radiation into electrical current using solar cells containing semiconductor material. Demand for renewable energy has produced an industry around the manufacture and installation of solar cells, photovoltaic arrays, and other components such as inverters, trackers, and racking systems. Demand has also produced a need to build investor confidence in larger PV systems by assessing performance over time in different climates.

Sandia has a long history of measuring and modeling performance of PV systems, from single panels to multi-megawatt arrays, the kinds of systems found on residential rooftops and small businesses. “Sandia works in partnership with the US solar industry to advance the state of the art in system integration and system optimization,” Charles says.

Sandia researchers a few years ago developed the idea of an incubator for commercial-scale PV systems up to 500 kilowatts or a megawatt, the size found on big-box stores or schools. The Labs’ National Solar Thermal Test Facility (NSTTF) was quickly identified as a perfect site for such a PV testbed.

At the same time, DOE was working with industry and stakeholders to determine their most pressing needs. The agency hosted a workshop in Berkeley, Calif., on PV manufacturing attended by the CEOs of module manufacturers and members of the financial community.

“It was clear from the workshop that the broad community wants better ways to quantify technical aspects to support the bankability of PV systems,” says Jennifer Granata (6112) of the Labs’ solar group.



Bankability is a measure of a project’s risk to an investor. The lower the risk the more bankable it is, thereby lowering associated financing costs. The technical risk must be quantified to make PV systems more commercially viable.

“The RTCs will develop protocols and conduct testing and analysis on the systems that can give investors some concrete data with which to assess the risk,” Jennifer says.

A good fit for Sandia

She says the PV world until now did not have full and independent standardized processes for monitoring and evaluating large systems. The country’s few other PV test sites accommodate only small systems.

The workshop attendees asked DOE to develop test locations for large arrays where PV manufacturers could try out new designs and systems and get reliable data. “It fit with the Sandia idea on system incubators,” Jennifer says. “We had ideas on how this

could work.”

DOE asked Sandia and the National Renewable Energy Laboratory (NREL) in Golden, Colo., to submit proposals for what the agency named Regional Test Centers. Jennifer led a team effort to develop a Sandia proposal for testing infrastructure and a validation plan to measure and evaluate performance and reliability.

DOE decided to fund physical and data monitoring infrastructures and validation plans at five locations in different climates, with Sandia and NREL working together on the overall project management. Sandia manages four of the five locations with local partners: Albuquerque; Orlando, Fla.; Burlington, Vt.; and Las Vegas, Nev. The fifth location, Denver, is managed by NREL.

The sites are in varying stages of development, from early planning to ready-to-go. Each will put in infrastructure up to one megawatt, so multiple different-sized systems can be tested. At Sandia, the project has started on eight acres at the NSTTF with an option to expand by an additional 30 acres. Infrastructure includes a road, communications equipment, and the electrical lines for monitoring systems, transformers, and switches.

“Most of the work is underground,” Jennifer says. “Companies can come in and put a PV system in place. AC goes right to the grid.”

Jennifer says key components of the RTCs are the processes, standards, and guidelines for validating large PV systems. Experts from the participating sites have developed a validation plan with step-by-step processes to assess and quantify system performance.

“The Regional Test Centers, with lab expertise, can provide an independent, third-party perspective, and test beyond the standard protocols to improve our understanding,” Jennifer says.

RTCs are a part of DOE’s SunShot Initiative, a collaborative national effort to make solar energy cost-competitive with other forms of energy by the end of the decade. DOE wants to encourage widespread, large-scale adoption of renewable solar energy technology and restore US leadership in the global clean-energy race.

Charles says the RTCs are an important part of the effort. “This will produce improvements in performance monitoring that can greatly reduce the uncertainty around investing in large-scale projects and therefore help keep the dramatic growth in this market on track,” he says.

Getting on the XPRESS track

(Continued from page 1)

says program lead Ron Brightwell (1423).

Scientists in industry and in research institutions believe that exascale computing speeds will more accurately simulate the most complex nuclear, chem/bio, and atmospheric reactions, but enormous preparation is necessary to improve supercomputing so that it can achieve such speeds.

Current software now based on 20-year-old technologies

“System software on today’s parallel-processing computers is largely based on ideas and technologies developed more than 20 years ago, before processors with hundreds of computing cores were even imagined,” says Ron. “The XPRESS project aims to provide a system software foundation designed to maximize the performance and scalability of future large-scale parallel computers as well as enable a new approach to the science and engineering applications that run on them.”

Current supercomputers operate through a method called parallel processing, where individual chips work out parts of a problem and contribute results in an order controlled by an overall program, much like the output of instruments in an orchestra are controlled by a conductor. Chip speed itself thus plays a less important role than the ability to synchronize individual results, since more chips can be added for greater traction in solving harder problems.

But merely adding more chips to a supercomputer “orchestra” to solve extremely difficult problems in a reasonable amount of time can make the orchestra unwieldy, the conductor’s job more difficult and, in the end, impossible.

In addition to programming difficulties, excess heat generation wastes energy, adding more components increases the chances that some will fail, and designing convenient information storage locations so memories are immediately available to processors is not a trivial problem.

The conundrum is, in short, that an exascale computer using current technologies could have the unwanted complexity of a Rube Goldberg contraption that uses the energy of a small city and requires constant upkeep.

To reduce these problems and start researchers on the road to solutions, the multi-institution XPRESS effort will address specific factors known to degrade fast supercomputer performance. These include “starvation” — the insufficiency of concurrent partial problem-solving at particular locations. This hinders both efficiency and scalability because it can require more parallelism. Information delays, known as latency effects, need to be reduced through a combination of better locality management, reduction of superfluous messaging, and the hiding of information unnecessary to the problem. Overhead limits the fitness of granularity that can be effectively

exploited through inference. This reduces scalability. Waiting — because the same memory is needed by several processors — also causes slowdowns.

The team brings together researchers with expertise not only in operating systems, says Ron, but also other system software capabilities, such as performance analysis and dynamic resource management, that are crucial to supporting the features needed to effectively manage the increasing complexities of future exascale systems.

Sen. Bingaman honored by SS&TP



OUTGOING SEN. JEFF BINGAMAN, who represented the state of New Mexico in Washington, D.C., for 30 years, received a Pillars of the Park Award from the Sandia Science & Technology Park (SS&TP) for his contributions to its success. He was honored Nov. 2 at a ceremony attended by Sandia executives including VP and Chief Technology Officer Steve Rottler, members of the business community, and representatives of elected officials. Bingaman told the crowd the SS&TP, which houses more than 30 companies employing about 2,500 people, has accomplished a lot. “Its future is very bright,” he said. “I look forward to hearing about its continued success.” The Pillars of the Park Award is given to individuals who have significantly supported the SS&TP.

(Photo by Linda von Boetticher)

Making a difference

By Stephanie Hobby • Photos by Patty Zamora

More than 250 Sandia employees, contractors, retirees, and family members devoted their October weekends to participate in the nationwide Make a Difference Day. For more than 10 years, Sandia has been providing opportunities for employees to participate in the event, which impacts local nonprofit organizations.

"Sandia has a long and rich history of serving our communities, and we are proud to continue that tradition," said Kim Sawyer, deputy Labs director and executive vice president for mission support at Sandia.

This year, Sandians helped out by sorting and packaging food for Roadrunner Food Bank, decorating pumpkins with the Make-A-Wish Foundation, conducting nanochemistry experiments with students at the National Museum of Nuclear Science and History, landscaping the grounds of Sandia Base Elementary School, and repairing and extending a fence at Shandiin Child Development Center. In addition, the Sandia Women's Action Network sorted clothing for Barrett House Attic Thrift Shop.

Early in October, Sandians donated items and funds to a drive for care packages for the Rio Grande Valley Blue Star Mothers, after which 10 Sandians sorted and packaged the donated items for US troops.

Make a Difference Day is the nation's largest volunteering event and is known as "the national day to help others." Nationwide, the event is the fourth Friday and Saturday of October, but Sandia volunteers decided to make the most impact by extending their efforts through the entire month.

Make a Difference Day is celebrated in nearly every city and state across the country, and last year more than 3 million Americans joined together in the spirit of service. Sandia partners with several businesses in Albuquerque to help, and this year, 2,000 people are expected to join the effort in Albuquerque and the surrounding area.



SANDIA VOLUNTEERS gathered prior to decorating pumpkins with the Make-A-Wish Foundation.



VOLUNTEERS helped out by sorting and packaging food for Roadrunner Food Bank.



SANDIANS sorted and packaged donated items for US troops through a drive for care packages organized by the Rio Grande Valley Blue Star Mothers.

Thanksgiving turkey drive



TALKING TURKEY — Members of the Sandia workforce donated 350 frozen turkeys weighing a total of almost 5,000 pounds during this year's Take a Turkey to Work Day. Community Involvement Dept. 3652 organized the drive, which was held Nov. 20. Collection bins were deployed at Hardin Field, in front of Bldg. 800, in the Steve Schiff Auditorium parking lot, and at IPOC. The Community Involvement team extended thanks to the volunteers who helped with the collection, including Trudi Martinez (5742) and Teri Walker (5251), pictured here at the IPOC facility, and Daniel Sanchez and Kevin Romero (both 10262-1) for picking up and delivering the turkeys to the Roadrunner Food Bank.

(Photo by Randy Montoya)



PITCHING IN to repair and extend a fence at Shandiin Child Development Center.



VOLUNTEERS sorted clothing for Barrett House Attic Thrift Shop.



CONDUCTING nanochemistry experiments with students at the National Museum of Nuclear Science and History.



LANDSCAPING the grounds of Sandia Base Elementary School.



SANDHILL CRANES LEAP INTO THE SKY as sunset approaches, moving from dryland feeding areas to seek nighttime safety in the wetlands of the Bosque del Apache National Wildlife Refuge near Socorro. Thousands of the migratory cranes winter over in the area, along with more than 20,000 Ross's and Snow Geese. An annual "Festival of the Cranes" is held the weekend before Thanksgiving as large numbers of cranes begin arriving in the refuge. (Photo by Randy Montoya)

Intern adds Rhodes Scholarship to remarkable achievements

By Nancy Salem

Rachel Kolb has one of those rare resumes for a 22-year-old. She's a National Merit Scholar with a bachelor's degree in English from Stanford University. She's the first Stanford student to twice win the university's distinguished Boothe Prize for essay writing. She was a summer intern four times at Sandia in areas ranging from the *Lab News* to Strategic Foundations to Surety Engineering. And she's closing in on a master's degree.

Rachel just added another entry: Rhodes Scholar.



RACHEL IS AN ACCOMPLISHED HORSEWOMAN and president of the Stanford Equestrian Team. She says her connection to horses is one of the most important things in her life. (Photo by Randy Montoya)

She found out two weeks ago she is one of 32 U.S. students chosen for post-graduate study at the University of Oxford in England in 2013 under what is widely considered the world's most prestigious scholarship.

"I was stunned," Rachel (420) says. "I'm also very excited and trying to wrap my mind around everything this means, the whole process, being away from home, keeping that kind of company."

What makes Rachel's accomplishments even more extraordinary is that she was born deaf. She learned to speak through 18 years of intensive weekly speech therapy. And receiving a cochlear implant two years ago has helped her hear better than she could with hearing aids alone. "The challenge is how to use and interpret the sounds," she says.

Rachel is an Albuquerque native. Her parents Bill (6123) and Irene (2992) Kolb have worked at Sandia since the early 1980s. Rachel graduated in 2008 from Albuquerque Academy and entered Stanford, where she earned a bachelor's degree this year and will complete a master's, also in English, next June.

Rachel wants to be a writer and plans to study contemporary literature and comparative social policy at Oxford, earning a master's degree in each over two years. She loves fiction and nonfiction and hopes to work disability-related issues into her writing. She's also considering work in academia.

"I love reading," she says. "I read the classics and try to keep up with contemporary fiction."



RACHEL KOLB says she might pursue a PhD after completing two master's degrees at the University of Oxford under a Rhodes Scholarship. She also might launch a writing career or teach. "My options will be open," she says.

Some favorite authors are Jonathan Franzen, Hilary Mantel, Michael Chabon, Virginia Woolf, William Faulkner, and George Eliot. Her undergraduate thesis was on Charlotte Bronte's *Jane Eyre*. "I enjoy writers who experiment with the form and with what they can do with their craft," she says.

Rachel is an accomplished horsewoman and president of the Stanford Equestrian Team. She says her connection to horses is one of the most important things in her life. "They allow me to communicate without language," she says. "They take you as you are."

Rachel heads to Oxford next fall. She studied there through Stanford's Bing Overseas Studies Program during her junior year, from October to December 2010. "Being at Oxford made me want to apply for the Rhodes Scholarship," she says. "I enjoyed the one-on-one tutorial system and the intensive focus on individual projects instead of large classes."

"We are so thrilled for her," Irene says. "And to be honest, we feel quite humbled. We are proud of everything Rachel has accomplished."

Rachel's childhood speech therapist advised Irene not to put limits on Rachel. "And we didn't," Irene says. "Look at all the wonderful things she's brought to our lives."

Bill says his daughter's life is packed with scholarly pursuits. "She's always reading, always writing, always responding to people. Her heart is people. She loves being included and inclusive."

Irene says she loves the conversation Rachel brings to the family, which includes another daughter, Leigh, a Pepperdine University sophomore who is studying this year in Switzerland. "Rachel is never at a loss for words at the dinner table no matter what the subject might be," Irene says. "She brings up all types of interesting topics."

Bill and Irene say they'll miss Rachel while she's in England but will visit and talk. "With two kids abroad thank goodness for Skype," Bill says.

He says he knew from the beginning his daughter was special.

"We're blessed to have her," he says. "I'm proud and I'm honored to know her and to have her in my life. She's extraordinary. I've learned more from her than she has from me."