



S A N D I A

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Chasing the light: Sandia study finds new clues about warming in the Arctic



SHINING THE LIGHT ON WARMING — A Sandia study used previously unpublished data from GPS monitors to learn more about what’s decreasing the sun’s reflectivity in the Arctic, which is heating up faster than any other place on Earth. **Photo by Valerie Sparks**

Study focuses on reduction in sunlight reflectivity

By **Kenny Vigil**

The Arctic, Earth’s icy crown, is experiencing a climate crisis like no other. It’s heating up at a furious pace — four times faster than the rest of our planet. Sandia researchers are pulling back the curtain on the reduction of sunlight reflectivity, or albedo, which is supercharging the Arctic’s warming.

The scientists are not armed with parkas and shovels. Instead, they have tapped

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2023 Sandia economic impact marks biggest ever

Labs credited with pumping nearly \$4.8 billion into the economy

By **Kim Vallez Quintana**

Sandia’s economic impact for fiscal year 2023 reached an all-time high of \$4.77 billion, over half a billion more than in 2022.

The impact can be seen everywhere, from the 1,200 new jobs added in the last year to the \$114 million in gross receipts taxes paid to the state and the \$1.08 billion paid to the small-business suppliers who

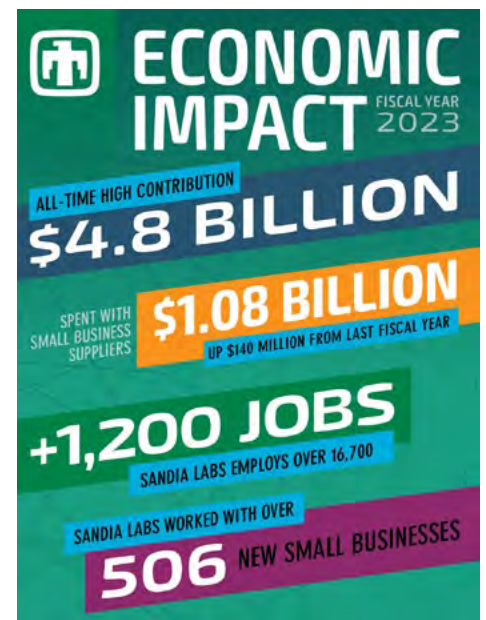
help provide critical components for Sandia to fulfill its mission.

“For more than seven decades, Sandia Labs’ dedication to outstanding service has significantly contributed to the national good,” Labs Director James Peery said. “Our collaboration with a wide range of suppliers has been crucial to our achievements. Engaging with small businesses fuels creativity, creates jobs and introduces advancements that enhance the quality of life.”

Job growth

As it continued to expand its footprint around the world, Sandia’s workforce continued to grow. Sandia ended

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BIGGEST IMPACT EVER — Sandia made its largest financial impact ever in 2023, contributing nearly \$4.8 billion to the economy.

Graphic by **Lloyd Wilson**

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Sandia National Laboratories

Albuquerque, New Mexico 87185-1468
 Livermore, California 94550-0969
 Tonopah, Nevada | Kauai, Hawaii
 Amarillo, Texas | Carlsbad, New Mexico | Washington, D.C.

Katherine Beherec, Editor kgbeher@sandia.gov
Ray Johnson, Production rbjohns@sandia.gov
Craig Fritz, Photographer cvfritz@sandia.gov
Michael Langley, California Contact mlangle@sandia.gov

CONTRIBUTORS

Michelle Fleming (milepost photos, 505-844-4902),
 Neal Singer (505-846-7078), Kristen Meub (505-845-7215),
 Troy Rummier (505-284-1056), Meagan Brace (505-844-0499),
 Mollie Rappe (505-288-6123), Skyler Swezy (505-850-2063),
 Kim Vallez Quintana (505-264-1886), Kenneth Vigil (505-537-1528),
 Luke Frank (505-844-2020), Michael Baker (505-284-1085)
 Maggie Krajewski mkrajew@sandia.gov,
 Valerie Alba (505-250-0262)

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National award goes to Sandia engineer



SQUARED UP — Tony Garcia's innovative thinking earned him a 2023 Society of Hispanic Professional Engineers STAR of Today award for technical achievement. **Photo by Craig Fritz**

Society of Hispanic Professional Engineers spotlights Anthony Louis Garcia

By **Luke Frank**

Tony Garcia often reflects on his grandfather's words: "Work hard and be good to people, and you'll end up happy."

This simple principle has been Tony's beacon throughout his academic and professional journeys, and now has led to his recognition with a prestigious 2023 Society of Hispanic Professional Engineers STAR of Today award for technical achievement.

The **STAR** awards recognize individuals in STEM who are excelling in their fields and also making a significant impact through their work, research and community outreach.

"This is a really big deal for me," Tony said. "I strive to make a difference in my career and life while not standing out, so receiving this award feels both exciting and a little awkward. But I share this recognition with my colleagues because we've accomplished something together, which makes it even more meaningful."

The grandson of immigrants, Tony watched as the generations before him struggled to make ends meet. "My grandfather brought his young wife and four children from Chile to America in pursuit of the American dream," Tony said. "My mom was 8 years old before her first car



CLEAR VISION — Tony Garcia’s community support is changing lives locally and beyond.

Photo by Craig Fritz

ride. Eventually my dad went to college while working construction and earned a degree in computer science.” But their struggles lingered, and Tony’s parents urged him to seek job stability rather than advanced degrees, a sentiment shaped by their own experiences.

“That was probably a byproduct of their young lives,” he said. “They were always very loving and supportive.”

However, Tony’s determination led him to a doctorate in mechanical engineering at the University of New Mexico. His decision was strongly supported by his grandfather, who had been an engineer in Chile before fleeing political unrest.

“He really understood what I was going through,” Tony said. “The sacrifices involved — the financial sacrifice, missed opportunities and a delayed career. He always encouraged me to pursue my education and acquire as much knowledge as possible. ‘Just continue getting your degree,’ he would say. ‘Keep improving your education. Learn as much as you can, and things will work out.’”

During his doctoral studies, Tony seized an opportunity to intern at Sandia, where he researched nuclear fuels. The experience not only helped shape his

dissertation but also introduced him to Sandia’s team-science culture, dedicated to addressing vital national security missions. Tony was inspired by the work of the team and found his calling in contributing to global security.

“It was a great fit,” he said. “This was a place I wanted to be. I love being a part of an effort to keep the world safe.”

Since joining Sandia in 2007, Tony has played a pivotal role in developing concepts, advancing technologies, enhancing diagnostics, supporting production and resolving complex issues to address national security challenges. His responsibilities include creating test plans, procedures and reports; crafting project proposals and specifications; optimizing manufacturing processes; and conducting statistical analyses of experimental data. “It’s been a really rewarding journey, and I believe our team has accomplished a great deal for the Labs and the nation,” Tony said.

Community connections

While Tony’s professional accomplishments are impressive, his personal commitment to community engagement is equally inspiring. “As we gain levels of success, we must remember to look back and reach out to those who are coming


up behind us,” he said. “It only takes a few key people at key moments in life to inspire a generation. We can have an enormous impact on the lives of others.”

As a UNM student, Tony actively participated in a NASA training project, providing academic and financial support to underrepresented science students. Currently, he volunteers for various STEM outreach programs, including through UNM’s Young Children’s Health Center. He develops STEM demonstrations for at-risk teens and leads STEM demonstrations for elementary school students. He also is part of Sandia’s working fathers mentoring group and a founding member of the St. Chad’s Episcopal Church Men’s Group, focusing on fellowship and communication skills for fathers of young children.

“I’m at a place in my life where I have the means to give back,” Tony said. “I can show kids that no matter where they come from, they can achieve great things. Seeing somebody who looks like them and comes from similar place can make anything seem possible. Do we want to miss the next Einstein because kids don’t believe they belong?”

Tony emphasizes the value of organizations like the Society of Hispanic Professional Engineers. “Through mentorship and activities, they guide young individuals in understanding what is expected of them and how to create and achieve their goals. Diversity is so important. Innovation is fostered by bringing together people from different backgrounds, values and communication styles. In such an environment, we feel secure and empowered to be more innovative.

“It’s also fun to celebrate where you come from and what you love about who you are,” Tony said.

Tony’s recognition serves as a valuable reminder that success is not solely measured by personal accomplishments but also by the positive impact left on others. In the spirit of his grandfather’s wisdom, Tony continues to inspire, embodying the belief that with dedication and kindness, one can truly find happiness in making a difference. 

Chasing the light

CONTINUED FROM PAGE 1

into data from GPS satellite radiometers, capturing the sunlight bouncing off the Arctic. This data dive could be the key to cracking the Arctic amplification code.

“The uneven warming in the Arctic is both a scientific curiosity and a pressing concern, leading us to question why this landscape has been changing so dramatically,” said Erika Roesler, an atmospheric and climate scientist at Sandia.

Previous studies have suggested that sea-ice albedo feedbacks are likely driving Arctic amplification. These albedo feedbacks can be broken down into two main areas. First, there’s an overall reduction in sea ice, leading to more exposure of the dark ocean, which absorbs more sunlight than snow-covered ice — raising temperatures. The second factor is the reflectivity of the remaining sea ice, or local albedo, which includes ponding water on ice due to melting.

Sandia researchers aimed to gain a better understanding of the reduction in reflectivity in the Arctic. Senior scientist Phil Dreike collaborated with the U.S. Space Force to obtain permission for Sandia to analyze previously unpublished data from

the radiometers on GPS satellites.

“New observational climate datasets are unique. To qualify as a climate dataset, observations must span a multitude of years. Small-scale science projects are typically not that long in duration, making this dataset particularly valuable,” Erika said.

Amy Kaczmarowski, an engineer at Sandia, conducted an analysis of the data spanning from 2014 to 2019. “There have been numerous local measurements and theoretical discussions regarding the effects of water puddling on ice albedo. This study represents one of the first comprehensive examinations of year-to-year effects in the Arctic region,” Amy said. “Sandia’s data analysis revealed a 20% to 35% decrease in total reflectivity over the Arctic summer. According to microwave sea-ice extent measurements collected during the same period, one-third of this loss of reflectivity is attributed to fully melted ice.”

The other two-thirds of the loss in reflectivity is likely caused by the weathering of



Fresh snow-covered ice reflects more sunlight.

LIT UP — Watch the albedo process. **Animation by Andrew Dormody**

the remaining sea ice. “The key discovery here is just how much the weathered ice is reducing reflectivity,” Amy added. Weathered ice refers to the remaining sea ice, which can be thinner and may contain melt ponds.

The GPS satellites are expected to continue providing data through 2040. Sandia researchers hope that other researchers will consider their findings, recently published in the journal [Nature Scientific Reports](#), and incorporate them into their models for Arctic amplification. They plan to continue mining the GPS data and are enthusiastic about collaborating with other climate researchers for further analysis. “We will continue to use this data to investigate various regions of the Earth for climate applications,” Amy said.

Center opens for radiological response teams

By **Jim Danneskiold**

Last month, NNSA opened its new Radiological Assistance Program Regional Operations Center on Kirtland Air Force Base.

The center comprises an office building and a centralized depot that consolidates equipment, maintenance, procurement and other functions across 12 DOE national labs, plants and sites that host [deployable RAP teams](#), along with some used by the national Nuclear Search Program.

The office building houses personnel from RAP Region 4 (southwestern states)

and NNSA RAP leadership based at the Albuquerque headquarters site. In Region 4, which includes Sandia, Los Alamos, Pantex Plant, the Waste Isolation Pilot Plant and regional NNSA and DOE federal personnel, 21 Sandians serve as volunteers out of 68 experts who can deploy immediately on RAP teams of eight or more responders. “This new Regional Operations Center gives RAP capabilities that we’ve never had before and



DETECTOR CHECK — Technologist Gary Baldonado from Weapons of Mass Destruction Detection and Threat Analysis, a longtime Radiological Assistance Program volunteer, examines a backpack instrument used to detect radiation as he organizes storage at the new RAP center on Kirtland Air Base.

Photo by Craig Fritz

enables the calibration and standardization of equipment and software,” RAP program manager Kent Gray said.

Marc Phipps, RAP 4 regional program manager called the center a “hub for continuous learning and preparedness,” and added, “It elevates our ability to train and equip emergency response personnel, ensuring a robust and agile regional response to radiological incidents.”

The center also houses the second surge pallet that RAP teams can use when responding to provide security for national events such as the Super Bowl, and to emergencies. The other pallet is at Nellis Air Force Base northeast of Las Vegas, Nevada.


RAP, which formed in 1958, is the nation’s premier first responder organization for assessing hazards and incidents that involve radioactive materials. RAP advises federal, state, local, and tribal public safety officials, first responders and law enforcement personnel



RAP CENTER CEREMONY — Marc Phipps of NNSA, Region 4 Radiological Assistance Program federal program manager, cuts a ribbon to mark the opening of the team’s new Regional Operations Center last month. **Photo by Craig Fritz**

on protecting public health and safety or the environment during radiological incidents. It is part of the Nuclear Emergency Search Team, or NEST, NNSA’s umbrella

organization for radiological and nuclear emergency response functions.

NNSA published a comprehensive article about the new center [here](#). 

Economic impact

CONTINUED FROM PAGE 1

fiscal year 2023 with more than 16,700 employees, 1,200 of those being new jobs. Included in Sandia’s workforce are 8,234 employees with advanced degrees along with 8,532 research and development scientists, engineers and technologists.

With a move to a permanent hybrid workforce in 2023, hundreds of those employees can now do their jobs from cities around the country. Sandia has approximately 1,950 full-time telecommuters, 1,050 part-time telecommuters and 1,600 remote workers spread out around the country. That is about 30% of Sandia’s workforce. The change has allowed some current employees to relocate to other states while staying with the organization and helped attract new employees who would have never considered a job at Sandia because of location.

Small-business support

Along with playing a vital role in national security, one of the biggest impacts Sandia has, is on the

small-business community.

Sixty-seven percent of Sandia’s suppliers are small businesses.

In all, Sandia paid out nearly \$1.1 billion in subcontract payments to small business, with \$481 million of that going to New Mexico small businesses.

Those businesses help supply everything from building construction and office supplies to engineering, computer-related services and the specialized cables, valves and components that Sandia needs to carry out its national security work.

“Small businesses are the backbone of the U.S. economy and the capabilities they offer are vital to our national security mission. Sandia continues to be committed to small businesses both nationally and locally here in New Mexico,” said



SANDIA POWER — Kairos Power LLC manager Gareth Whatcott, left, and engineer Ahmed Moustafa collaborate with Sandia on a power project as part of the Technology Readiness Gross Receipts initiative. **Photo courtesy of Kairos Power**

Zach Mikelson, small-business program manager. “The partnership between Sandia and small businesses strengthens our community and ensures support for Sandia’s mission for years to come.”

New Mexico small-business successes

Sandia also helps small businesses by sharing its expertise.

In 2023, through the New Mexico Small Business Assistance Program, Sandia

provided \$2.4 million in technical assistance and helped 120 small businesses.

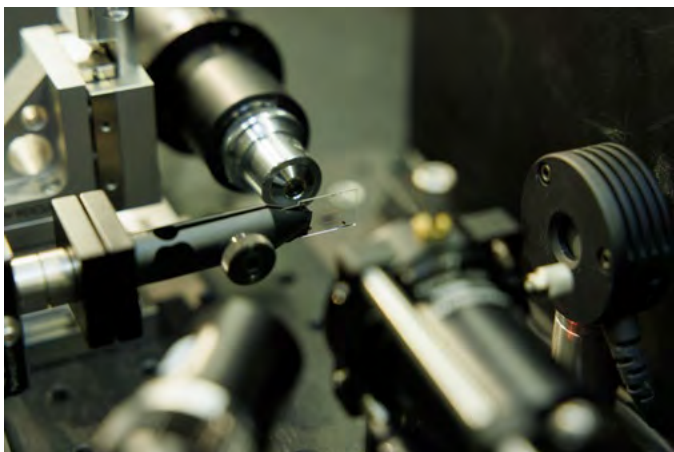
One of them was Voss Scientific LLC, located in Albuquerque. Voss provides a wide variety of scientific and research and development services and products. While working to expand its product line to include a new type of laser system, Voss encountered issues that required a novel optical component that could only be fabricated by experts in nanoscience. Lacking that expertise and the multimillion-dollar equipment necessary to develop their product, Voss turned to Sandia for help. A team from Sandia was able to help them problem solve and develop a nanotech-optic to eliminate beam distortions due to thermal effects.

“This program has given us the ability to leverage Sandia’s nanotechnology fabrication facility, which has been critical in taking our design from concept to a produced test sample,” said Alex Lovesee, senior scientist at Voss.

If successful, the company and its partners will have demonstrated a technology that could enable the DOE to make laser-driven fusion power for clean energy applications.

Technology Readiness Gross Receipts initiative

Sandia also continues to help businesses through the Technology Readiness Gross Receipts initiative. This initiative is focused on technology maturation for New Mexico companies that have licensed technology from Sandia or Los Alamos National Laboratory or engaged in a cooperative research and development agreement with them.



SOLVING PROBLEMS — Sandia helped Voss Scientific LLC build a nanotech-optic for its new laser system. **Photo by Bret Latter**

In fiscal year 2023, Sandia helped work on 12 projects involving 11 businesses. As a result, nine licenses were acquired for Sandia technologies and three companies engaged in CRADAs.

One of the success stories is Kairos Power LLC, a nuclear energy engineering, design and manufacturing company. The company is commercializing a fluoride salt-cooled high-temperature reactor with a mission of enabling the world’s transition to clean energy.

The company’s testing and manufacturing facility in Albuquerque will support the design, construction and operation of the Hermes demonstration reactor in Oak Ridge, Tennessee.

Kairos is developing a Burn-up Measurement Sensor to analyze graphite fuel pebbles during operation, identifying how much fuel has been used and whether a pebble could be reused. Kairos was able to use Sandia’s specialized equipment and expertise to support the sensor’s development.

“The Burn-up Measurement Sensor project has been an outstanding example of rapid iterative development in collaboration with a national lab to accelerate innovation for a critical system. We are grateful to have the TRGR

program’s support in building it,” said Edward Blandford, Kairos co-founder and chief technology officer.

Kairos has made a commitment to invest up to \$125 million in New Mexico. It has already invested \$50 million and hired more than 90 full-time employees in Albuquerque with an average salary exceeding \$100,000.



LOAD ‘EM UP — Employees from Albuquerque and Silver City schools picked up printers and other equipment at Sandia’s K-12 computer donation event in August. **Photo by Craig Fritz**

Sandia Gives

But Sandia’s impact on the community extends far beyond the business world. Sandia’s employees work hard to give back to the community in other ways.

One of the most popular programs is the K-12 computer donation event in which Sandia upgrades aging technology and donates retired computers to area schools. In 2023, Sandia donated 1,654 desktops, laptops and tablets to Albuquerque and Silver City schools.

Sandia also helps organize regular STEM events to encourage youth to explore careers in STEM. That includes the annual New Mexico Electric Car Challenge, which brings together hundreds of middle school students from across the state.

Each year, Sandia’s employees and their families also donate their time and talents to help those who are less fortunate.

In fiscal year 2023, employees donated 1,220 units of blood during regular blood donation events. During the annual Sandia Serves Day in October, more than 250 volunteers donated their time at community service events, which ranged from making meals at the Ronald McDonald House to sorting food at Roadrunner Food Bank, donating and cleaning up bicycles for kids in need in the community, and building a shade structure at a local nonprofit.

In fiscal year 2023, employees also donated \$4.4 million through the United Way of North Central New Mexico and \$36,000 in holiday gift cards for families in need, along with more than 1,000 toys for the Toys for Tots program. [ti](#)

Tech startups get a timely Boost

New Sandia program rewards entrepreneurs fulfilling energy needs in New Mexico, Alaska

By **Troy Rumler**

Grab your maps. On Dec. 12, entrepreneurs from New Mexico, Alaska, Illinois, Florida, Maryland, North Carolina and Texas attended a meeting of tech startups in Albuquerque. They pitched strategies for new ventures that could benefit remote communities in New Mexico and Alaska, aiming for a prize package of services from a consulting firm in Washington, D.C.

Sandia's plan had worked out perfectly. Sandia and its partner, **FedTech**, hosted the networking event and pitch competition, the inaugural **DOE Boost** showcase. It was the culmination of months of work helping entrepreneurs solve specific energy needs in rural and remote communities by licensing national laboratory inventions.

Boost was funded in 2022 by DOE's **Technology Commercialization Fund** with a mission to overcome barriers to commercializing federal energy tech.

"Our purpose, really, is to invite people into the Labs' innovation ecosystem," said Mary Monson, Sandia's senior manager of technology transfer and business development, and the program's principal investigator.



FEELING A LITTLE JUDGY — Competition judge Randy Trask, center, asks questions following a presentation at DOE Boost. Joining him on the panel are Mark Billingsley, left, and Dana Catron. **Photo courtesy of FedTech**

Sandia is recognized in its communities and by DOE for its standout ability to move technology out of the Labs and into the private sector.

"Sandia Labs is a powerful economic engine," Mary said. "A recent study commissioned by NNSA demonstrated that over a 20-year period Sandia's technology transfer program generated \$140.2 billion in economic impact to the U.S."

The Boost program focuses on tapping into areas of the country, she said, that are often overlooked in tech development — a sentiment FedTech director Thom Martin echoed in remarks at the showcase. "How do we move past the Silicon Valleys and the Bostons?" he said.

Startups navigate shifting economic winds

Boost enters a tumultuous scene for the deep tech startup community. High interest rates and tightening pocketbooks among venture capital firms have made it difficult for small, private companies to stay afloat. In December, **The New York Times** reported that at least 3,200 private-venture-backed U.S. companies went out of business in 2023, making it one of the worst years for startups in recent history.

On the other hand, a string of legislation, including the Inflation Reduction Act and the Infrastructure Investment Act, has directed a trillion dollars to the private sector for clean energy, offering Boost startups alternative funding sources.

Vanessa Chan, DOE's chief commercialization officer and director of the Office of Technology Transitions, said in a pre-recorded video shown during the event that the funds are an effort by the Biden administration to reach ambitious climate goals.

"We won't get to our



NETWORKING HOUR — Sandia's Mary Monson talks business with Andres Sebastian and Janice Lucero from ZEFRA Technologies. More than 400 people registered for the hybrid DOE Boost showcase. **Photo courtesy of FedTech**

goals without a flood of new small businesses," Chan said.

Boost participants Lori Eich, chief operating officer of HydrokinetX, and Heather Linn, chief executive officer of Cybr Security, both said the decline in venture capital funding means they're relying more on federal small-business grants to reach their initial goals.

A grassroots approach to business

D.C.-based firm FedTech provides entrepreneurs and innovators with a viable path toward commercializing federal technologies. With clients spanning across several government agencies, FedTech runs numerous **Startup Studios** annually. However, FedTech community manager Ellen Erickson said she's never seen a partner approach the studio with a deep community focus like Sandia has.

The Boost program takes a community-centered approach to innovation by focusing on local energy challenges. Sandia hosted workshops across rural New Mexico and Alaska to listen to community members describe their local needs and challenges.

For example, oceanic researchers and members of fishing industries in Alaska raised concerns about the buoys they place in the ocean to collect data, such as climate information or the movements of marine life. These buoys need costly maintenance to have their solar panels cleaned and batteries replaced. Expeditions to service these remote stations by ship can cost buoy owners up to \$25,000 monthly.

Sandia and FedTech searched for national laboratory intellectual property that could help solve this and other community problems.

Fifteen teams were accepted into the first DOE Boost cohort to develop go-to-market strategies for commercializing the national lab technologies. Over the course of 16 weeks, they received resources and coaching, and conducted more than 400 customer discovery interviews.


In the end, teams gathered for a pitch competition amid the industrial-chic trappings of **Q Station**, a coworking space and business incubator funded by the Air Force Research Laboratory in Albuquerque's Nob Hill neighborhood. Winning teams were awarded prizes that included consultation packages from FedTech.

Eich, representing HydrokinetX, pitched an idea of a buoy powered by the ocean, reducing maintenance costs and potentially increasing the data that can be harvested from the sea. Each Boost company pitched

a solution for a specific community challenge. These solutions included more efficient wind turbines, more efficient solar panels, a new kind of long-lasting battery, a new way to recycle lithium-ion batteries, cybersecurity for energy infrastructure, an artificial intelligence-based tool for allocating energy demands throughout a hospital and a system for improving microgrid resiliency.

In 2024, Sandia and FedTech plan to extend their outreach to 10 new communities, in addition to New Mexico and Alaska, and start a new cycle of venture creation.

FedTech senior associate Ish Singh said, "Expanding into new ecosystems to recruit

entrepreneurial talent ensures that our program's opportunities are accessible to all Americans, fostering equity and inclusivity in the pursuit of innovation and economic growth." 



FREEZING OUT THE COMPETITION — Cybr Security CEO Heather Linn pitches enhanced data protection for solar farms at the DOE Boost showcase event in December. **Photo courtesy of FedTech**

A 'life-changing' recruitment

How a Sandia hiring initiative sold one SoCal local on the Land of Enchantment

By **Maggie Krajewski**

Growing up in Southern California, Stefani Olcott had no plans of leaving, let alone to a city with a weird name in a landlocked state.

And then she heard about Sandia's One Year on Campus program.

Stefani was in her last year as an undergraduate studying computer science at UCLA and said she was at a crossroads about what was next.

"I was debating between going to graduate school or looking for a full-time position," Stefani said. "But then I heard about One Year on Campus, where I could do both."

The program, now called Critical Skills Recruiting, is a Sandia recruiting and entry-level hiring initiative under University Education Programs. It is open to students who have graduated within three years with a technical, science or engineering bachelor's degree and are looking to pursue a master's in one of the Labs' defined critical skills disciplines.

Critical Skills Recruiting pays for the student's master's degree and provides them with a stipend to cover living expenses. In the



HERE TO STAY — Manager Stefani Olcott credits an initiative by Sandia's University Education Programs for her move to New Mexico and the career opportunities she's experienced since. **Photo by Craig Fritz**

summer, recipients work as salaried employees as they build their knowledge of Sandia's mission and work. When they graduate, they transition to full-time employees.

"I had never heard of anything quite like it so deciding to apply was kind of a no-brainer," Stefani said.


Stefani graduated with a master's degree in computer science, specializing in databases, and was hired on as a software engineer,

which she did for 15 years. In 2018, she was promoted as a manager overseeing the Next Generation Systems and Solutions department.

“This program changed my life,” Stefani said. “Sandia opened my eyes to the national labs environment and how committed the Labs is in investing in employee’s careers, education and continual growth.”

But career trajectory wasn’t the only way things changed for Stefani.

“When I first started, I had never been skiing or snowboarding before, but now I can take advantage of the beautiful mountains all around us. I started my family here, met my husband, had our two children. I’ve enjoyed foods I didn’t know existed, visited Carlsbad Caverns and White Sands, experienced all four seasons,” Stefani said.

Stefani has three sisters and has so far convinced one to move to the city with the weird name in a landlocked state. She’s still working on the others. 

Investing in your professional and educational aspirations

Sandia’s University Education Programs offers several opportunities to help employees elevate their future including tuition assistance, critical skills (part-time and recruitment programs) and in-state tuition partnerships. To learn more about the programs and find out how to apply visit the [University Education Programs website](#).

Computing that solves complex national challenges

By **Ariana Stern**

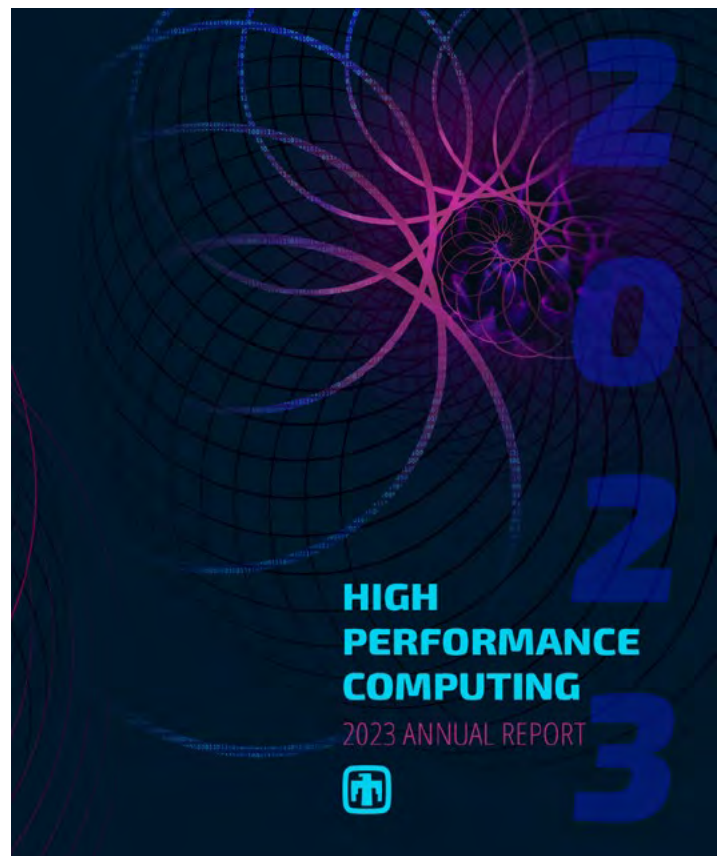
With its world-class high performance computing capabilities, Sandia continues to develop solutions to some of the most sweeping and complicated national challenges. For example, Sandia’s HPC community stepped up when COVID-19 hit, running [medical resource modeling simulations](#) and more.

Each year, Sandia releases the transformative [HPC Report](#) that delves into cutting-edge advancements in how our scientists, engineers and researchers use supercomputers to address some of these challenges. Explore the recently released 2023 report to discover the breakthroughs and impact of HPC on various sectors.


This report offers insights and an enhanced understanding of exceedingly complex systems, from [modeling arctic permafrost degradation](#) and coastal erosion to the [design of strong and flexible interlocking metasurfaces](#) to [forecasting explosive behavior for confidence](#). Read how Sandia’s researchers are leveraging machine learning models to complement classic scientific computing models. This emergent modeling paradigm is known as scientific [machine learning](#), or SciML, and has the potential to revolutionize computational modeling.

In addition, tying back to the Labs’ most important mission, HPC continues to be instrumental in nuclear deterrence work. A team of researchers have built HPC models that can predict [how much wear nuclear weapon components will experience over time in a specified environment](#). This work would not be possible without HPC, due to the size and complexity of the models.

Take a moment to dive into this innovative report and download the SNLSimMagic app, an augmented reality iOS application developed at Sandia, to watch the pages come to life. SNLSimMagic offers an interactive experience where you can watch real-time simulations that help our researchers advance in this rapidly evolving field.



Cover design by Johanna Pearman

If you would like to request a copy of this report or be added to the HPC distribution list, email hpcreport@sandia.gov. If you are an HPC researcher at Sandia and would like to submit an article proposal for the 2024 report, email the [HPC Report team](#) at the same email address. 

SCREAM wins Gordon Bell climate prize at SC23 convention

Cloud-resolving Sandia model shows unprecedented speed and accuracy

By **Neal Singer**

Running a model of the global atmosphere with unprecedentedly high resolution on the world's first exascale supercomputer, a Sandia-led team has won the Gordon Bell Prize for Climate Modeling hosted by the Association for Computing Machinery. The award, announced on Nov. 16 at the SC23 convention in Denver, recognizes innovative computing contributions toward solving the global climate crisis.

"We have created the first global

cloud-resolving model to simulate a world's year of climate in a day," said Sandia researcher Mark Taylor, the chief computational scientist of the **Energy Exascale Earth System Model**, or E3SM, an eight-lab project led by Lawrence Livermore National Lab and supported by the DOE's Office of Science for the development of advanced climate models. "We're ushering in a new era of accuracy."

The E3SM model simulates critical aspects of Earth's climate system that might impact conditions in the U.S. in the coming decades, including extreme temperatures, droughts, floods and a rise in sea level. Mark, who led the Gordon Bell submission, detailed the team's record-setting demonstration of SCREAM, the Simple Cloud Resolving E3SM Atmosphere Model, on Oak Ridge National Laboratory's Frontier supercom-

puter, capable of 1.2 exaFLOP, or 1.2 quintillion, computing operations per second.

Clouds play a critical role in Earth's climate system, impacting weather patterns and precipitation.

"Traditional Earth system models struggle to represent clouds accurately because they cannot simulate the small overturning circulation in the atmosphere responsible for cloud formation and instead rely on complex approximations of these processes," Mark said. "This next-generation program has the potential to substantially reduce major systematic errors in precipitation found in current models



CLIMATE MODEL — Sandia researcher Mark Taylor, Energy Exascale Earth System Model's chief computational scientist.

Photo by Lonnie Anderson

because of its more realistic and explicit treatment of convective storms and the atmospheric motions responsible for cloud formation."

Incorporating state-of-the-art parameterizations for fluid dynamics, microphysics, moist turbulence and radiation, SCREAM is a full-featured atmospheric general-circulation model developed for very fine-resolution simulations on exascale machines. The Gordon Bell Prize for Climate Modeling, according to the Association for Computing Machinery, "aims to recognize innovative parallel computing contributions toward solving the global climate crisis." It was awarded for the first time this year at the International Conference for High-Performance Computing, Networking, Storage and Analysis, or SC23, in Denver and accompanied by a \$10,000 award provided by Gordon Bell, a pioneer in high performance computing. The Sandia-led model was selected based on its potential to impact climate modeling and related fields.

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NOMINATION DEADLINE **FEBRUARY 2**

Sandia hosts Education with Industry officer

By **Sofia Wolinski**

For the fourth time, Sandia National Labs Military Liaison is sponsoring a fellow in the prestigious U.S. Air Force Education with Industry program. The highly selective program pairs participants with industry leaders in their career field.

Sandia's Military Liaison group is sponsoring Capt. Jose "PR" Perez-Rodriguez, who is also the fourth 21M munitions maintenance officer ever selected for Education with Industry.

"I am very grateful and honored of having been selected for this program, especially after being able to do it with one of the national leading labs in the industry," PR said.

PR has extensive experience leading logistics and maintenance technicians in numerous countries, including Iraq, Turkey and Germany. Additionally, PR was the Special Weapons Flight Commander in the 898th Munitions Squadron team.

"Capt. Perez-Rodriguez is one of the strongest maintenance officers I have ever worked with in 40 years," said Mark Meyer, a systems engineer and PR's Sandia coordinator.

Understanding industry

Education with Industry is administered by the Air Force Institute of Technology on behalf of the Secretary of the Air Force, Acquisition. The program sends Air Force officers and enlisted personnel on a 10-month career-broadening tour with a selected company to learn cutting-edge technology and innovative management processes. The Education with Industry program began in 1947, the same year the Air Force was established.

In the 75th Education with Industry class, over 40 companies, such as Boeing Co., Delta Air Lines and Google LLC, will support nearly 80 fellows hand-picked by



INDUSTRY LEARNER — U.S. Air Force Capt. Jose "PR" Perez-Rodriguez stands next to an MK 5 model weapon. PR is the fourth Education with Industry fellow to be sponsored by Sandia's Military Liaison group. **Photo by Frank Winston**


a personnel board in an extremely competitive process. Air Force personnel in the program develop a more thorough understanding of commercial industry and can better interpret Air Force needs in industry terms, resulting in more effective and efficient maintenance processes.

During PR's first couple of weeks in Military Liaison, he has already gained hands-on experience with a B61-12 Type 3 trainer, assisted with facilitating and training over 100 students from all over the U.S. nuclear enterprise and took the lead to conduct nuclear stockpile orientation training during a visit from the U.S. Senate Intelligence Committee, U.S. Strategic Command, as well as for the new commander of the 377th Air Base Wing at Kirtland Air Force Base.

"I have experienced a monumental increase in knowledge and understanding of the nuclear enterprise, and I look forward to the remainder of the program as I continue to increase my growth to become a better advocate for this community," PR said.

"Our goal is to immerse PR into Sandia mission areas such as stockpile sustainment, annual assessment, as well as research and development for life extension programs here and at other locations such as Pantex, Y-12, Savannah River Site and Kansas City National Security Campus," Mark said. "When he returns to the United States Air Force after 10 months, he will have a much better understanding of how his military requirements for nuclear weapons, test gear, handling gear and publications are translated into operational stockpile systems.

"As a future 21M munitions maintenance senior leader, PR will use this Education with Industry experience to enhance mission readiness and combat capability for the land-based intercontinental ballistic missiles and air delivered systems, which is two-thirds of the U.S. nuclear triad deterrent mission," Mark said.

Sandia employees wishing to help with PR's training can locate him through the Labs' employee directory. 

The Intrapreneur

Stephanie Beasley's award highlights a career of inclusion

By **Michael Ellis Langley**

The **San Francisco Business Journal** recognized Stephanie Beasley as one of the 100 Most Influential Women in Bay Area Business not because she is the archetypal business-woman, but because she is anything but.

“Entrepreneurs are the people who create new companies based on ideas. Intrapreneurs are people inside organizations that generate new ideas and build programs and capabilities,” Stephanie said. “I fashion myself as an intrapreneur,

which is why I've been able to create new roles for myself and stay at Sandia.”

Creating a career

Stephanie started her Sandia career in 2011 after years in private-sector marketing and public relations. She was hired on the communications and tech transfer business development team, and then quickly learned a pattern that would define much of the last 12 years.

Since 2012, Stephanie's positions have included community relations, program communications, economic development and regional engagement, business development and now executive strategist.

“This place is amazing, in that you can work in so many different areas and missions,” Stephanie said. “Sandia encourages you to not only think about your capabilities in new ways, but to develop new skills and evolve yourself.”

Making the right connections

Stephanie has become an advocate for the Labs, with a zeal for connecting Sandia to the businesses and communities throughout the Bay Area.

“In California, Sandia is a small fish in a big pond, but we have a lot of influence in terms of technology, innovation and impact,” she explained. “We are a central part of the ecosystem in the Bay



CREATIVE LEADER — Executive strategist Stephanie Beasley accepts the award as one of the 100 Most Influential Women in Bay Area Business on Oct. 9.

Photo courtesy of Doug Smith Photography

Area. The labs are an innovation magnet helping to draw top talent and companies to the region. Connecting our technology and people to that innovation ecosystem is an important aspect of delivering value and impact for the labs. Connecting people and ideas is my passion.”

By harnessing the innovation horsepower at Sandia, Stephanie knows it will move the needle on continuing to keep the labs relevant and creating innovation in Tri-Valley and broader Bay Area.

“Part of my role is to help teams break down silos and improve integration, which, I believe, is how new ideas are born. I help teams find and develop solutions so they can move toward a common goal and work more effectively to meet the nation's needs,” she said.

Stephanie believes that effective teaming comes from collaboration and living one's values, which enables advancements and technologies that can only come through cooperation.

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“I’m passionate about authenticity,” she stated definitively. “I want people to be authentic and true to themselves. It requires understanding what’s important and motivating to someone. What are your values? What is your life experience that may influence how you show up for a team or how you think about a challenge? If you are clear on your values and you live them authentically, you naturally bring your best self forward. You bring your life experiences to the table, and that shapes how you think about the problem at hand.”

Paying it forward through mentoring

Stephanie believes in mentoring others as a grassroots way to form better teams, improve Sandia’s capabilities and grow leaders. It’s something she learned from the bosses she has had throughout her time at the Labs.

“They challenged me to think bigger, do better and make an impact. They advocated for me when I needed it most and exposed me to new paths and opportunities at the Labs,” Stephanie recalls. “The best coaches and mentors pushed me to not let the status quo hold me back from my potential.”

That kind of inspiration wasn’t limited to her Sandia mentors. Stephanie is the new chair of the board leading **Innovation Tri-Valley** Leadership Group, an organization of business leaders whose aim is to foster innovation in the Tri-Valley by connecting innovators into the local business climate while improving the quality of life for the region. She is the first woman to chair the board of directors.

Being the first isn’t new for Stephanie as she also held the position as the youngest and first woman to chair the



INFLUENCES — Executive strategist Stephanie Beasley, second from right, is congratulated by, from left, Integrated Security Solutions Deputy Associate Labs Director Trish Benguerel, Associate Labs Director Andy McIlroy and executive strategist Annie Garcia after being named one of the 100 Most Influential Women in Bay Area Business for 2023.

Photo courtesy of Doug Smith Photography

board of **iGATE**, a nonprofit organization dedicated to building a thriving startup community in the Tri-Valley. She is now the immediate past chair for the organization.

But it is Stephanie’s first role models and mentors — her mother, an educator, and grandmother, a hairstylist — who put her on the path to thrive and succeed.

“When I think about the story of my life, why I am who I am is because of the strong women role models that I had as a kid,” she said. “My mom and my grandma taught me that there is a very special role that women play in helping to grow and nurture each other. I was taught not to be limited by a stereotype, they encouraged me to dream big. And they never questioned anything that I dreamt. I had some bold, wild, crazy dreams about my future.”

Their support also taught her to be a trailblazer for other women.


“You can pave the way for other women,” Stephanie said. “That actually has been how I’ve gotten to every success I’ve

had, because someone opened a door, or pointed out an obstacle, or said, ‘I see this in you, even when I don’t see it in myself.’”

Now she wants to pave the way for unconventional leaders, creating a ripple effect of ways to impact the globe. Her drive to bring others along motivates her and informs her top advice for everyone she works with:

“Be authentically you and create your own path. On the way, focus on the positive and strive to bring out the best in others. Be an advocate, open doors to new opportunities and bring others with you.”

It is Stephanie living her values out in the open, for her authenticity, for the benefit of everyone at Sandia and for the communities we serve.

“If we all worked at our best and thought about the connections we have and what we learn from them — if we try to just be better, and kinder, and more collaborative — think about the world we would create.” 

Mileposts



John Schwartz

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James Lucero

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Dominic V. Martinez

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Linda Flores

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Brian Gutierrez

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Larissa Velasquez

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