FEBRUARY/MARCH 2013

CAREER CURRENTS

EXPLORING TODAY'S ENERGY CAREERS WITH THE NEED PROJECT

WON'T IT BE GREAT TO BE A NERD AGAIN?

BY CATHY PADRÓ
[former seriously nerdy kid]

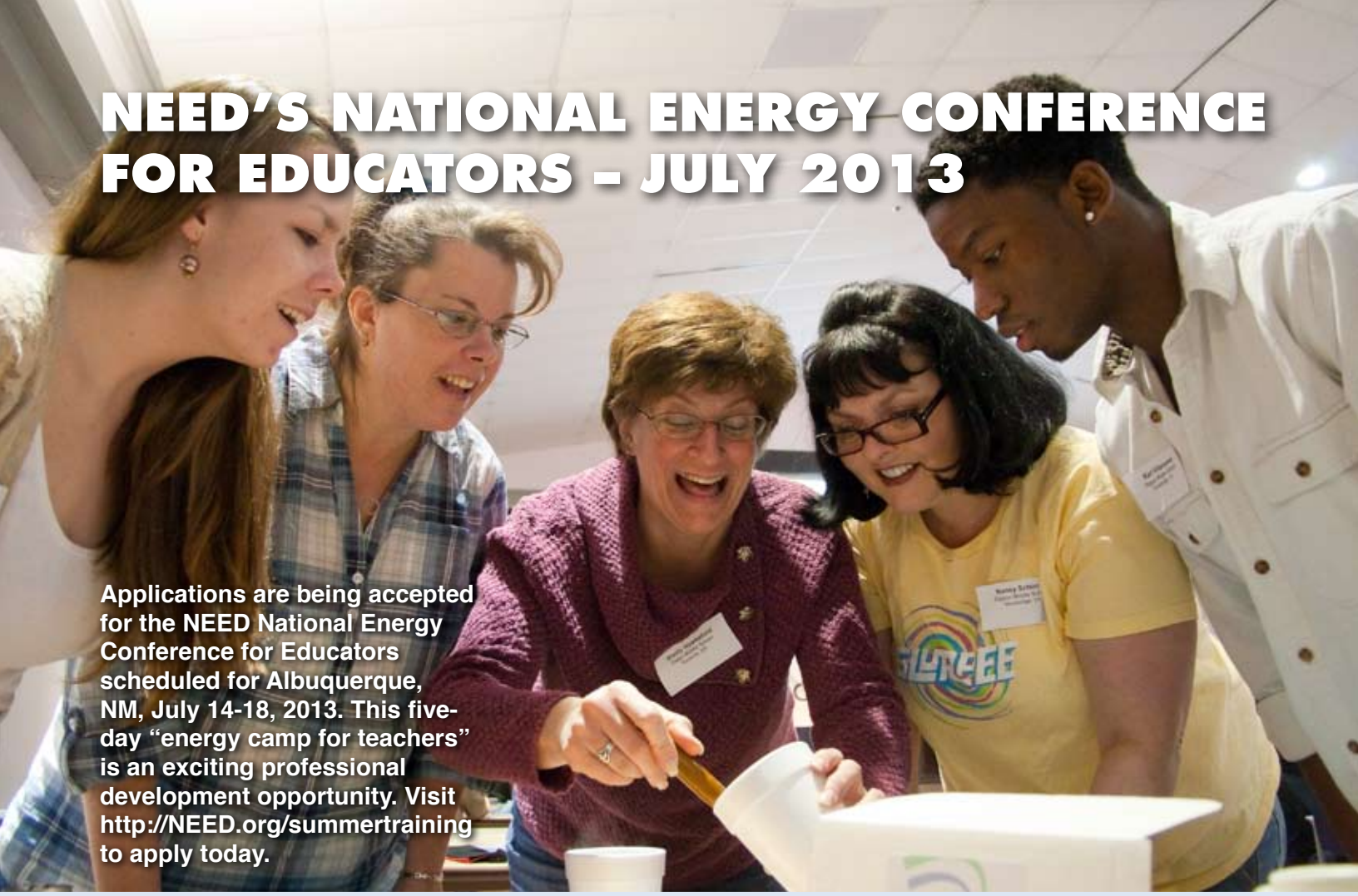
I'M JEALOUS. When I was young, there were few if any opportunities for me "to get my nerd on." There were no "Women in Science" groups showing me what professional women did and talking to me about how they got where they were. I didn't have teachers who were strong science mentors (although I will admit that my 8th grade math teacher was incredible – I still love algebra). There was no Supercomputing Challenge – well, that's maybe because there were no supercomputers. Young people today have opportunities to be exposed to advanced science and mathematics, and I am proud to be a member of the Los Alamos National Laboratory community that provides these opportunities to the youth of New Mexico. Each year, LANL scientific staff members participate in two very special events – the Expanding Your Horizons conference and the Supercomputing Challenge.

Expanding Your Horizons in Science and Mathematics™ (EYH) conferences are designed to nurture girls' interest in science and math courses and to encourage them to consider science and math-based career options such as engineering, computer science and physical science. EYH conferences are held around the world at over 120 locations. Over 625,000 girls have participated in EYH conferences since their inception in Northern California in 1976. The EYH mission is to encourage young women to pursue science, technology, engineering and mathematics (STEM) careers by providing STEM role models and hands-on activities for middle and high school girls. The ultimate goal is to motivate girls to become innovative and creative thinkers ready to meet 21st Century challenges.

Now in its 33rd year, the Northern New Mexico EYH (NNM-EYH) conference is organized by Los Alamos Women in Science (LAWIS). The youth conference targets girls in 8th-10th grades so that they have the enough time to take the necessary mathematics and science courses in high school and can enter college with a stronger foundation for scientific studies. In addition to the youth conference, the NNM-EYH also features a concurrent Teacher's Conference, designed to provide ideas on incorporating more math and science into the curriculum. The combined EYH and Teacher's Conference is widely known in the region. Many EYH participants come from small schools, and this one-day event provides a concentrated view of STEM fields. The 2012 Los Alamos-EYH took place on March 21st.

SEE RETURN OF THE NERD, page 3

NEED'S NATIONAL ENERGY CONFERENCE FOR EDUCATORS – JULY 2013



Applications are being accepted for the NEED National Energy Conference for Educators scheduled for Albuquerque, NM, July 14-18, 2013. This five-day "energy camp for teachers" is an exciting professional development opportunity. Visit http://NEED.org/summertraining to apply today.

**RETURN OF THE NERD,
continued from page 1**

The Supercomputing Challenge is an exciting program that offers a truly unique experience to students in New Mexico. The opportunity to work on the most powerful computers in the world is currently available to only a very few students in the entire United States, but in New Mexico, it is just one of the benefits of living in the "Land of Enchantment."

The Supercomputing Challenge is a school-year-long program in which teams of students complete science projects using high-performance supercomputers. Each team of up to five students and a sponsoring teacher defines and works on a single computational project of its own choosing. Throughout the program, help and support are given to the teams by their project advisors and the Supercomputing Challenge organizers and sponsors.

The Challenge Year opens with a Kickoff at a Conference Center where students attend talks and tutorials on essential knowledge for successful completion of the Challenge. In the middle of the year, Sandia National Laboratory hosts a tour with talks and demonstrations of technology developed at Sandia. The year culminates at Los Alamos National Laboratory in late April with a Project Expo and Judging followed by an Awards Ceremony. The students and teachers are treated to a series of technical tours of various parts of the Lab.

For the 2012 EYH conference, I was the lecturer for the "Teach-the-Teachers" segment, and my graduate student, Calita Quesada (one of the interviewees), led one of the student workshops. We both used components from the NEED H_2 Educate Kit. The teachers participated in a lab demonstrating electrolysis. In addition to having the girls work with the hydrogen car that comes in the kit, Calita also demonstrated the LANL hydrogen fuel cell mobility scooter and the girls took it for a drive.

For the Supercomputing Challenge, we had the students observe (for safety reasons) the electrolysis experiment and they got to "light off" the hydrogen and oxygen – this was a big hit!

You might have missed out on these opportunities as a kid, but don't let that stop you from making a difference to some nerds-in-training!

THE NEED PROJECT

The NEED Project
Putting Energy into Education

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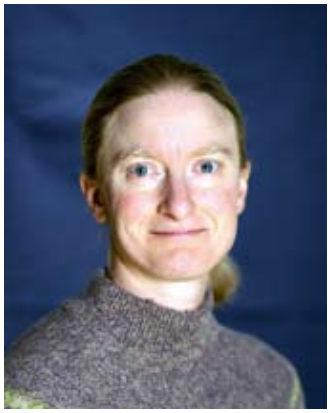
Q&A

NEED GETS TO KNOW INDUSTRY PROFESSIONALS

KATHRYN A. BERCHTOLD, PH.D.

Project Leader for Carbon Capture and Separations for Energy Applications (CaSEA) at Los Alamos National Laboratory (LANL)



TELL US A LITTLE ABOUT YOUR JOB AND WHAT YOU DO.

At Los Alamos National Laboratory (LANL), I am a Project Leader for Carbon Capture & Separations for Energy Applications (CaSEA). The CaSEA research team is largely comprised of staff scientists and engineers from the Materials Physics and Applications and Materials Science and Technology Divisions at LANL. We work together with collaborators from industry, academia, and other national laboratories to develop materials based separation technologies for energy related applications. For example, we are working to develop gas separation membranes to reduce greenhouse gas emissions from power generation plants and chemical production facilities.

HOW DID YOU DECIDE TO GO TO WORK IN THIS FIELD? WHAT PIQUED YOUR INTEREST IN ENERGY AND SPECIFICALLY IN OCEAN POWER AND POTABLE WATER GENERATION?

I have had an interest in chemical engineering and materials science for as long as I can remember; certainly long before I knew that my interests could be categorized with those names. I went to college to pursue academic degrees in chemical engineering. Through my academic research and industrial co-op experiences at Eastman Chemical Company I learned of the numerous opportunities for materials and process development in the context of chemical engineering and "energy". It is the convergence of those areas that continues to inspire and drive my current energy focused research endeavors.

WHAT IS A TYPICAL DAY AT WORK LIKE FOR YOU?

I spend my workdays interacting with our core LANL project team helping to provide them with the environment, resources, and guidance that they need to tackle the tough technical challenges that we are working to solve and to realize their professional goals. I interact frequently with internal and external project collaborators and project sponsors on all of our current projects, conveying and analyzing project results and defining the next project steps both near and long term. I also work with our industrial partners and sponsors to develop new projects and advance our current research endeavors to the next stages of technology readiness.

COULD YOU DO YOUR JOB ANYWHERE IN THE COUNTRY? ANYWHERE IN THE WORLD?

The development of materials for energy related separations and technologies/processes to support those materials is a global challenge. So yes, the technical challenges that our team is addressing are ones that scientists and engineers across the globe are working to solve.

However, Los Alamos has world class facilities and internationally recognized researchers in a number of fields, which make this an especially exciting place to work.

WHAT IS THE MOST REWARDING PART OF YOUR JOB?

I enjoy mentoring the students, post-doctoral researchers, and early career staff who work on my team. It is very rewarding to share in their excitement as they design and execute new experiments in the lab. I also enjoy coaching them in improving their communication skills when it comes to writing papers, making presentations, and writing proposals for research that will further our work.

WHAT IS THE HARDEST PART OF YOUR JOB?

At the national Labs, we have to balance safety requirements and protection of proprietary information and technologies with the need to seek out the most capable and innovative partners to develop creative solutions to difficult and challenging energy issues.

WHAT TRAINING AND/OR EDUCATION DID YOU NEED TO BEGIN YOUR JOB?

I have degrees in chemical engineering as well as industrial experience that has provided me with a real-world perspective and application basis that has significantly motivated my research and my application-driven approach to that research.

ANY TYPE OF PROFESSIONAL DEVELOPMENT OR LICENSE YOU NEED TO RENEW ANNUALLY?

There are no licenses that I need to keep in my position, although continued professional development and learning is a critical part of any career path. Working in energy related R&D is certainly no exception. In fact, every aspect of this broadly defined field is rapidly changing, so keeping abreast

of the latest technical advances is critical to keeping our work relevant and impactful.

WHAT CHALLENGES DO YOU FACE IN THE INDUSTRY? WHAT CHALLENGES FACE THE INDUSTRY?

We need to explore a variety of high-risk approaches to solving the many issues that face the world at the nexus of energy and environment today. Determining which approaches merit our attention and convincing our sponsors to invest in them is a challenge that we must face every day. Everyone in the industry must figure out how to balance being a good steward of the environment and delivering promising technologies to the Department of Energy and other sponsors.

WHAT ARE SOME BENEFITS TO WORKING IN THIS INDUSTRY?

Working at a national laboratory, while interacting with industrial partners, is an ideal setting in my opinion. It is a beautiful combination of academics and industry. Industry gives us real-world perspective and challenges us to understand the motivation for our experiments. You still have academic freedom in a research environment, but our work is application driven and mission focused.

WHAT EXTRAORDINARY OPPORTUNITIES HAVE YOU HAD IN YOUR CAREER?

During my undergraduate years, I had the opportunity to work as a co-op student for Eastman Chemical Company. This gave me a unique ability to blend academic innovation with an application-base during my graduate and post-graduate career. I also was very fortunate to be able to spend six months working as a guest scientist at the National Institute of Standards Technology (NIST) in the Washington, DC area during graduate school. This experience gave me a unique perspective on collaborating with people across disciplines and an insight into the U.S. government laboratory research environment. This experience had a substantial impact on my chosen career path after graduate school and the work/research environment design and structure that I aspire to achieve and maintain for myself and my students, colleagues and collaborators.

WHAT ADVICE WOULD YOU GIVE TO A YOUNG PERSON WHO IS INTERESTED IN WORKING IN ENERGY?

I would encourage any young person to actively seek opportunities to engage directly with the sector(s) of the energy community that interests them most. Summer internships, cooperative education experiences, and academic research opportunities are a great way to learn more about any field and to help you define and refine your interests with a real experience basis.

ANYTHING ELSE YOU WOULD LIKE TO TELL US ABOUT YOURSELF?

I was born in south Jersey and grew up in a small town. My father was a science teacher who constantly encouraged my sense of inquiry, whether we were caring for the homeroom pet during the summer, working on the family car, or programming the very first desktop computers. During high school and college, I enjoyed active sports including swimming, soccer, and bike racing. After I received my B.S. in Chemical Engineering from North Carolina State University in 1995, and my M.S. and Ph.D. degrees in Chemical Engineering from the University of Colorado at Boulder in 1998 and 2001, respectively, I joined Los Alamos National Laboratory in 2002 as a Director's Funded Postdoctoral Fellow. I am now a member of the technical staff of the Materials Physics and Applications Division and the LANL Project Leader for Carbon Capture & Separations for Energy Applications. My research interests include the investigation of the formation, structure, and properties of polymeric materials, crosslinked/gelled polymeric materials, and polymer derived ceramics with an emphasis on development of high glass transition temperature selective barrier materials with controlled free-volume architectures and tailored morphologies for separations applications, photopolymerizations, and reaction engineering. My primary research focus currently involves the design, synthesis, development and characterization of high temperature gas separation membranes, pervaporation membranes, and energy efficient separations processes with applications in hydrogen purification, carbon dioxide capture, fuels/chemicals production, and energy/national security. Recent work of note includes the development and demonstration of polymer-based membrane chemistries, structures, deployment platforms, and sealing technologies that achieve the critical combination of high selectivity, high permeability, chemical stability, and mechanical stability all at elevated temperatures (>150°C and up to 400°C, the highest ever reported viable operating temperature of a polymer based membrane) and packaged in a scalable, economically viable, high area density system amenable to incorporation into an integrated gasification combined cycle (IGCC) plant for pre-combustion CO_2 capture.

Kathryn and her K9 partner Abby practicing their rappelling skills at a recent search and rescue training seminar.

Q&A

NEED GETS TO KNOW INDUSTRY PROFESSIONALS

CAROLYN ELAM

Director, Crosscutting Programs Support Division at the Golden Field Office, U.S. Department of Energy

TELL US A LITTLE ABOUT YOUR JOB AND WHAT YOU DO.

Currently, I am the Director, Crosscutting Programs Support Division, for the U.S. Department of Energy Golden Field Office. I supervise a team of project managers who are responsible for technical oversight and monitoring for more than 200 federal grants.

HOW DID YOU DECIDE TO GO TO WORK IN THIS FIELD?

I started working in the renewable energy and energy efficiency field while in college (as a part-time lab assistant) and have been working in the field ever since. I am an analytical chemist by training. Being able to apply this skill set to help advance clean energy technologies was appealing because of the critical importance of clean technologies in meeting our growing energy needs and in creating new domestic industry. As my career progressed, I moved out of the lab environment into more of a project/program management role. This track is what led me to my current position.

WHAT IS A TYPICAL DAY AT WORK LIKE FOR YOU?

I am a working supervisor, so I both manage projects and manage a staff of 7-9. My days vary quite a bit, but I usually spend a lot of time in meetings and conference calls. As new work comes in, I am working with the client to understand the requirements and then assign that work out to the team.

HOW HAS YOUR FIELD CHANGED IN THE LAST 5-10 YEARS?

The main difference in my field is that it has become more mainstream than when I started 20+ years ago. It has more political interest than ever before, which is both good and bad. There is a lot more financial support, but there is also more pressure and scrutiny. The science continues to advance and many of the technologies I worked on early in my career are now in the commercial markets.

COULD YOU DO YOUR JOB ANYWHERE IN THE COUNTRY? ANYWHERE IN THE WORLD?

Technical project management requires a solid technical background in the sciences and engineering, as well as project management and organizational skills. These skills have broad applicability in the private sector, both domestically and globally, particularly when applied to development and deployment of clean energy technologies.

WHAT IS THE MOST REWARDING PART OF YOUR JOB?

Working on clean energy is rewarding as the successes benefit the environment and the economy. Helping my team members achieve success and realize their goals is equally rewarding

WHAT IS THE HARDEST PART OF YOUR JOB?

In the government, particularly my area of the government, there is a split between those that are here for the mission and those that are simply here to do a job. Those that are here to just do the job can frequently be impediments to getting the job done.

WHAT TRAINING AND/OR EDUCATION DID YOU NEED TO BEGIN YOUR JOB?

I have degrees in chemistry and mathematics. I have also taken numerous training classes in project management and contracts administration.

ANY TYPE OF PROFESSIONAL DEVELOPMENT OR LICENSE YOU NEED TO RENEW ANNUALLY?

DOE has a certification program for its technical project managers, specific to grants management and administration. This certification program includes continuous education requirements.

WHAT TECHNOLOGY HAVE YOU USED THAT HAS HELPED YOU THE MOST IN YOUR WORK?

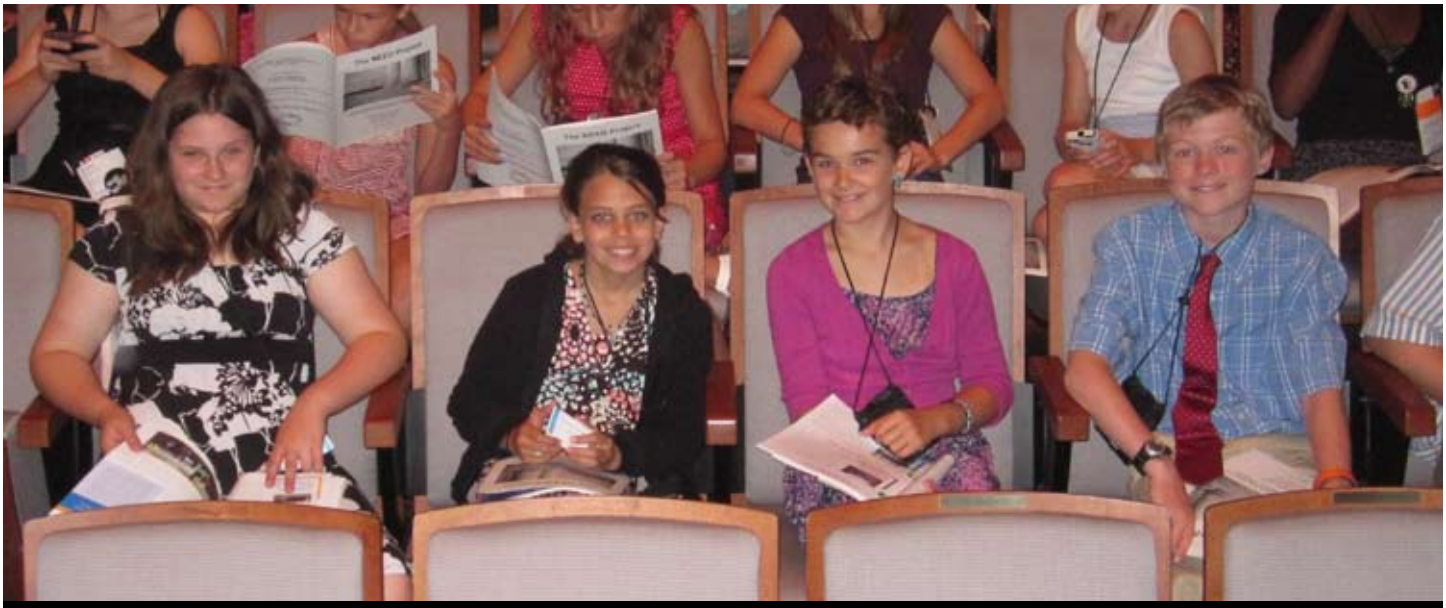
Project management tools, such as Microsoft Project. Both corporate and locally developed databases. Spreadsheets. Web and videoconferencing.

WHAT CHALLENGES DOES THE INDUSTRY FACE?

The economy and global competition are the two key challenges facing the renewables industry. The poor economy has greatly reduced the demand for renewable technologies, such as wind and solar. On top of this, countries like China are saturating what domestic markets are available. These make it very difficult to bring new technology into the market.

WHAT ARE SOME BENEFITS TO WORKING IN THIS INDUSTRY?

Clean tech continues to be one of the most promising areas for future investment and domestic jobs creation. This is a highly innovative and exciting industry.



IT'S NEVER TOO LATE!

It is never too late to begin a Youth Awards for Energy Achievement Project. You may already have one going on in your school. Are you doing interesting energy activities in your school and community?

Share your successes with NEED as part of the 33rd Annual Youth Awards for Energy Achievement. This program reviews and recognizes excellence in energy education nationwide. Awards are given at the state and national levels with the culminating event being the National Recognition Ceremony hosted in Washington, D.C. June 21-24, 2013. For details, visit http://NEED.org/Youth-Awards.

WHAT EXTRAORDINARY OPPORTUNITIES HAVE YOU HAD IN YOUR CAREER?

During my career, I have had the opportunity to represent my organizations at international conferences and in international working group efforts. This exposure to efforts across the globe has been invaluable.

In January 2010, I was selected to participate in DOE's Senior Executive Service Career Development Program. I was one of only 12 people selected to participate from a pool of more than 200 candidates from across the federal government. This was a highly competitive process and an extremely robust development program. As part of this, I had the opportunity to start up a brand new $450M program for DOE.

WHAT ADVICE WOULD YOU GIVE TO A YOUNG PERSON WHO IS INTERESTED IN WORKING IN THE INDUSTRY?

Energy, particularly the renewable and efficiency areas, is a very exciting field. Opportunities cover the gamut, from basic research and development, to building new start-ups, to installing/deploying new technology, and to being a policy developer and technology advocate. When deciding where to focus, you should consider your own personal interests, where you have the most energy, and the level or risk that you are willing to take. A solid foundation in science, engineering and business is critical for those interested in these fields.

ANY OTHER ADVICE TO SHARE ABOUT A CAREER IN ENERGY OR ABOUT THE CHALLENGES AND OPPORTUNITIES FOR THE INDUSTRY IN GENERAL?

You need to have fun and find what you are doing rewarding. When it stops being fun, it is time to make a change. Always strive to surround yourself with people who challenge you and from whom you can learn.

Q&A

NEED GETS TO KNOW INDUSTRY PROFESSIONALS

CALITA QUESADA

Graduate Research Assistant in the Los Alamos National Laboratory fuel cell group

TELL US A LITTLE ABOUT YOUR JOB AND WHAT YOU DO.

I am a Graduate Research Assistant in the LANL fuel cell group. I work with single-cell hydrogen polymer electrolyte fuel cells, testing the effects of impurities on their performance. We test both membrane electrode assemblies (MEAs) that are commercially-available and sometimes we make our own, starting with a polymer electrolyte, making catalyst inks and painting the inks onto the membranes. I assemble the cells and then connect them to a computerized test station where all the parameters are controlled and recorded. All the recorded data can be interpreted and compared by creating polarization curves.

HOW DID YOU DECIDE TO GO TO WORK IN THIS FIELD? WHAT PIQUED YOUR INTEREST IN ENERGY AND SPECIFICALLY IN YOUR CURRENT WORK?

Being aware of how much energy is used and how much pollution it creates. Some of the first hydrogen fuel concept cars came out when I was in high school and the idea of helping to develop a clean, renewable energy caught my attention.

WHAT IS A TYPICAL DAY AT WORK LIKE FOR YOU?

Most days are spent interpreting data and making sure the cells are running.

HOW HAS YOUR FIELD CHANGED IN THE LAST 5-10 YEARS?

Fuel cells made a big change from mostly research for niche applications to main stream once material development advanced enough to increase the efficiency, reduce costs, and improve durability. Auto companies are very interested in research advances, as they continue their efforts to commercialize fuel cell vehicles.

COULD YOU DO YOUR JOB ANYWHERE IN THE COUNTRY? ANYWHERE IN THE WORLD?

There are a few select places that work with fuel cells throughout the country and the world.

WHAT IS THE MOST REWARDING PART OF YOUR JOB?

Contributing to the development of cleaner, sustainable, alternative energy systems.

WHAT IS THE HARDEST PART OF YOUR JOB?

Sitting behind a computer most of the day is hard for me. I have a hard time sitting still and love to be outside.

WHAT TRAINING AND/OR EDUCATION DID YOU NEED TO BEGIN YOUR JOB?

I started as a summer intern at LANL, finished my BS in Chemical Engineering, and am now working at LANL while I pursue a masters in materials engineering.

ANY TYPE OF PROFESSIONAL DEVELOPMENT OR LICENSE YOU NEED TO RENEW ANNUALLY?

No

WHAT CHALLENGES DO YOU FACE IN THE INDUSTRY? WHAT CHALLENGES FACE THE INDUSTRY?

Research is facing funding issues. Hydrogen generation and infrastructure is a limiting factor for fuel cells.

WHAT ARE SOME BENEFITS TO WORKING IN THIS INDUSTRY?

Experiencing how things change and trying new things.

WHAT EXTRAORDINARY OPPORTUNITIES HAVE YOU HAD IN YOUR CAREER?

Getting hands-on experience working with fuel cells and all of their components has made this a great opportunity.

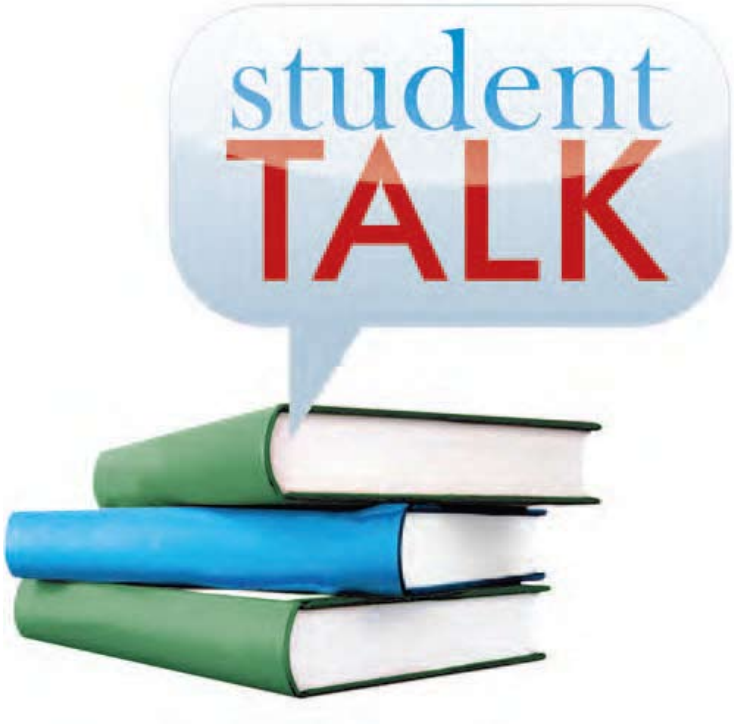
WHAT ADVICE WOULD YOU GIVE TO A YOUNG PERSON WHO IS INTERESTED IN WORKING IN ENERGY?

There are many opportunities out there - find something of interest and you will be amazed at how far working hard will get you.

ANY OTHER GREAT WORDS OF WISDOM TO ADD ABOUT A CAREER IN ENERGY OR ABOUT THE CHALLENGES AND OPPORTUNITIES FOR THE INDUSTRY IN GENERAL?

Petroleum is a finite resource and we will need alternatives in the future. The more great minds are involved and collaborating the better.

After living in a rural Malian village while serving in the Peace Corps, I realized how important education is for young women. Statistically around the world, more-educated women have fewer but healthier, better-educated children. Upon returning to the US, I realized that it is important to get people interested in science, so that they are more aware of their surroundings and the impact we have on the environment.



RYAN FLYNN

Student at the University of Rhode Island, pursuing an undergraduate degree in Electrical Engineering (expected graduation 2013)

We are very proud of the young adults that come through our program, and think they're some of the best young adults around! There is no question that involvement in NEED programs helps kids become good leaders and problem-solvers. This time, we chatted with Ryan Flynn.

TELL US ABOUT YOUR HOME TOWN AND EDUCATION.

I grew up in Scituate, Rhode Island, and graduated from Scituate High School in 2008. I am a student at the University of Rhode Island, studying Electrical Engineering, and expect to graduate in 2013.

WHAT HAS YOUR CAREER PATHWAY BEEN WHILE AT URI?

I was originally in Computer Engineering, but I didn't like all the coding and scripting that was involved. I decided to switch to Electrical Engineering, which is much more math based, the main reason I picked engineering. In 2011, I accepted a full-time job as the Purchasing Manager at Creative Extrusion & Technologies. This forced me to drop down to part time student status at the beginning of my senior year.

COULD YOU DESCRIBE SOME OF YOUR RECENT ACCOMPLISHMENTS?

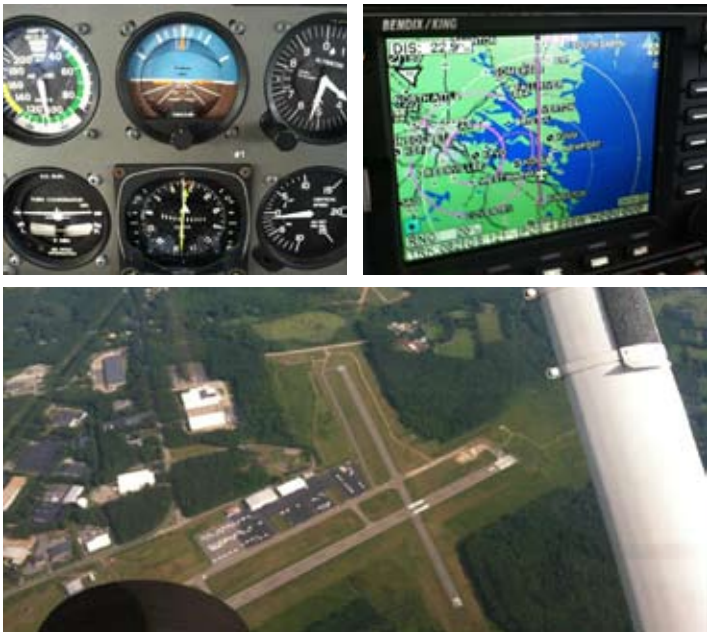
At Creative Extrusion & Technologies, I developed a method that would measure sample retains and verify they were within standards, and record them in our databases. Additionally, I developed an automated way of tracking the shape and size on some of our customer profiles to alert the operator and management when the job is running out of spec. This has proven very reliable and useful, saving our company tens of thousands of dollars.

WHAT ELSE HAVE YOU BEEN UP TO?

I have started working for the Provost at URI developing a new system to approve general education courses. I have my solo pilot certificate, which means I can fly by myself, and I recently received my Private Pilot's License in February. And I can speak English and French, although my French isn't as good as it used to be!

WHAT HAS YOUR EXPERIENCE WITH NEED BEEN LIKE?

I first started with NEED in ninth grade, and have been affiliated with NEED for eight years. I received the NEED Youth Leadership Award three times, and in 2008 was named Student Leader of the Year. Most recently I have been helping out with technology for National Youth Awards in Washington, D.C.



Ryan is an avid pilot.

NEED has provided me with a way to stay connected with energy and education. It's rewarding to see all the kids come to DC every year and review the projects they have done in their local communities. I continue to work with NEED because of the positive atmosphere. I can't think of an experience at NEED that wasn't fun or memorable.

WHY SHOULD STUDENTS BE INVOLVED WITH NEED?

Involvement with NEED is awesome. It has allowed me to grow my leadership experiences. NEED has the power to see the good in people and bring it out even more! Students who want to learn more about energy and have fun while doing so should participate in NEED. The leadership role at NEED allowed me to better myself at work, too, by being better prepared to lead projects and assignments.