

Electrical Engineering Graduates Determined to Make a Difference

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Energy Sector Presents Diverse Opportunities

Of Electrical Engineering's many applications, the energy sector is increasingly evolving into a world of diverse opportunities.

Three University of Vermont EE students are pursuing different options in that branch, all fueled by their experiences in the classes, internships, research and extracurricular activities they took advantage of while at UVM. They're ambitious and determined to make a difference.

Sam Chevalier



From kinetic energy to energy systems

Sam Chevalier's interest in engineering was triggered in a logical, though probably unusual, way—through high school pole vaulting.

“Pole vaulting is one big physics experiment,” says Chevalier, who will finish his master's program in Electrical Engineering (MSEE) this fall. He considered studying physics as a UVM undergraduate but learned he would get physics and math in engineering.

“Electrical Engineering is an exciting field with different avenues: renewable energy, power networks, embedded systems and semiconductors, to name a few. I found this diversity very attractive,” says EE major Chevalier, '15.

He was a pole vaulter on UVM's track and field team. Off the track, he shifted his focus from the kinetic and potential energy of pole vaulting to energy systems.

Haiti trip was pivotal

A Haiti service trip with UVM's Chi Alpha Organization reinforced his interest in energy systems. Chevalier saw crisscrossed distribution lines everywhere, the power was shut off nightly, and they relied on big generators and DC/AC inverters to power their building.

“I was profoundly struck by how much a lack of access to electricity can hold back a society. How can education, health care or infrastructure progress without electricity? This experience gave me a strong desire to work on research problems to help those in need,” he says. “Electricity is a fundamental need, and with increasing global environmental crises, the incorporation of large-scale renewable energy is a must.”

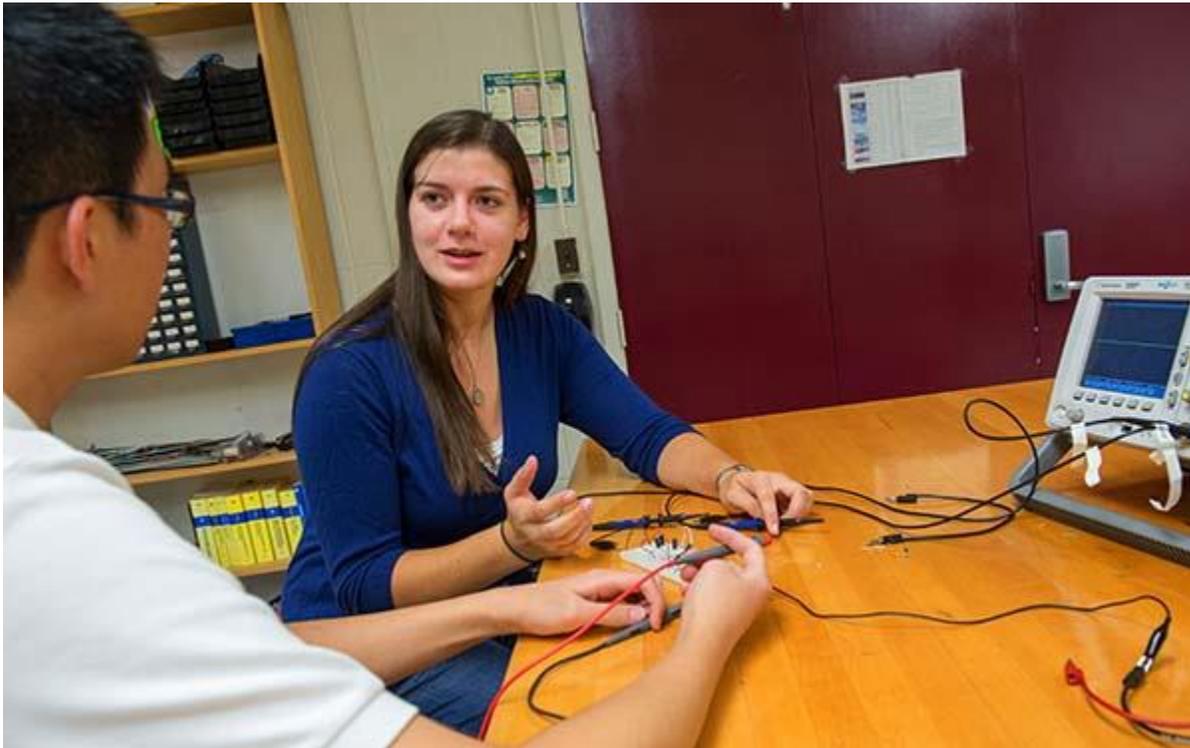
Helping Vermont achieve sustainability

Thanks to Chevalier's graduate work with UVM professor Paul Hines, he will go on to pursue a PhD at the Massachusetts Institute of Technology, where he'll research power- and energy-related problems.

He cites new EE faculty member Mads Almassalkhi's cours, Electrical Energy Systems Analysis, and his senior design project under the guidance of Prof. Yves Dubief as particularly impactful. For the project, his team built a device that measures the forces a cross country skier generates when using poles, which could help competitive skiers improve performance.

Chevalier, from Williston, wants to eventually come back to Vermont and teach in higher education. “I would like to be involved in practical research problems which are relevant to entities like Green Mountain Power and Burlington Electric,” he says. “In this way, I can help my home state achieve energy stability, independence and sustainability.”

Anna Towle



Focusing environmental passion on renewable technologies

The impact Anna Towle wants to make in the renewable-energy area is both simple and complex.

“I want to help make renewable-energy technology so easy and affordable to use that people will stop questioning it, fighting it and simply ignoring it due to low fossil fuel prices,” says EE major Towle, '16, from Dunstable, Massachusetts. Toward that goal, she chose EE to learn about power systems and integrating renewable energy into the grid.

“The world of power systems is of huge interest around the globe, and I love being part of such a rapidly changing field,” she says.

Exploring renewables in Europe

Towle’s exposure to power systems in another part of the globe reinforced her interest.

During a semester in Copenhagen through the Danish Institute for Study Abroad, she learned about renewable energy and other sustainable practices in Europe. She climbed up a turbine at a wind farm and toured a geothermal plant.

“It became clear that electric power is what I should focus on to make a difference,” Towle says. “Electric power is the biggest use of energy in the world, so how we make that power can make a big impact. A lot of European countries are actively integrating renewable energies.”

Her UVM classes and projects have given her varied experience in the sector.

In Mads Almassalkhi’s Energy Systems course, Towle helped design a solar plant with the computer program MATLAB, and compared costs and payback times of solar, wind and natural gas plants.

Through the Electrical Engineering Department sponsored Research Experience for Undergraduate (REU) program, she worked with Almassalkhi, studying boilers and chillers in UVM’s physical plant to optimize energy costs and usage with heating, cooling, and electric loads.

Integrating, not reinventing

Towle will pursue a graduate degree in electric power systems engineering at Stockholm’s Royal Institute of Technology. Eventually, she hopes to work at a research lab or electric company, planning—maybe renewable—power plants, analyzing big-power data or developing ways to move power around most cheaply.

“We already have such a huge infrastructure that it’s not practical to reinvent the power grid,” Towle says. “Integrating new technologies is a big problem that will require a lot of engineering work.”

Andrew Giroux



Toward a more reliable power grid

In fourth grade, Andrew Giroux tried to design a personal helicopter using window blinds glued together for wings and stuck into a cordless drill held above his head. When he was even younger, he spent time on a tractor and wielded a hammer.

With an inventor's instincts and raised to fix things himself, he followed the maker-hobbyist movement in high school. "I was in awe of how many cool things could be made when mechanical, electrical and software systems were integrated," says EE major Giroux, '15, who will finish his master's EE program this fall.

"EE...has had the most innovation for the last 100 years and continues to have the most innovation," says Giroux, of Hinesburg.

Much of the innovation comes from embedded systems, which fueled his interest in power and energy systems.

Using EE advances to address grid problems

“The current power grid is neither sustainable nor reliable considering near-future consumer demands. With the incredible power and ridiculously low price-point of modern electronics, why not take EE’s latest advances and use them to fix problems with EE’s original major accomplishment: the grid?” Giroux says.

He’ll apply his EE knowledge in his new job at a Burlington startup, where he’ll develop electronics related to making the power grid more reliable.

The value of learning other engineering disciplines

Especially helpful for Giroux were his Communication Systems and Microcontrollers courses taught by EE faculty Jeff Frolik and Tian Xia, respectively.

“I use knowledge learned in Communications Systems nearly every day. It was *that* useful a class,” he says. The course covered how to measure sensors in electronic devices and sending information wirelessly.

Giroux’s involvement with UVM’s Alternative Energy Racing Organization (AERO) was invaluable with its teamwork focus. “Many disciplines come together to make something complicated work. The more you know about the other disciplines, the better the engineer you are,” he says.

“Employers were always very impressed with my knowledge of systems—mechanical, electrical, software, production, test—engineering. That’s because with AERO, everyone has the opportunity to learn it all,” Giroux says.

One job brought his childhood helicopter project full circle—a summer internship designing helicopter safety systems.