

A close-up of a dark grey gauge with a red needle. The needle is positioned between 'PAST' and 'FUTURE', closer to 'FUTURE'. Above the needle is a curved scale with a color gradient from orange on the left to green on the right. The background of the gauge is dark grey with a fine texture.

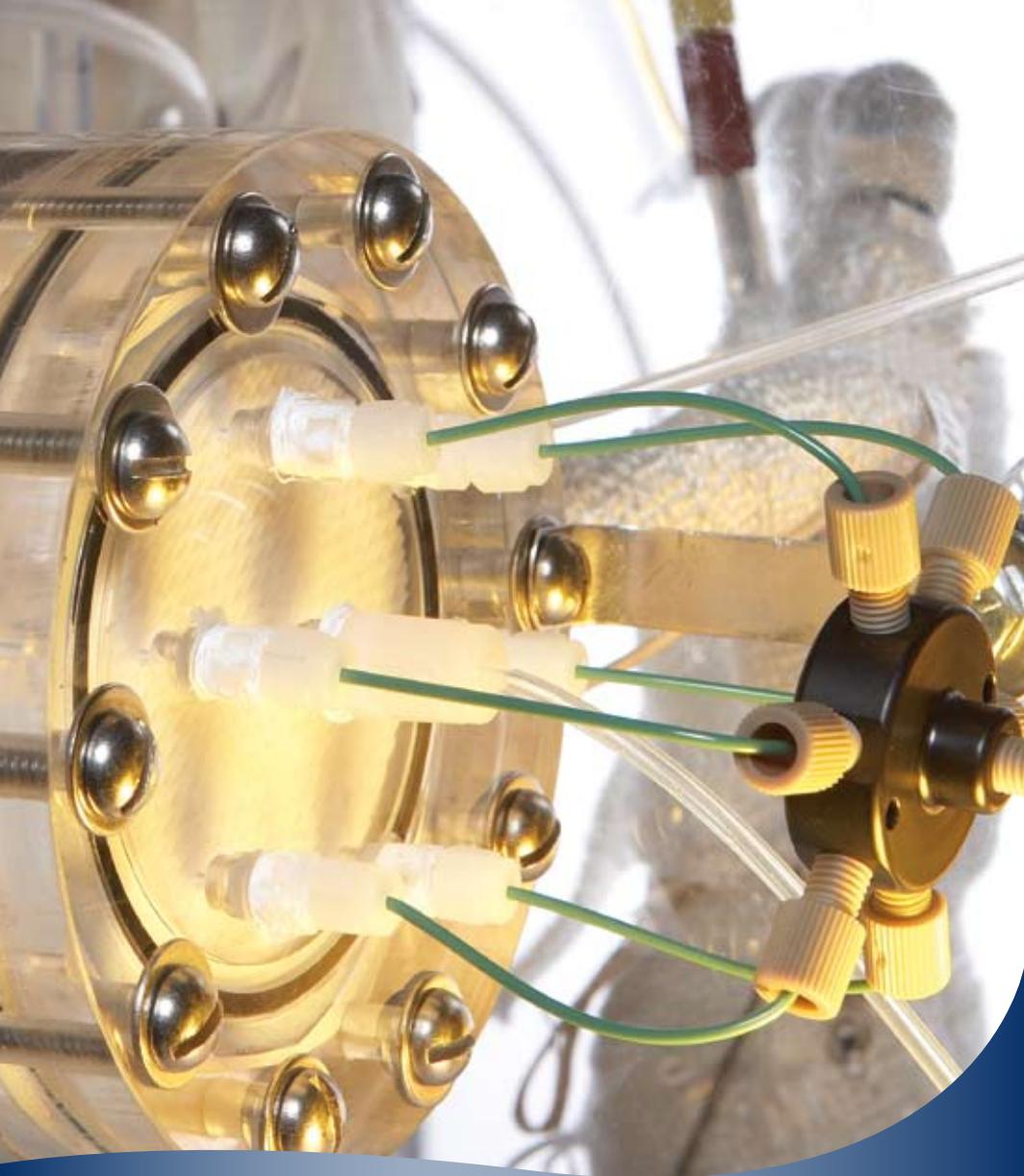
PAST

FUTURE

FUEL CELL

2007 President's Report on Fuel Cells

UNIVERSITY OF CONNECTICUT



Think of fuel cells as “better batteries” as they have a virtually unlimited lifespan. Unlike conventional batteries that must be discarded when their chemical components are depleted, fuel cells can be refueled repeatedly. Once they have been fueled and started, they run for an extended period of time. They have few moving parts and generate practically no byproducts, except water and heat, so they do not harm the environment. Although the basic design of fuel cells is generally consistent from cell to cell, they can operate on a wide range of fuels.

THE PRESIDENT'S REPORT ON FUEL CELLS



America's public research universities serve multiple functions—educating students, expanding knowledge through faculty research, and serving the wider community through programs on and off the campus. At the University of Connecticut in one way or another each of these activities enhances our

state's intellectual growth, economic expansion, and quality of life.

UConn's level of contribution expanded dramatically with the adoption of UCONN 2000 in 1995 and its extension through 21st Century UConn in 2002. This \$2.3 billion infrastructure investment fueled a renaissance that doubled student applications and research funding, generated an eightfold increase in annual giving, and lured hundreds of outstanding new faculty to supplement a strong cadre of talented professors.

Our program in fuel cell technology is an excellent example of UConn at work in the state's and the nation's service. Collaborating with the federal government, Connecticut industry, and international partners, UConn is now a leader in this critical field of investigation. The work of our engineers and scientists promises to unleash safe, clean, virtually limitless sources of energy, enhancing national energy independence. Equally important for a state flagship university, UConn research in this area will make a major, lasting contribution to our state's knowledge-based economy.

What follows is just a snapshot of intensive work in a highly complex field. It tells an interesting and important story, however, and it is one we are eager to share with the people of Connecticut and those across our country.

Philip E. Austin,
President, University of Connecticut

THE HUB

Few universities are able to celebrate the fifth anniversary of any of their centers with such a sense of accomplishment as the University of Connecticut has about the Connecticut Global Fuel Cell Center. When it comes to development of this important energy source, UConn and our School of Engineering are leading the way. Our Fuel Cell Center was impressive from the day it opened. It was created to help make our nation energy independent, by bridging the gaps in science and engineering that separate current technology from the fuel cells needed to efficiently power automobiles, factories and homes of the future.

To date, UConn has attracted more than \$20 million in fuel cell-related funding from private industry and both state and federal governments. Swiftly affirming its role as the nation's most respected fuel cell hub, UConn's state-of-the-art Global Fuel Cell Center has become adept at essential roles – training the professionals the industry will need today and in the future as well as helping fuel cell companies solve challenging technological problems.



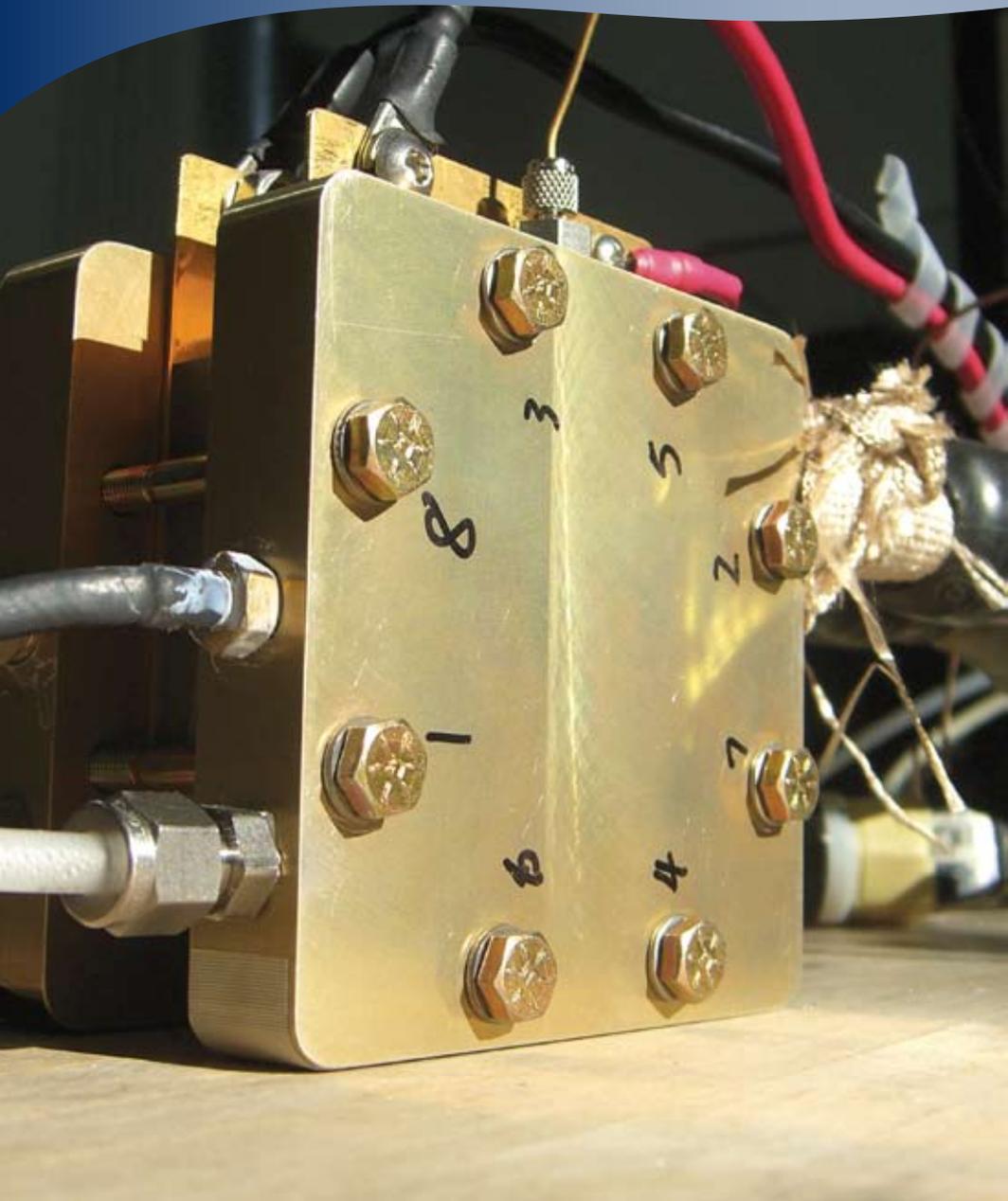
**CONNECTICUT
LEADS THE WAY**

**1/3 of all fuel cell-related
jobs in North America**



The University is committed to ensuring not only that Connecticut remains at the forefront of the rapidly growing fuel cell industry, but also that the nation's future energy sources are developed here today.

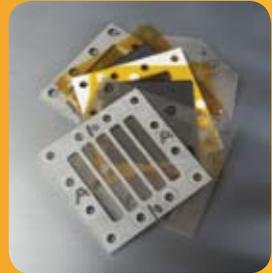
Our investment in the development of fuel cell technology supports a segment of Connecticut's economy that dramatically distinguishes our state from the rest of the nation.



GENERATING MORE THAN CLEAN ENERGY

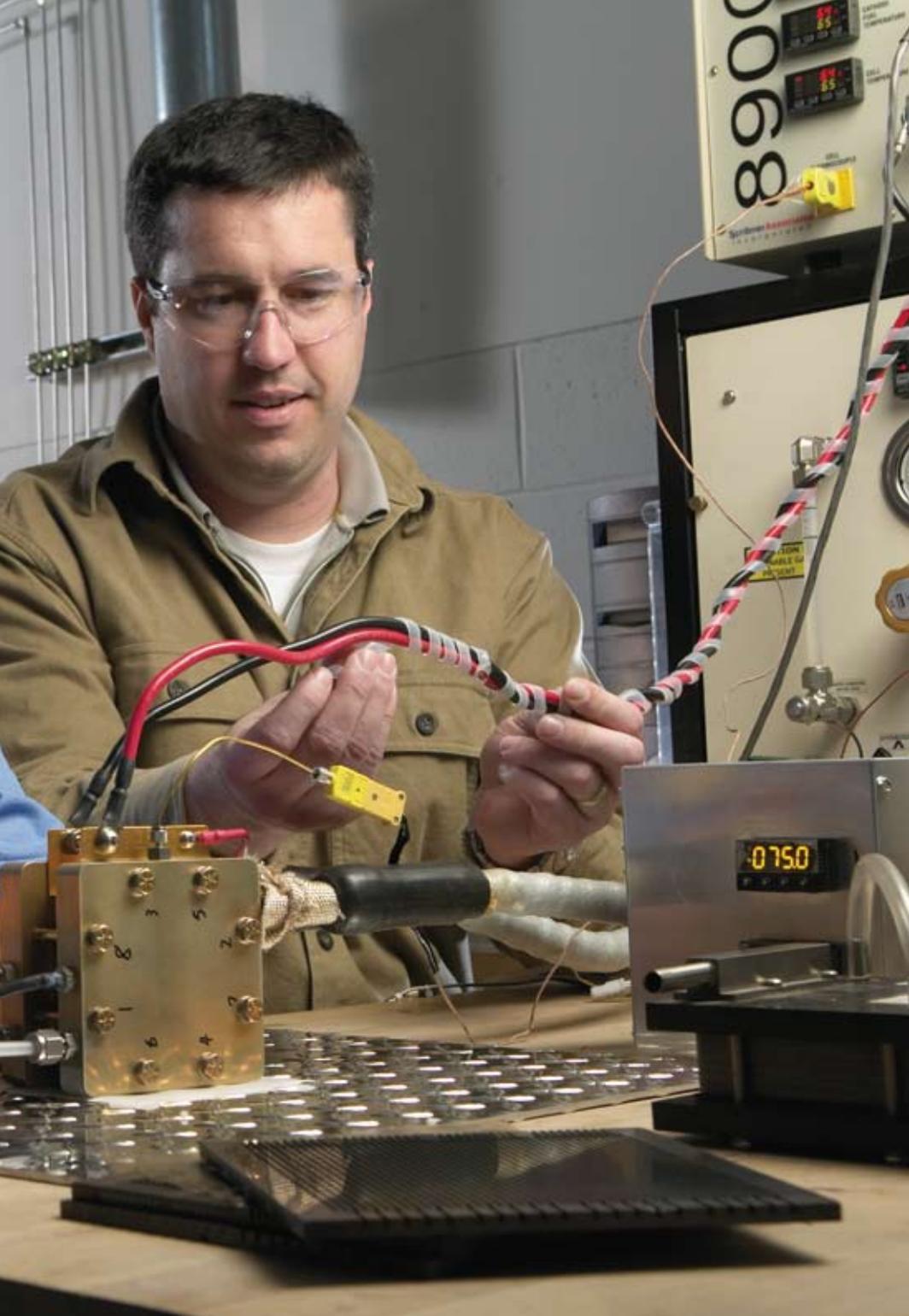
It is estimated that by 2013 the fuel cell industry could achieve \$40 billion in annual worldwide sales. When that happens, the fuel cell industry in North America is expected to account for more than 140,000 direct and indirect jobs. From researching and building better fuel cells, to collaborating with established energy companies, to training the next generation of industry experts, UConn is fueling the economy with both trained professionals and technological innovations to ensure that Connecticut remains poised to meet these demands.

Many industry leaders call Connecticut the nation's "fuel cell capital," and with some 30 companies manufacturing fuel cells or fuel cell components it's easy to understand why. Connecticut companies have produced and shipped more than \$300 million fuel cell products. Some 1,500 people in Connecticut are currently employed in the fuel cell industry, fully a third of all the fuel cell-related jobs in North America.



The University of Connecticut, the state's flagship public university, is right in the thick of this rapidly growing industry. We are among an elite class of nationally recognized Carnegie research universities, and the Fuel Cell Center exemplifies our commitment to research that enhances society here in Connecticut, across the nation and around the globe.





FUELING THE INDUSTRY – AT HOME AND ABROAD

Fuel cell companies often gravitate to our Center because we offer a unique value to the industry by focusing on a variety of fuel cell technologies. Our nationally acclaimed engineers and dedicated fuel cell researchers are experts in all aspects of fuel cell technology, as is evidenced by their impressive record of scholarly publications and submission of more than 59 invention disclosures and 25 patent applications. The Center is not only equipped to help fuel cell companies design and build their products, but also educates and trains the business community on the capabilities and potential applications of this emerging technology.



**CONNECTICUT
LEADS THE WAY**

1,500 jobs in fuel cell industry

From concept generation to prototype design to product testing in our state-of-the-art facility, we provide an array of services and expertise needed to drive this technology forward.

Our Fuel Cell Center is known and respected worldwide. And yet it is just one component – just one example – of how UConn serves the business community both at home and abroad to develop technology and train workforces to achieve their goals.

1 UNITED TECHNOLOGIES INCORPORATED

Our new two-year project with UTC has the potential to revolutionize the telecommunications industry by bringing to market a remarkable five kilowatt fuel cell-based back-up power system.

3 ENSIGN-BICKFORD AEROSPACE & DEFENSE

The potential impact of this emerging technology and energy source is far-reaching and incredibly potent. Imagine a compact fuel cell that provides portable power for soldiers. Lightweight power systems like the one being developed by Ensign-Bickford Aerospace & Defense Company in our Center holds the promise of enhancing soldier effectiveness by lightening loads, reducing logistics and extending mission durations.

2 FUELCELL ENERGY

To make fuel cell energy a more viable and realistic alternative to today's fossil fuels, the industry must face the challenge of capturing and utilizing hydrogen in a safe and efficient manner. Working with FuelCell Energy, we are developing an advanced electromechanical hydrogen separator, a device that will be critical in the establishment of power plants for the future.

4 TOHO GAS

While there's a definitive relationship between the University and leading Connecticut businesses, there's also a sound justification as to why our exceptional Center is aptly named The Connecticut *Global* Fuel Cell Center. When, for instance, Toho Gas, a prominent Japanese company, wanted to develop a fuel cell to use natural gas, Toho and a number of collaborators, including leading Japanese universities, sought out our Center's expertise to help design fabrication methodologies for new fuel cell micro-tubes.



CONNECTION TO THE FUTURE

Our Center serves as an educational leader of industry professionals through the creation and editorship of the *American Society of Mechanical Engineers Journal of Fuel Cell Science and Technology*. Our graduate and undergraduate students have many opportunities to develop and enhance their knowledge of fuel cells by pursuing advanced coursework, and working with researchers and faculty to develop solutions to meet the needs of our business partners today. And as this technology becomes more viable and prevalent in our society, we already note the shift in thinking among our students to embrace this emerging technology as ever-increasing numbers of seniors opt to tackle fuel cell-related problems for their industry-sponsored design projects.



CONNECTICUT
LEADS THE WAY

\$300M in fuel cell products

A resource to aid the state's fuel cell industry, UConn also serves future generations of industry professionals.

But the Center's commitment to educating young people – who may help to drive the future of the fuel cell industry as professionals or just as informed citizens – is much broader.

Hundreds of Connecticut youngsters have visited our Center in the past two years. Many have learned about fuel cells through tours of the Center's facilities. Many more have benefited from educational programs such as the Galileo Project, a multi-faceted educational program funded by the National Science Foundation to introduce high school students and K-12 educators to core engineering concepts; Engineering 2000, a one-week residential program for high school juniors and seniors; Pre-Engineering, a Saturday enrichment program for seventh, eighth and ninth graders; and Multiply Your Options, a one-day conference designed to expose eighth-grade girls to female role models in the fields of science and technology.



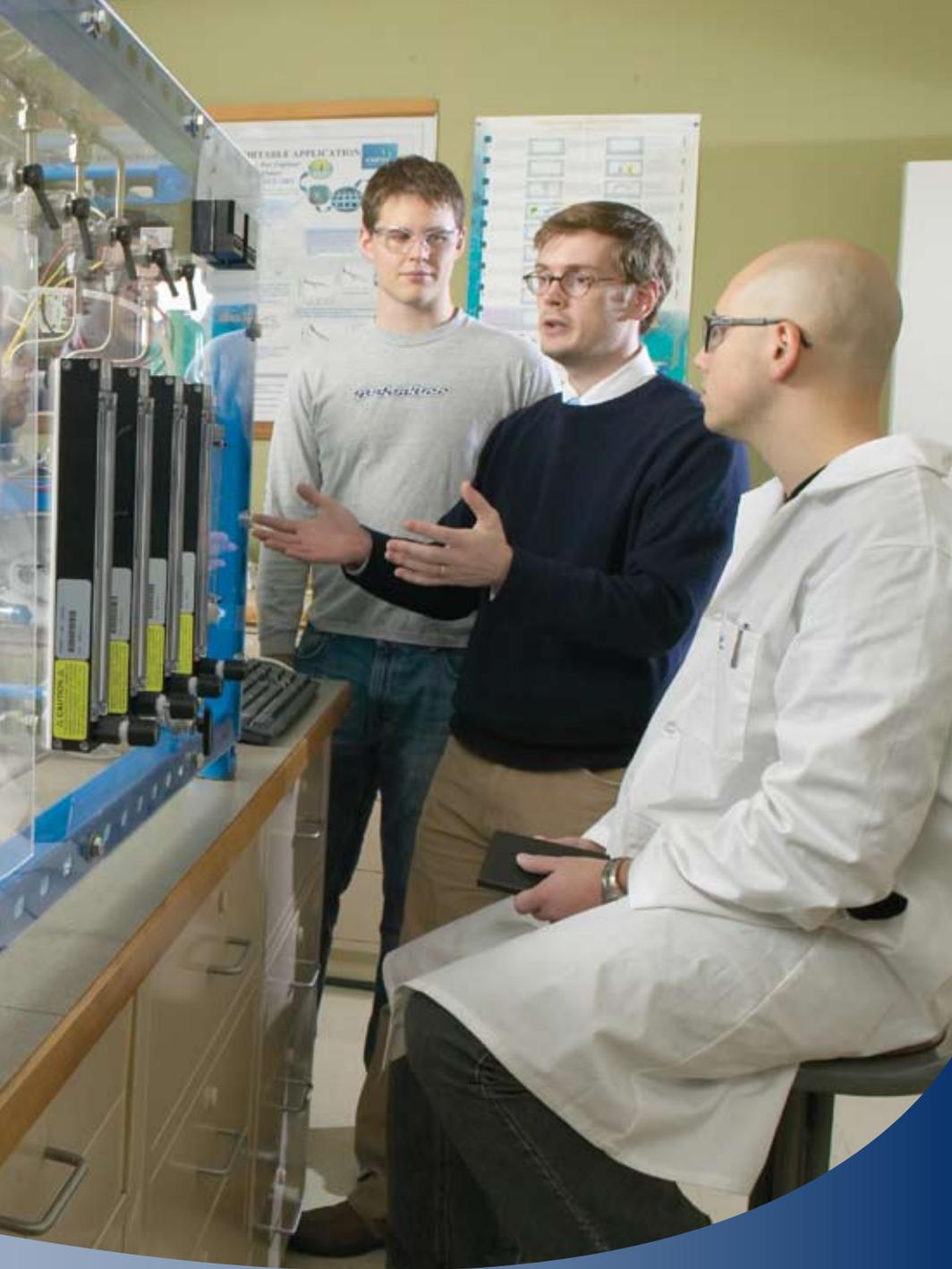
Our Center has been crafted to train the professionals of the future and provide the technological support and expertise this important segment of our state's economy needs to remain vibrant and healthy.



Across Connecticut, more and more fuel cells are appearing as part of a network of clean energy installations the Connecticut Clean Energy Fund calls the Connecticut Clean Energy Trail. At such diverse locations as South Windsor High School, St. Francis Hospital, Yale Peabody

Museum and the Mohegan Sun Resort and Casino, fuel cells are transforming the way Connecticut generates and thinks about energy. And the Connecticut Global Fuel Cell Center is at the heart of that transformation.

From working on wireless communications for businesses and hospitals to rethinking the way soldiers' gear is powered to improving the delivery of power in Japan, the University is at the forefront of an important revolution in the energy industry. We are committed not only to the technology, but also to providing the support needed to develop and implement this technology both here in Connecticut and beyond. From collaborating with the businesses of today to educating the leaders of tomorrow, the University of Connecticut points the way toward the future.



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