

# Bulletin *of the*

CONNECTICUT ACADEMY OF SCIENCE AND ENGINEERING



1976

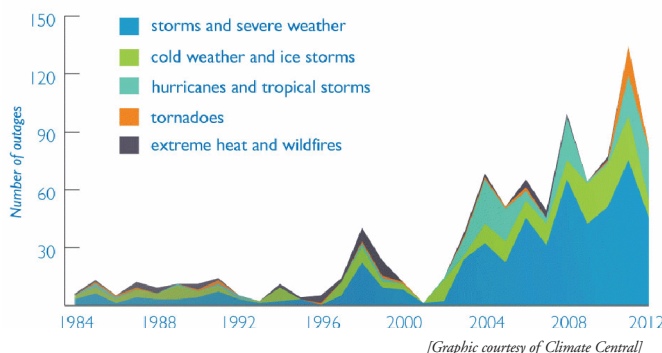
Volume 29,3 / Fall 2014

## Connecticut's Electric Grid: Keeping the Lights on Three Years Later

In 2011, more than 800,000 Connecticut residents experienced prolonged power outages brought about by Tropical Storm Irene in August and a Nor'easter in late October. Then along came Hurricane Sandy in October 2012, and it was "lights out" for more than 8.5 million people in the northeastern United States.

Considering the fact that US households use more electricity to keep cool than all other countries in the world combined, it's a wonder the utility companies can keep up with demand during normal weather conditions. But "normal" may not be the norm anymore. According to Climate Central, an independent organization of leading scientists and journalists researching and reporting the facts about our changing climate and its impact on the American public, weather caused 80% of

Extreme Weather Is Causing More Major Power Outages  
(major = at least 50,000 customers affected)



[Graphic courtesy of Climate Central]

all outages between 2003 and 2012, with climate change driving an increase in severe storms and extreme weather conditions.

The "Two Storm Panel," which was created by Governor Dannel P. Malloy following the 2011 storms, prompted a number of initia-

tives to improve preparedness and recovery efforts from emergencies and natural disasters. "But, after 10 days of public hearings and testimony from 100 people, we broadened our scope to address the long-term effects of climate change, the first in the United States to do so," said Joe McGee, co-chair of the Two Storm Panel and vice president of the Fairfield County Business Council. The Two Storm Panel issued their report in January 2012, with 82 recommendations. From these, Governor Malloy proposed 19 new initiatives.

One of those initiatives included a \$1 million annual increase to the Department of Transportation's (ConnDOT) existing tree management budget of \$550,000 for tree trimming (used primarily for roadway safety and clearance). Trees were the leading

(See *Keeping the Lights On*, page 2)

## Award-winning 'Science on Saturdays' at Yale

Science on Saturdays is an award-winning lecture series that conveys the excitement of research and the passion of scientists to school-age children in Connecticut. The series introduces middle school children to scientists and explores who scientists are, and how and why they study what they do. It is designed to dispel stereotypes children have about scientists and to show the fun of science. Yale faculty members participating in the program represent various backgrounds, ages, and disciplines. Each event in the series involves a lecture and an engaging science-related game and/or demonstration run by Yale college students. Past topics include:



'When I see that look of total amazement come over someone's face at one of the demonstrations, I know I hooked another amateur scientist.' — CASE member Kurt Zilm, host of Science on Saturdays. [Photo: Yale University]

- *Germ Busters! The Genetics Behind Our Amazing Immune System (or, why we aren't sick all the time?)*
- *Why Birds Are Dinosaurs*
- *The Universe in Your Hands*
- *Your DNA: Sense or Nonsense?*

Created in 2004, the series is presented by *Yale Scientific Magazine* and hosted by CASE member Kurt Zilm, professor of chemistry and chemical engineering at Yale. "I really enjoy bringing real science to the public and I'm really impressed

(See *Science*, page 7)

## From the National Academies

The following is excerpted from press releases and other news reports from the National Academies ([www.national-academies.org](http://www.national-academies.org)).

### ◆ 'National Vision' Urged for Coastal Risk Management

In recent years, an increase in the population and property located along the Atlantic and Gulf coasts of the United States has contributed to a dramatic rise in storm-related losses. Climate change poses additional threats to these coastal communities due to sea-level rise and possible increases in the strength of the most intense hurricanes. Because the vast majority of funding associated with coastal storms comes from the federal government, property owners and local and state governments have few incentives not to develop or rebuild in high-risk areas. A new report from the National Research Council calls for a "national vision for coastal risk man-

(See *NAS*, page 7)

culprits for downed utility wires during the storms, accounting for 90% of the fallen wires following Storm Irene. In conjunction with ConnDOT's tree trimming budget increase, the Connecticut Light and Power Company (CL&P) is planning to spend \$314 million over five years (in 143 towns) and United Illuminating (UI) plans to spend \$100 million over eight years (in 17 towns).

CL&P's 2012-2013 tree trimming efforts focused on poor-performing electrical circuit areas, circuits serving a large number of customers and circuits that had not received enhanced tree trimming before. Prior to any work performed, CL&P delivered consent forms to property owners. However, in June 2014, Connecticut's Public Utility Regulatory Authority (PURA) changed the rules regarding tree trimming, requiring the utility companies to be more accommodating to property owners and municipal tree wardens. This ruling came about after residents in urban areas, such as New Haven and Hamden, launched a campaign to curtail tree trimming since they believed the removal of trees would change the character of their neighborhoods and decrease the benefits trees provide—shade, water management, etc.

The state's aging electric infrastructure was another issue the Panel addressed, specifically the need to better maintain and upgrade the state's 900,000+ utility poles. In 2011, CL&P estimated that 45% of their utility poles were past due replacing. That estimate was reinforced when CL&P lost nearly 3,000 utility poles during the two

storms that year. These poles carry several layers of wires for distributing electricity, telecommunications and cable television services to Connecticut residents and businesses. To add to the complexity of these structures, the poles are jointly owned by CL&P or UI, and AT&T or Verizon, with one of these entities responsible for maintenance. For these reasons, the Panel recommended the establishment of a pole administrator to monitor and coordinate pole maintenance statewide.

In August 2012, a working group was formed by PURA and chaired by CL&P's senior counsel, Vincent Pace. The group included utility pole owners, municipalities and other interested parties. Their task was to develop "a consensus pole administration structure to facilitate pole attachments," to include the appointment of a third party statewide utility pole administrator. The Working Group's final report was submitted to PURA in July 2014, for review and final approval. PURA's ruling is expected shortly.

From an infrastructure hardening perspective, CL&P has several modernization projects underway. Among them is CL&P's Line Project structure replacement initiative. This project, along with what is known as the 1990 Line, targets 21 miles of existing 115-kV transmission lines that run from Watertown to Monroe. A second 3-mile-long section from Middlebury to Waterbury is also part of the project. The new structures and lines will be able to withstand 1 inch of ice loading combined with 40-mph winds and 110 mph hurricane-force winds, per the National Electrical Safety Code requirements.

The impact of severe storms on Connecticut's critical facilities (hospitals, police stations, fire stations, water and sewage treatment plants, public shelters or correctional facilities, commercial areas of a municipality, etc.) led to the Panel's recommendation to establish a microgrid program that would provide electricity on a 24/7 basis to these facilities during electric grid outages. A microgrid is a small-scale power grid that can operate independently or concurrently with the main power grid. Microgrids can also be used to support the main power grid during periods of heavy demand.

In April, 2013, Connecticut became the first state in the nation to launch a statewide microgrid pilot program. The initial \$15 million allocated from the state's budget for the pilot program is administered by Connecticut's Department of Energy and Environmental Protection (DEEP). Following Hurricane Sandy, the program gained momentum and another \$30 million in funding was added for a second round of microgrid programs—final selections will be announced in October 2014.

The program targets projects that meet a stringent list of requirements. "Microgrids must be designed and operated in accordance with existing statutes and regulations, for example, who can supply energy to a retail customer and who has the right to cross a public right-of-way," said Veronica Szczerkowski of the DEEP's Bureau of Energy and Technology Policy.

Connecticut's program encourages the use of clean energy sources such as fuel cells, wind and solar energy sources. Connecticut's program also requires the microgrid to run for two weeks with enough easily accessible fuel to operate it for a total of four weeks.

In 2013, the DEEP selected eight projects for funding, with assistance from an expert technical consultant and the state's two major electric utility companies. The projects include police stations, emergency response teams/operations centers, fire stations, grocery stores, gas stations, schools and universities. Wesleyan University was the first microgrid grantee to complete their project—upgrading and expanding their existing microgrid to include the Freeman Athletic Center. During emergency situations, the Center serves as

*(See Keeping the Lights On, page 8)*

### The Connecticut Academy of Science and Engineering

The purpose of the Academy is to "provide guidance to the people and the government of the State of Connecticut ... in the application of science and engineering to the economic and social welfare."

#### OFFICERS OF THE ACADEMY

Sandra K. Weller, President  
UConn Health Center

Laura Grabel, Vice President/President Elect  
Wesleyan University

Regis A. Matzie, Secretary  
Westinghouse Electric Company, LLC (ret.)

Phillip J. Gardner, Treasurer  
Coherent Inc. (ret.)

#### EXECUTIVE DIRECTOR

Richard H. Strauss

#### ASSOCIATE DIRECTOR

Terri Clark

#### ASSISTANT DIRECTOR FOR PROGRAMS

Ann G. Bertini

#### EDITORS

Phillip Gardner, Executive Editor - Engineering  
Coherent, Inc. (ret.)

Edward Monahan, Executive Editor - Science  
Director, Connecticut Sea Grant College Program (ret.)  
Professor emeritus, Marine Sciences & Resource Economics  
UConn

#### MANAGING EDITOR

Martha Sherman

The BULLETIN is published by the Connecticut Academy of Science and Engineering, Inc., 805 Brook Street, Building 4-CERC, Rocky Hill, CT 06067. Telephone (860) 571-7143. E-mail: acad@ctcase.org. Web: www.ctcase.org. To subscribe, contact us by phone or email or via our web site. The Connecticut Academy of Science and Engineering is a private, nonprofit public-service organization established by Special Act No. 76-53 of the Connecticut General Assembly.

COPYING PERMITTED, WITH ATTRIBUTION

# IN BRIEF

## Science and Engineering Notes from Around Connecticut



### Biomedical Research

**UCONN TEAM REPORTS NEW APPROACH TO MS.** Researchers in the **UConn Technology Incubation Program** have identified a new approach to treating multiple sclerosis (MS) using human embryonic stem cells. Findings of the study, which was led by **ImStem Biotechnology Inc.** of Farmington, along with UConn Health professor **Joel Pachter**, assistant professor **Stephen Crocker**, and **Advanced Cell Technology (ACT) Inc.** of Massachusetts, appear in the July edition of *Stem Cell Reports* online. The researchers demonstrated that embryonic stem cell therapy significantly reduced MS disease severity in animal models, offering better treatment results compared with stem cells derived from human adult bone marrow. Eight lines of adult bone marrow stem cells were compared to four lines of human embryonic stem cells. All bone marrow-related stem cells expressed high levels of cytokine that stimulates autoimmunity and can worsen the disease. The human embryonic stem cell-related lines expressed little of the inflammatory cytokine. ImStem is seeking FDA approval to make this treatment available to patients.

#### **FUNDING EXTENDED FOR CT VACCINE MANUFACTURER.**

**Protein Sciences Corporation** of Meriden announced in June that the Biomedical Advanced Research and Development Authority (BARDA), part of the US Department of Health and Human Services, had extended the company's contract to support development, scale-up and expanded licensure of its influenza vaccines, Flublok® (seasonal) and Panblok® (pandemic) to December 31, 2015, with a budget of \$50.6 million. The total value of the contract, first awarded in 2009, is \$146.9 million. Protein Sciences will use the funds to license and build its manufacturing facility in Pearl River, New York, in order to produce 50 million doses of vaccine within six months of the declaration of a pandemic.

**\$10M IN CT STEM CELL GRANTS ANNOUNCED.** On June 24, the **Connecticut Stem Cell Research Advisory Committee** announced the award of nearly \$10 million in Connecticut stem cell research funds to 18 Connecticut-based researchers. Those sharing in the grants include researchers from **Wesleyan**, **Yale**, **UConn**, and **Jackson Laboratory for Genomic Medicine**. A total of 111 applications were received in December 2013. On behalf of the **Department of Public Health**, the **Connecticut Academy of Science and Engineering** facilitated the **Connecticut Stem Cell Research Peer Review Committee**. This committee reviewed the proposals in accordance with National Institutes of Health guidelines and provided to the Advisory Committee its recommendations with respect to the ethical and scientific merit of each proposal. In announcing the 2014 awards, Governor **Dannel Malloy** called the grants "another example of Connecticut's unprecedented investment in biomedical research."

#### **JAPANESE OFFICIALS OKAY NEW BRISTOL-MYERS SQUIBB**

**DRUGS.** **Bristol-Myers Squibb** (BMS) received approval from the Japanese Ministry of Health, Labor and Welfare for two new drugs to be used in combination therapy for the treatment of genotype 1b Hepatitis C Virus (HCV). The drugs—daclatasvir and asunaprevir—can lead to a cure for many patients in Japan who haven't been able to take or respond to traditional treatments such as interferon-based therapies. Daclatasvir is a potent, pan-genotypic NS5A replication complex inhibitor (in vitro) and asunaprevir is a NS3/4A protease inhibitor. The discovery and clinical development of these molecules,

which have been accorded Breakthrough Therapy status by the US Food and Drug Administration (FDA), were conducted at the BMS pharmaceutical research center in Wallingford. Approval by the FDA is expected later this year.



### Business & Industry

#### **SIKORSKY TO BUILD NEW MARINE ONE FLEET, USAF**

**PROTOTYPES.** **Sikorsky Aircraft** will build the next fleet of Marine One helicopters for the Office of the President, according to an announcement by the US Navy in May. The contract includes \$1.24 billion for engineering and manufacturing development to modify, test and deliver six FAA-certified S-92® helicopters and two trainer simulators to the Marine Corps. The fixed-price incentive is the initial step to providing, by 2023, a replacement fleet totaling 21 operational aircraft. In addition to the Marine One contract, the US Air Force this summer awarded Sikorsky \$1.28 billion to build four prototype Combat Rescue Helicopters, replacing the HH-60G Pave Hawk helicopter fleet. This is the first part of a potential \$7.9 billion contract to build 112 new helicopters for rescuing wounded, injured or stranded service personnel. "This is a big boost and a shot of energy not only for Sikorsky but for their subcontractors and the region," said US Senator **Richard Blumenthal**.

**P&W ANNOUNCES FIVE-YEAR EXPANSION PLAN.** **Pratt & Whitney** recently announced a five-year capital expenditure plan focusing on technology improvements and facility expansions to prepare for increasing commercial and military engine production levels. Investments include \$400 million to expand the company's East Hartford and Middletown facilities; \$63 million to expand the company's West Palm Beach, Florida, facility that opened in June; a \$140 million expansion at the company's Advanced Coating Technology facility in Wallkill, New York; and a \$110 million investment in Singapore to build a new manufacturing facility expected to open later this year, along with a repair and engineering facility that opened in December 2013.

**CT FIRMS WIN NASA CONTRACTS.** On May 29, it was announced that **Materials Technologies Corp** (MTC) of Monroe was one of six Connecticut companies awarded contracts from NASA's Small Business Innovation Research and Small Business Technology Transfer programs. The company won a contract for a feasibility study to determine whether aircraft wings can operate without movable flaps. Other winners, with support from **Connecticut Innovations**, include: **Proton Energy Systems** of Wallingford; **Precision Combustion** of North Haven; **Flightware** of Guilford; **Qualtech Systems** of East Hartford; and **Sustainable Innovations** of Glastonbury. The CEO of MTC, **Yogesh Mehrotra**, said success in the study could lead to more funding and the possibility of expanding.

#### **DANBURY DRUGMAKER GETS \$1.5M LOAN TO EXPAND.**

**Connecticut Innovations** announced in July that it will provide a \$1.5 million loan to Danbury drugmaker **Perosphere Inc.** to help build a 16,000-square-foot building to house more than 30 employees, and provide 12,000 square feet for laboratory and manufacturing needs. The three-year-old company is developing ultra-rapid-acting insulin and converting Felbamate, currently a seizure medication, into a treatment to protect neural function in individuals with traumatic brain injury.

*Items that appear in the In Brief section are compiled from previously published sources including newspaper accounts and press releases. For more information about any In Brief item, please call the Academy at (860) 527-2161, write the editors at CASE Bulletin, 179 Allyn St., Suite 512, Hartford, CT 06103-1422, or email us at acad@ctcase.org*

# IN BRIEF

## Science and Engineering Notes from Around Connecticut

### GREENSKIES ESTABLISHES FUND FOR LARGE SOLAR PROJECTS.

Connecticut-based **Greenskies** recently announced a partnership with **United Bank of Glastonbury** to create a \$25 million renewable energy fund that will be used to finance large commercial solar projects. Greenskies designs, builds and maintains solar photovoltaic systems for corporate clients, municipalities and government agencies, educational institutions and utilities. The money will go to projects in Connecticut, Massachusetts, New Jersey and New York, said Greenskies co-founder **Michael Silvestrini**. Greenskies currently has more than 60 installations online and an additional 100 projects in various stages of development throughout the region.



### Communication

**FRONTIER APPOINTS HEAD OF CT OPERATIONS.** On July 23, **Frontier Communications Corporation** announced the appointment of **Paul Quick** as senior vice president and general manager of the company's Connecticut operations. The new chief stated the company will increase its broadband service on what was once AT&T's territory as landline telephone business continues to erode. Frontier and AT&T announced last December that AT&T would sell its Connecticut wireline operations for \$2 billion. State regulatory agencies still must approve the deal, following federal approval on July 25. Quick said Frontier will add 75 jobs to Connecticut's unionized workforce of 2,348 within the first six months of the AT&T deal closing this year. Another 10 jobs will be added in 2017.



### Education & Cognition

**STAMFORD SCHOOL WINS ENERGY CHALLENGE.** On May 22, the **Villa Maria School** of Stamford announced it had won a \$10,000 grant from America's Home Energy Challenge contest, taking first place in the middle school category of the nationwide contest. The Challenge, sponsored by the US Department of Energy and administered by the National Science Teachers Association, encourages children to learn about energy and the benefits of energy conservation. Sixth and seventh grade students and their science teachers completed materials provided by the Challenge, collected three months of energy data, created an Energy Savings Plan, recorded new energy data and wrote a detailed narrative explaining their efforts. Villa Maria is a private, co-educational day school in Stamford that serves K-9 students with learning disabilities.

### HARTFORD SCHOOL NAMED TOP MAGNET SCHOOL IN US.

In early May, nonprofit Magnet Schools of America ranked **Hartford Pathways Academy of Technology and Design** as the top magnet high school in the United States. Pathways incorporates technology and "project-based learning" into its education methods and recently moved to the **Goodwin College** campus in East Hartford.

### DANBURY HS WINS SIKORSKY STEM CHALLENGE.

On June 5, **Sikorsky Innovations** announced that **Danbury High School's** team won the 2014 Science, Technology, Engineering and Math (STEM) Challenge. Sikorsky Innovations, **Connecticut Corsair** and **Connecticut Innovations** co-sponsor the competition, now in its third year. The challenge is open to Connecticut high school students with student teams paired with Sikorsky engineers to solve technical problems faced in an actual engineering workplace. Connecticut Corsair develops the challenge using the official state aircraft of Connecticut, the F4U-4 Corsair. This year's challenge was to redesign the landing gear components on the aircraft. **Amity Regional High School** was awarded second place and **Ridgefield High School** earned a third place award.

### WESLEYAN ANNOUNCES COLLEGE OF INTEGRATIVE SCIENCES.

This summer, **Wesleyan University** announced creation of the **College of Integrative Sciences (CIS)**. Students majoring in the natural sciences or mathematics now may pursue a cross-disciplinary, research-based course of study through CIS. The new college builds on the idea that tomorrow's scientists will face challenging problems in the diverse areas such as energy, public health, and the environment that will require a broad knowledge base, and a synthesis of different research methodologies and creative problem solving skills. A key feature of CIS is the integration of different fields to address complex problems.



### Energy

**BRIDGEPORT SCHOOLS WIN DEEP AWARD.** The **Bridgeport Board of Education** received a Summer Savers Gold Award from the **Connecticut Department of Energy and Environmental Protection** in May for its success in reducing electricity consumption by 20% through lighting upgrades completed at two schools. In addition, a Summer Savers Silver Award was given for energy efficiencies completed at a third school, resulting in a more than 15% reduction in electricity usage. The board took advantage of programs offered through the **Connecticut Energy Efficiency Fund**, administered by **The United Illuminating Company** as part of the Energize Connecticut initiatives.

### CONTEST SHOWCASES 'ENERGY SMARTS.'

On June 5, Energize Connecticut, in partnership with **Connecticut Light & Power** and **The United Illuminating Company**, held a ceremony at the state capitol to honor contest winners of the 10th annual eesmarts Student Contest. Students in grades kindergarten through 12 showcased their "energy smarts" through various media projects. This year's winners were 6th graders, with first place going to **Brendan McMahon** of Fairfield, and **Bryce Coudriet** of Torrington and **Elizabeth Terry** of Bridgeport coming in second and third, respectively.

### SULFUR CONTENT OF HOME HEATING OIL TO DROP.

The sulfur content of Connecticut's home heating oil dropped to 500 parts per million from 3,000—an 84% reduction—under a new state law that went into effect on July 1. The law was approved as an amendment to Public Act 13-298 in 2013, and went into effect in July. Lower sulfur content will also translate into savings for consumers because of reduced maintenance costs for home heating equipment, according to **Chris Herb**, president of **Connecticut Energy Marketers Association**. The new, lower levels of sulfur will also mean lower sulfur dioxide emissions, reducing air pollution.

### STATE, NU RANK HIGH IN EFFICIENCY, RENEWABLE SOURCES.

In a study released July 24 by CleanEdge, an Oregon research and advisory firm serving the environmental technology sector, and Ceres, a nonprofit working to mobilize businesses to preserve natural resources, **Northeast Utilities (NU)** ranked eighth among 32 of the nation's largest electric utilities in energy efficiency and sales of power from renewable sources. According to CleanEdge, in 2012, the cumulative annual energy efficiency savings achieved by NU equaled 16.46 % of its annual retail electric sales. Connecticut was ranked one of the nation's Top 10 leaders in clean energy for being the first state to develop a "green bank" in 2011.



### Environment

### NEW FRACKING WASTE BILL CREATES 3-YEAR MORATORIUM.

In June, Governor **Dannel Malloy** signed Public Act 14-200 into

# IN BRIEF

## Science and Engineering Notes from Around Connecticut

law, imposing a three-year moratorium on bringing fracking waste into Connecticut. During the moratorium, the legislation requires the **Department of Energy and Environmental Protection** to establish regulations to ensure that fracking waste does not create a hazard for Connecticut's air, land, water, and public health. The new law, which has been called one of the strongest in the nation, was approved by the **General Assembly** with strong bipartisan support and was supported by grassroots advocacy across the state. Fracking waste, which is a byproduct of the hydraulic fracturing process used to produce natural gas, can contain high levels of salt and other toxic chemicals.

**NEW MOTH IN EASTERN CT.** In May, **Katherine Dugas**, research assistant with the **Connecticut Agricultural Experiment Station**, was alerted to the presence of winter moth caterpillars in eastern Connecticut by an entomology professor at the University of Massachusetts Amherst. The moth is a European native that first appeared in Nova Scotia in the 1950s, and has been creeping into forests in Massachusetts, Maine, Rhode Island and, now, Connecticut. "We're watching it closely," Dugas said. The tiny, lime green caterpillars, she noted, are destructive to trees only in the caterpillar stage. They attack a wide variety of hardwoods and other plants, including maples, oaks, ash, apple, blueberry, white elm and basswood. Property owners should contact the Experiment Station or a licensed arborist before applying pesticides or taking other action.

**GOOD, BAD NEWS IN ENVIRONMENTAL REPORT.** The **Council on Environmental Quality** recently issued the *Environmental Quality in Connecticut* report outlining the condition of the state's environment through 2013. The report found Connecticut residents are driving less, taking the bus more and using electricity more efficiently, resulting in 2013's air quality being the best in decades. Some areas of decline include warming temperatures of Long Island Sound, causing cold water species like lobsters to significantly decline, and flooding along Connecticut's rivers and streams that is "more frequent and more damaging" than in the past. The report also found that the state has not been as aggressive as in the past in enforcing environmental laws. More than 1,000 violations were found, the most in more than a decade. The report also found that the state's preservation of farmland, open space, parks, and forests requires a greater level of commitment from the state.

**REPORT CITES PROGRESS IN MEETING GREENHOUSE GAS MANDATES.** According to a new report issued this spring by the **Connecticut Department of Energy and Environmental Protection** (DEEP), data indicate Connecticut is making solid progress towards meeting federal and regional mandates to reduce greenhouse gas emissions to 10% below 1990 levels by 2020, and 80% below 2001 levels by 2050. The report, *Taking Action on Climate Change: 2014 Progress Report*, shows that the biggest reduction was achieved in the electric power sector, where emissions fell 31% since 1990 and 22% since 2005. Residential emissions fell 5% since 1990 and 24% since 2004, while transportation emissions have dropped 17% since 2004.

**ASH BORER SPREADS.** The **Connecticut Agricultural Experiment Station** announced this summer that the emerald ash borer (EAB) infestation has expanded into Fairfield, Hartford, Litchfield, Middlesex and New London counties and is now detected in 40 towns. The emerald ash borer is a destructive insect responsible for the death and decline of tens of millions of ash trees from Colorado and the Midwest to New England and south to Georgia. According to State Entomologist and CASE member **Kirby Stafford**, ash makes up 4-15% of Connecticut's forests and represents about 2-3% of the urban trees in many communities. "The spread of EAB within

our state poses a severe and imminent threat to ash trees on both private and public property," stated **Department of Energy and Environmental Protection** commissioner **Robert Klee**. Regulations also are in effect regarding the movement of firewood from out-of-state into Connecticut and within Connecticut.

**NEW LAW CALLS FOR STRATEGIC WATER RESOURCES PLAN.** With the support of Governor **Dannel Malloy**, the General Assembly in 2014 enacted legislation requiring Connecticut's **Water Planning Council** to complete a strategic state water resources plan by 2018. Among its most critical provisions is a requirement that the plan account for the potential impact of climate change as well as climate resiliency. A legislative task force led by State Representative **John Hampton** last fall and a February **UConn** conference chaired by CASE member **Gene E. Likens** provided many of the substantive policy recommendations now incorporated into PA 14-163. More information is available at [www.cga.ct.gov](http://www.cga.ct.gov).



### Food & Agriculture

**NEW FOOD RECYCLING FACILITY GETS NOD.** In early May, Southington recycler **Quantum Biopower** received approval from the **Southington Planning and Zoning** committee to put Connecticut's first food recycling and anaerobic digestion facility on 65 acres in the town. Quantum has contracts with **Aqua Turf Club**, the **Southington Country Club** and the **Farmington Club** to power its facilities, using the gas created by the decomposing garbage to generate electricity. The facility is expected to generate enough electricity to power 750 homes per year.

**FARMER'S COW ANNOUNCES 'REAL LOCAL' CAMPAIGN.** This summer, **The Farmer's Cow**, a dairy farm association owed by six families in eastern Connecticut, announced the creation of the "REAL Local" campaign to promote local agriculture amidst concerns over farms located far from Connecticut labeling products as "local." The campaign helps food buyers, both shoppers and retailers, identify what is truly local; in addition, it helps consumers understand the benefits to the economy, the environment and local communities. The REAL Local campaign provides a geographic reference promoting not just the member farms of The Farmer's Cow but all REAL Local farms in Connecticut.

**PET SHOP OWNERS TO OBEY USDA ANIMAL WELFARE REGS.** On June 18, Governor **Dannel Malloy** signed Public Act No. 14-77, legislation that will take effect October 1 prohibiting pet shop owners from buying or selling cats and dogs from breeders who have violated the US Department of Agriculture's animal welfare regulations. Pet shop license-holders will also be required to post certain USDA inspection reports for breeders of any dog offered for sale. The state agriculture commissioner will be able to fine pet shop license-holders directly if they do not conform to the law.



### Health

**FORUMS FOCUS ON CHILDREN'S MENTAL HEALTH.** On May 21, **Connecticut College** held the third of six statewide forums organized by the **Child Health and Development Institute** where parents and advocates gathered to provide input for a state plan to improve children's mental health services and systems in Connecticut. The new plan, required under Public Act 13-178, calls for the state **Department of Children and Families** (DCF) to develop a statewide behavioral health plan for children. The process is being supported through a public-private partnership

# IN BRIEF

## Science and Engineering Notes from Around Connecticut

that includes DCF, the **Connecticut Health Foundation** and the private, nonprofit Child Health and Development Institute. Forum moderator **Michael Hoge**, psychology professor at the **Yale School of Medicine** and a consultant to the institute, said forum comments will be summarized and incorporated into the plan. A draft version will be available online for public comment by late summer; a revised version is due to the General Assembly by October.

**PATIENTS MAY REQUIRE RE-VACCINATION.** It was announced on July 18 that 5,000 doses of vaccines given to more than 3,800 Connecticut patients may have reduced effectiveness because of improper storage temperatures. The doses were administered beginning Jan. 1, 2013, to patients throughout the **Hartford HealthCare Medical Group** practices in Enfield, South Main Street in West Hartford, Storrs and the Unionville section of Farmington. As many as 50% of those who received those vaccines may need to be re-vaccinated. Two-thirds of the vaccines were for the flu, pneumonia, tetanus and pertussis. The remainder included a variety of vaccines, including doses to prevent human papillomavirus and meningitis.

**2013 DEATH CONFIRMED AS 1ST EEE CASE IN STATE.** *The Connecticut Epidemiologist*, a publication of the **Connecticut Department of Public Health**, reported in June 2014 that a Connecticut resident who was hospitalized with encephalitis and died in the fall of 2013 died of Eastern equine encephalitis (EEE), marking the state's first confirmed human case of the rare and often fatal mosquito-borne virus. This followed the repeated detection of EEE-infected mosquitoes in six towns in eastern Connecticut from July through October of 2013 in annual statewide surveillance conducted by the **Center for Vector Biology and Zoonotic Diseases** at the **Connecticut Agricultural Experiment Station** under the direction of CASE member **Theodore G. Andreadis**.

**ASTHMA STUDY TO FOCUS ON INDOOR AIR POLLUTANTS.** The **Yale School of Public Health** announced plans for a five-year research study to identify the role of specific residential air pollutants and their sources on asthma morbidity in inner-city children. Indoor exposure to air pollutants is associated with an increased risk in asthma severity in children, including a greater frequency in respiratory symptoms and medication use. "We believe the results of our study will show us if reductions in certain kinds of indoor air pollution can result in reductions in asthma severity," said lead researcher and CASE member **Brian P. Leaderer** of Yale. The study is funded with a \$6.25 million grant from the National Institutes of Health.



### High Technology

**UConn STUDENTS DEVELOP ARTIFICIAL KIDNEY PROTOTYPE.** This spring, two student teams at **UConn** presented Senior Design Projects at the School of Engineering Senior Design Demonstration Day. Under guidance from **Anson Ma**, assistant professor in the department of chemical and biomolecular engineering, the two teams developed a prototype of a cost-effective, functional artificial kidney using chemical engineering principles and 3-D printing technology. Each team collaborated with the **ACT Group** of Cromwell to select the appropriate polymers, as well as the right printer to print the particular prototype design.

**CCAT ACQUIRES WORLD'S MOST ADVANCED 3D PRINTER.** The **Connecticut Center for Advanced Technology** announced in June that it had installed the latest ProJet 5500x machine from South Carolina-based 3D Systems. Considered the world's most advanced 3D printer, the ProJet is capable of making complex, multi-material

parts. "What's unique about this is the size of the part you can make," said center director **Bob Torrani**. "This one has a 21-inch workspace, so you can make rather large parts. Also the resolution of the materials—you can deposit down to a thousandth of an inch." Most 3D printers can build using only one type of plastic or metal but the ProJet is capable of building objects using four different materials simultaneously.

**STARTUP GETS \$5.5M TO DEVELOP PLASMA TECHNOLOGIES.** **Amastan LLC**, a company in **UConn's Technology Incubator Program** (TIP), announced this summer that it has secured a \$5.5 million investment from two private sources for development of high-end plasma technologies for the production and processing of nanomaterials. Amastan's UniMelt Process technology produces contamination-free nanomaterials and advanced thermal spray coatings with applications for optics, missile domes, solid oxide fuel cells, turbine engines, additive manufacturing, and armored windows.

**TEAM COLLABORATES ON FACIAL RECOGNITION SOFTWARE.** CASE Member **Tarek Sobh**, dean of the **University of Bridgeport School of Engineering**, along with **Ausif Mahmood** and **Alan Dressler**, co-founder of **Central Computer Forensics Lab**, are collaborating to create Face Checks, a new facial recognition program. The Face Checks software builds on the Eigenface technique, detecting specific facial features through a complex database of subgroups and additional layers of algorithmic programming. The team is currently developing the software to recognize moving targets; a prototype for the adaptation of their software for use by federal agencies is also being developed.



### Transportation

**NEW CT PORT AUTHORITY CREATED.** In June Public Act 14-122 was enacted and includes the creation of the quasi-public **Connecticut Port Authority**, which will be responsible for coordinating development of the state's ports to promote economic activity. The port authority will market the ports to domestic and foreign shippers, seek private investments, and pursue state and federal funding for dredging and other improvements needed to boost shipping and cargo capacity.

**NEW HAVEN LINE GETS 16 NEW M8 CARS.** On July 20, the **Metropolitan Transportation Authority** announced that sixteen new M8 rail cars were delivered from Kawasaki Rail Car to run on **Metro-North's New Haven Line**, bringing the total to 372. The new M8 trains represent 87% of total weekday New Haven Main Line service, 92% of the Saturday service and 90% of the Sunday service, with Metro-North now operating more M8s than old equipment on the New Haven Line. These trains operate during peak and off-peak service between New Haven, Stamford and Grand Central Terminal.

**HARSH WINTER PROMPTS MORE FUNDING.** Connecticut will spend an additional \$11.9 million to repair roadways damaged during the harsh conditions of the winter season, including snow and ice storms, freeze-and-thaw periods and extreme cold, according to an announcement from state officials in May. The state **Bond Commission** on May 30 approved the extra funding request, which is in addition to \$57 million already approved for road repairs earlier this year, to pay for annual maintenance and road resurfacing programs for 264 miles of primary roads.

—Compiled and edited by Wendy Swift

agement” that includes a long-term view, regional solutions, and recognition of all aspects of economic, social, environmental, and safety benefits that come from risk management in order to reduce the impacts of natural disasters along the Atlantic and Gulf coasts. A national coastal risk assessment is needed to identify coastal areas that face the greatest threats and are high priorities for risk-reduction efforts. The report defines coastal risk as the potential for hazards, such as storm-surge-induced flooding and wave damage, to adversely affect human health and well-being, economic conditions, infrastructure, support services, and social, environmental, and cultural resources in coastal communities.

[http://www.nap.edu/catalog.php?record\\_id=18811](http://www.nap.edu/catalog.php?record_id=18811)

### ◆ Preparing the Planet for 10 Billion People

The Earth’s population, currently 7.2 billion, is expected to rise at a rapid rate over the next 40 years. Current projections suggest that the Earth will need to support 9.6 billion people by the year 2050, a figure that climbs to nearly 11 billion by the year 2100. At the same time, most people envision a future Earth with a greater average standard of living than we currently have—and, as a result, greater consumption of planetary resources. How do we prepare our planet for a future population of 10 billion? How can this population growth be achieved in a manner that is sustainable from an economic, social, and environmental perspective? *Can Earth’s and Society’s Systems Meet the Needs of 10 Billion People?* is the summary of a multi-disciplinary workshop convened by the National Academies in October 2013 to explore how to increase the world’s population to 10 billion in a sustainable way while simultaneously increasing the well-being and standard of living for that population. This report examines key issues in the science of sustainability that are related to overall human population size, population growth, aging populations, migration toward cities, differential consumption, and land use change, by different subpopulations, as viewed through the lenses of both social and natural science.

[http://www.nap.edu/catalog.php?record\\_id=18817](http://www.nap.edu/catalog.php?record_id=18817)

### ◆ NRC Workshop Examines Impact of Big Data on Materials Science Community, Manufacturing

The National Research Council Standing Committee on Defense Materials Manufacturing and Infrastructure convened a workshop in February 2014 to discuss the impact of big data on materials and manufacturing in the United States. *Big Data in Materials Research and Development* is a summary of that workshop. The materials science community would benefit from appropriate access to data and metadata for materials development, processing, application development, and application life cycles. Currently, that access does not appear to be sufficiently widespread. Workshop participants identified existing constraints to access as well as potential improvements that might enable broader access to materials and manufacturing data and metadata. The report discusses issues in defense materials, manufacturing and infrastructure, including data ownership and access; collaboration and exploitation of big data’s capabilities; and maintenance of data.

[http://www.nap.edu/catalog.php?record\\_id=18760](http://www.nap.edu/catalog.php?record_id=18760)

### ◆ IOM Report Urges Overhaul of Nation’s \$15 Billion Public Financing Program for Physician Training

A new report by the Institute of Medicine urges “significant reform” of the current federal system for financing physician training and residency programs to ensure that the \$15 billion in public funds invested annually produces the doctors that the nation needs. Current financing, which is provided largely through Medicare, requires little accountability, allocates funds independent of workforce needs or educational outcomes, and offers insufficient oppor-

tunities to train physicians in the health care settings used by most Americans, the report says. All medical school graduates must complete at least one year of “graduate medical education,” or residency training, to become licensed to practice, with board certification in a specialty often requiring three to seven years of training. Medicare and Medicaid provide more than 90% of federal funding to support physician residency training, with Medicare providing \$9.7 billion per year.

The report calls for public financing of this training to remain at its current level for now, but recommends that Congress amend Medicare laws and regulations to move to an accountable, modernized financing system over the next decade that rewards performance and spurs innovation. Continued Medicare funding should be contingent on its demonstrated value and contribution to the nation’s health needs. Although public funding also comes from other federal and state sources, the committee focused primarily on Medicare as the largest source of funding.

[http://www.nap.edu/catalog.php?record\\_id=18754](http://www.nap.edu/catalog.php?record_id=18754)

### ◆ New Report Confirms Classification of Styrene as ‘Reasonably Anticipated’ to be Human Carcinogen

A new report from the National Research Council upholds the listing of styrene as “reasonably anticipated to be a human carcinogen” in the National Toxicology Program’s 12th Report on Carcinogens (RoC). The committee that wrote the report found that the listing is supported by “limited but credible” evidence of carcinogenicity in human studies, “sufficient” evidence from animal studies, and “convincing relevant information” in mechanistic studies that observed DNA damage in human cells that had been exposed to styrene. The committee reached the same conclusion after conducting both a peer review of the RoC and an independent assessment of the styrene literature. Styrene is a substance of interest because many people in the United States are exposed. It is an oily, colorless to yellow liquid and it is found in many consumer products such as plastic packaging, food containers, and household goods. Sources of environmental exposure include cigarette smoke and vehicle exhaust. Occupational exposure can occur during the industrial processing of styrene.

Based on RoC criteria, a substance can be classified as reasonably anticipated to be a human carcinogen based on sufficient evidence in animals or limited evidence in human studies. In its independent assessment, the committee considered additional research published through Nov. 13, 2013. It found that “compelling evidence” exists in human, animal, and mechanistic studies to support listing styrene, at a minimum, as reasonably anticipated to be a human carcinogen.

[http://www.nap.edu/catalog.php?record\\_id=18725](http://www.nap.edu/catalog.php?record_id=18725)

## Science (from page 1)

by how committed our community is to getting our kids involved in science,” says Zilm. “When I see that look of total amazement come over someone’s face at one of the demonstrations, I know I hooked another amateur scientist.”

Admission is free and open to the public, but Science on Saturdays is best suited for children in 7th grade and above. Science on Saturdays will resume September 27 with mechanical engineering professor Eric Dufresne’s lecture “Small, Sticky, and Squishy.” Check <http://onhsa.yale.edu/science-saturdays> for more details.

**Information and schedules for Science on Saturdays and other STEM outreach events at Yale are available at [www.yale.edu/scienceoutreach](http://www.yale.edu/scienceoutreach).**

Visit our web site at [www.ctcase.org](http://www.ctcase.org)

## Keeping the Lights On *(from page 2)*

---

an emergency shelter for 48,000 residents and the area's distribution center for the Federal Emergency Management Agency. The remaining seven projects are in various stages of development and are scheduled to become operational between December 2014 and September 2015.

These initiatives represent some of the more tangible results from the Two Storm Panel's recommendations. However, there was one unforeseen hazard the Panel did not address—a cyberattack. In a 2012 report written by Joel Gordes, Connecticut Energy Advisory Board member, entitled, "The Third Storm, The Case for an All Hazards Approach," Gordes describes a "what if" situation wherein natural disasters or severe storms are the ideal situation for a cyberattack. This insidious attack could go unnoticed in the rush to respond to various emergency situations, and take root in the complex electric grid structure, rendering it useless at the most inopportune time. Gordes, a leading advocate for strengthening cyber-security, listed several reasons why these attacks were not addressed in the then-evolving All Hazards approach to disasters, from lack of awareness, to lack of ownership at the state level.

However, since Gordes's report, cyber-security has come to the forefront via

Connecticut's Department of Emergency Services and Public Protection (DESPP) and PURA, as well as through Connecticut's adoption of the Comprehensive Energy Strategy in 2013 that included defensive cyberstrategies for public utility companies.

"Several years ago, cybersecurity was not high on the radar screen. That has changed dramatically," said William Shea, Deputy Commissioner of Connecticut's DESPP, Division of Emergency Management and Homeland Security (DEMHS).

Approximately 18 months ago, the DESPP/DEMHS, in conjunction with the state Department of Administrative Services, and the Bureau of Enterprise & Systems Technology (DAS/BEST) formed a Cyber Security Committee, co-chaired by Deputy Commissioner Shea and Connecticut Chief Information Officer Mark Raymond. Members include local, state, national and federal organizations. The committee is taking a two-fold approach in addressing cybersecurity. The first is a "Down and In" approach whereby they are examining the state's structure/critical operations, making sure its cyberdefense is in place and there is a plan.

The other approach is "Up and Out" wherein information sharing is their primary

mission. The committee shares cyberdefense information (including threat mitigation and training opportunities) with a wide spectrum of organizations, including PURA, municipalities, utility companies, and other government agencies. One of the committee's primary resources is the Multi-State Information Sharing and Analysis Center (MS-ISAC). The MS-ISAC's cybersecurity operations center issues cyberthreat warnings and advisories, provides vulnerability identification and mitigation, incident response and multi-state information sharing.

In April, 2014, Connecticut's PURA, led by Chairman Arthur House, issued a report, *Cybersecurity and Connecticut's Public Utilities*.

"I was pleased to find a relatively high level of expertise and sophistication in the electric utilities and telecommunications companies. They are well aware of the dangers present and are skilled and up to speed in their defense," said House.

Next steps include conducting technical meetings with PURA and the utilities to develop metrics for assessing cybersecurity readiness and explore the feasibility of adopting the model of a financial audit for cyber security compliance. —**Deborah Mearman, freelance writer**