Clean Cut Quarterly

NJARNG Sustainability Newsletter

In collaboration with Rowan University

September 2016 Volume 2 - Issue 3

On July 26th, 2016, the Solar Impulse became the first solar powered airplane to circumnavigate the Earth. Learn more on page 12.

In this issue...

Welcoming new students

It's September, which means that another school year has begun.. Meet the new graduate students working for the NJARNG on **page 4**.

Interns on the lookout for Bats

It's almost Fall, so get in the Halloween spirit by catching up on the Environmental Interns' bat research. Read all about it on **page 7**.

Farm vertically, Save space

Find out how farmers are reinventing the way fruits and veggies are getting to a city near you on **page 9**.

Veterans Remembered During Memorial Day Ceremony

By: Katie Hollywood

"It takes great courage to put on the uniform, to go out and serve. But it takes great courage to make peace." -Congressman Donald Norcross

Residents in and around Gloucester County paid tribute to our veterans during the Memorial Day Ceremony held on May 29, 2016. The ceremony was held at the Gloucester County Veterans Memorial Cemetery with more than 400 people in attendance, many being veterans.

Veterans from Vietnam, Korea, Desert Storm, and even five veterans from World War II were present. Over 16,000 veteran's grave were marked with American flags throughout the county by veteran's community and volunteers.

Congressman Donald Norcross was a guest speaker at the ceremony and was joined by NJ Senate President Stephen Sweeney and Deputy Freeholder Director/Liaison of Veterans Affairs Joe Chila. Sweeney spoke to the crowd about the heroism of the men and women who died for our country, while Chila spoke about the loss of innocence. Chila also honored the five WWII veterans, presenting them with a special wreath during the wreath ceremony, where they received a standing ovation.

In the past two issues of Clean Cut Quarterly, we ranked each facility by its percent reduction in energy use intensity, or ***EUI***. In the last issue, we used the first half of results (Quarters 1 and 2) for each fiscal year, but in this issue, the results for the first three quarters, encompassing the months of October through June, were used to determine percent reduction in EUI. The NJARNG goal for annual energy reduction is 2.5%, and every facility is needed to help reach that goal. Look below to see where your facility stacks up and to see which facility is leading the way in percent reduction.

In the lead for biggest loser for the second straight issue is the… **CAPE MAY ARMORY!**

Keep up the great work everyone! Check out the next issue to see results from the entire fiscal year (all four quarters). Will your facility be the leading the way in energy reduction? Find out in December!

For tips on how to reduce your energy use and carbon footprint, please take a look at the Green Building Handbook: www.nj.gov/military/installations/docs/CLEAN-CUT-Green-Management-Handbook.pdf

Rank	Facility Name	FY15Q1+Q2+Q3 EUI	FY16Q1+Q2+Q3 EUI	% Reduction
1	Cape May Armory	108.1	35.9	67
2	Hammonton Armory	13.9	6.8	51
3	Atlantic City Armory	18.6	10.3	45
4	Cherry Hill Armory	24.6	14.3	42
5	Westfield Armory + OMS	17.2	10.7	38
6	Fort Dix - T3BL	31.2	21.6	31
7	Washington Armory	44.9	32.6	27
8	Tuckerton Armory	3.1	2.4	24
9	Lawrenceville DMAVA	84.5	66.2	22
10	Picatinny - FMS #7	7.9	6.2	21
11	West Orange Armory + CSMS	13.4	10.7	20
12	Morristown Armory	11.5	9.3	20
13	Toms River Armory	9.5	7.8	18
14	Lakehurst CLTF	23.1	19.2	17
15	Bordentown WTC	26.4	22.8	14
16	Riverdale Armory	13.2	11.5	13
17	Vineland Armory	27.3	24.4	11
18	Woodbridge Armory	9.9	8.9	10
19	Woodbury Armory	7.8	7.4	5
20	Teaneck Armory	10.1	9.6	5
21	Trenton Mercer AASF	39.8	38.4	3
22	Flemington Armory	36.1	35.5	2
23	Sea Girt Training Center	28.3	28.1	1
24	Lawrenceville, USPF&O	17.3	17.7	-2
25	Somerset Armory + DTMB	14.5	15.1	-4
26	Freehold Armory	32.0	33.3	-4
27	Dover Armory	9.3	10.1	-8
28	Mt. Holly Armory	12.9	14.2	-10
29	Hackettstown Armory	28.9	32.3	-12
30	Fort Dix - Headquarters	20.8	23.3	-12
31	Jersey City Armory	9.4	10.8	-14
32	Woodstown Armory	26.0	40.4	-55
33	Lawrenceville Armory	12.0	19.5	-62
34	Newark Armory	2.1	5.4	-153

Another year, two new grad students

We've said "goodbye" to Sarah Schanck, but we're saying "hello" to 2 new graduate research assistants. Sarah Zorn will be taking up the previous Sarah's mantle on the Energy Audit Project and Shalyn Brangman will be conducting research on solar hot water systems.

Sarah Zorn
NJARNG Energy Audits
Electrical Engineering

Sarah is a Design Engineer with over 12 years of experience in the utility engineering industry designing various structures and foundations for large power plants of 500 to 550 MW. Her experience has involved modeling of transmission lines, design of transmission line support structures and foundations, engineering research, material testing and project engineering.She holds a Bachelor's degree and two Master's degrees in Civil Engineering as well as a diploma in Business Administration. She also has her Engineer-in-Training certification. Sarah lives with her husband and 2 children.

Shalyn Brangman
NJARNG Solar Hot Water Design
Mechanical Engineering

Shalyn started in the NJARNG Energy Intern Program at Rowan University in Fall 2014 as one of the first interns of the program. During her time as an Energy Intern, she helped create the *Clean Cut Green Management Handbook*. In the summer of 2015, Shalyn interned at the United States Department of Energy Office of Fossil Energy in Washington, DC as part of the 2015 of USDOE Minority Educational Institutional Student Partnership Program. This past May, she graduated with her Bachelors Degree in Mechanical Engineering at Rowan. She is continuing her education at Rowan to obtain her Masters and conduct a Solar Hot Water assessment for the NJARNG.

Fall Energy Saving Tips

By: Fred Bishop

Summer is coming to an end, and with that, Fall is here. The weather in the Fall is usually moderate, but in New Jersey we can have a chance of snow one day, then a perfect beach day the next.These bizarre weather patterns often make it hard to save energy, but follow these tips to learn how to rake in the savings!

Take Time and Weatherize

Taking advantage of the more moderate days in the Fall is the best way to get things done outside of the house. On a day where it's not too cold or too hot, take a look around the house for any holes or openings. Something as small as a window that doesn't shut properly can waste a good amount of energy every year.

Daylight Savings

Remembering to set the clocks back an hour for daylight savings is usually hard enough, but there is even more devices that need to be changed! If you have occupancy sensors or timed lights, remember to reset those times as well. Also, controllable thermostats that come on at different times during the day need to be changed. Doing this will save money and energy through the fall and winter.

Watching the Weather

Make sure to keep an eye on the weather. If there seems to be a couple days where there are reasonable temperatures, with little to no pollen, then open the windows and turn of the air conditioning. When it begins to become cold again close the windows and turn on the heat if needed. Keeping an eye on the weather and adjusting the house as needed may seem tedious, but it will end up saving you money in the end.

Storm Windows

It is important to make sure that your windows have storm windows on them, but even more important to actually use the storm windows. The storm windows not only protect your regular windows, but also reduce the heat loss through each window pane. A cold draft through your window may be because there is no storm window stopping the air!

NJ's Clean Energy Program
Home Performance with EnergyStar

Everyone wants to save money on their utility bills, but sometimes simple actions don't get results. Maybe you have already improved your house as much as possible, and put into practice all the tips you've seen in *Clean Cut Quarterly*. The only improvements left to make require investing some serious dough. But it can be tough to set money aside for an expensive new water heater, when the one you have now works.

The New Jersey Home Performance with ENERGY STAR Program (HPwES) can now give you a way to make energy-efficient home improvements more affordable. The program works by finding the best energy investments for you to make on your home, and determining your eligibility for various incentives and rebates.

HPwES takes a holistic approach to saves you money and reduce your carbon footprint. Not only will making these home improvements lead to your home becoming a more comfortable and healthy place, it will also increase the value of your home. There are several tiers of the program, so there are many options that you can be eligible for.

As a new Jersey homeowner, you have until **June 30, 2017** to receive up to $4000 in financial incentives. You may also qualify for financing options to help pay for energy efficiency upgrades. There are many eligible measures, like replacing your water heater, , so make sure to check them all out.

To get started, visit the HPwES website at:
http://www.njcleanenergy.com/residential/programs/home-performance-energy-star/home-performance-energy-star-r

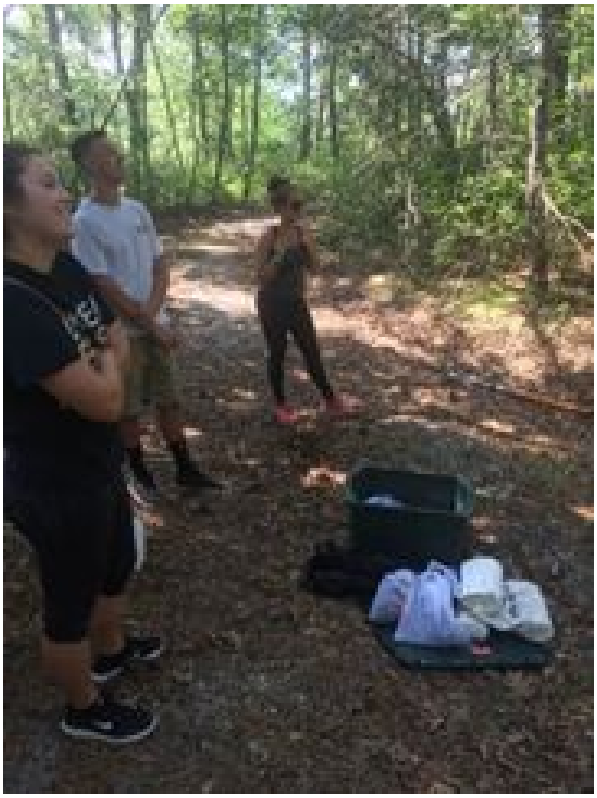
If you have any questions, feel free to contact Sam Valentine at valent80@rowan.edu .
To contact a program representative directly, you can call 866-NJSMART (866-657-6278).

Bats All, Folks!

Written by: Morgan Doherty and Nick Murphy

In the summer of 2015 the Environmental Management Bureau with assistance from Rowan University interns deployed bioacoustic recorders at eleven sites to try and determine the presence or absence of two rare bat species: Northern Long-eared bat (NLEB) and Indiana bats (IA). Of the eleven sites surveyed, four detected NLEB calls and one (Toms River) detected calls from both species.

Pictured right: An Eastern Red Bat.



The EMB decided to hire a contractor to perform live captures at all five of the sites where these species calls were recorded. These live captures would serve two purposes; (1) they would help to confirm the results the bioacoustics survey and (2) determine the bats use of the NJARNG property (i.e. summer roosting or feeding), if the rare species were captured. The Guard hired Wildlife Specialists LLC to perform the mist netting.

Pictured left: Student interns Rachel Hollingsworth, Nick Murphy, and Devin Walker observe a mist net being set up.

On July 20, 2016 the Environmental Management Bureau along with its interns had the opportunity to observe the first mist netting at Toms River Armory. The first step was to set up seven mist nets across the property, as well as bioacoustics recorders along trails. The Wildlife Specialists team determined the best placement for the mist nets, in Toms River to be along tank trails and the powerline easement as they would serve as corridors to funnel the bats into the nets. Once setup was complete the interns were able to talk with the crew about their bioacoustic recorders; having some experience working with recorders themselves, it was great to have more advanced users share some of their insight on how this technology helps with their research.

The team returned at about sunset to open the nets and begin their survey. Every 10-15 minutes they would set out to check each of the seven nets for bats, or any other species that may have gotten caught. We were able to see action right away, as several Big Brown Bats were found during the first round of checking the nets. When a bat was found in the net it was immediately removed, placed in a bag, and taken to their central spot for data collection. If the bat was not one of the target species, the head mammalogist, Drew Wanke, would take measurements, pictures, record its sex, age, reproductive status, and check for signs of white nose syndrome. He would then release it as safely and quickly as possible. One the night we observed, no species of interest were caught, however the team explained they would do the same for these bats but also put a tracker on any juvenile and females to find where they were roosting.

Pictured above: Big brown bat with its wing spread for measurements and pictures.

The Wildlife Specialists team was very knowledgeable about bats, as well as other species, and the types of rare species surveys we have been conducting at NJARNG sites. They gave the environmental interns valuable information on how they got into their careers, what else their job entails and were happy to answer any questions anyone had. It was a valuable learning experience and it was nice to see the surveys that the EMB and its interns performed last summer going to the next level.

To leran more about native bat species in New Jersey and wildlife conservation, head to http://www.conservewildlifenj.org/protecting/projects/bat/.

Vertical Farms in Newark Create Jobs and Local Food for NJ Residents

By: Fred Bishop

The largest city in New Jersey, Newark, is home to the largest indoor vertical farm in the world. What is vertical farming? It is a type of farming in which food is produced and grown in vertically stacked layers. Think of a parking garage. If there is enough room to build a large parking lot, then a parking garage can be built where all the cars can park vertically stacked on each other. This type of technology allows for control of all environmental factors; such as lighting, temperature, humidity, etc.

The RBH Group, Goldman Sachs Urban Investment Group, Prudential Financial Inc., and AeroFarms have all partnered up with Newark city officials and the New Jersey Economic Development Authority in a $30 million renovation project. The project turned a 69,000 square foot old industrial site on Rome Street in the Ironbound section of Newark into a vertical urban farm. As of February AeroFarms announced they were moving into their first phase and the third farm in Newark would be coming in the next couple of months. This means they will be growing greens soon.

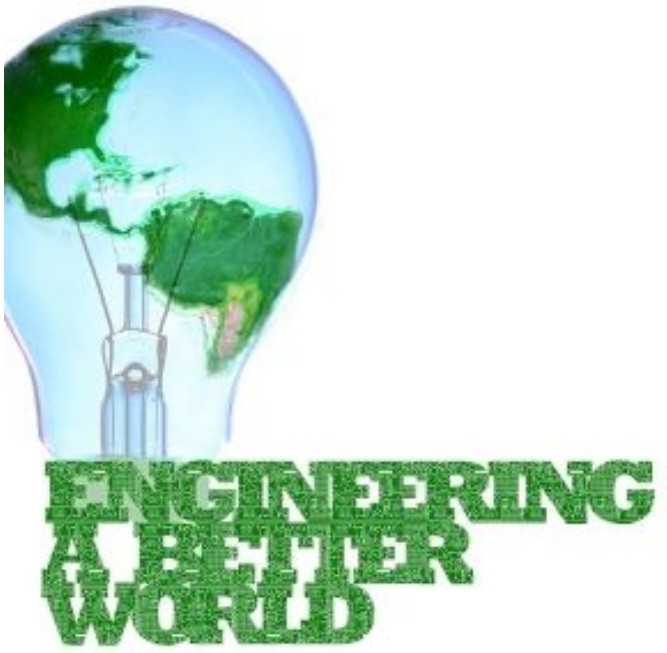
The old steel factory will be able to produce about two million pounds of green vegetables and herbs every year, according to AeroFarms. The backers of the project also added once in full operation it will bring about 78 jobs to Newark, as well as fresh food to New Jersey. Mayor Ras Baraka of Newark said, “This will provide greater access to healthy and inexpensive food choices for our residents, helping them live healthier lifestyles.” AeroFarms also has another farm in the Philip’s Academy Charter School in Newark. This farm has been open for four years already, so they are happy to open another, larger, farm close by.

Green Jobs

By: Katie Hollywood

Green jobs are becoming increasingly popular as the world becomes more environmentally conscious. A green job is any job in agricultural, manufacturing, research and development, administrative, and services that preserve and store environmental quality.

Energy auditors conduct energy audits of residential, commercial, or industrial facilities to identify energy conservation measures and savings potential. They also inspect buildings for correct insulation and weatherization, quantify energy consumption to establish baselines for energy use or need, and identify opportunities to improve operation, maintenance, and energy efficiency of building or process systems. Most energy auditors are required to have an training in vocational school or an Associate's or Bachelor's degree in energy management, engineering, architecture, or related disciplines. In 2012, energy auditors had an average salary of $70,000 per year.



Green construction is constructing new green buildings, retrofitting residential and commercial buildings, and installing other green construction technology. **Green architects** make sure a building design is functional, safe, economical, and 'green'. They are required to have a Bachelor's or Master's degree in architecture and earn an average of $77,000 annually. **Green engineers** can have various jobs such as erosion control, traffic flow patterns, design lighting systems, manage mechanical equipment, and manage materials that are all 'green'. They are required to have a Bachelor's or Master's degree in engineering and typically make $84,000 annually.

Green Product Showdown: Paper Towels vs. Electric Hand Dryers

By: Katie Hollywood

The electric hand dryer requires a decent amount of energy to manufacture, but they typically last 7 to 10 years, so the energy needed for the hardware's production can be considered negligible. A typical electric hand dryer used for 30 seconds, 3 times per day for an entire year uses 19.71 kWh of electricity. That translates into about 26.61 lbs of carbon dioxide emissions. There are models like the XLerator and Dyson Airblade that claim to be at least 80% more efficient.

The environmental effect of paper towels depend on factors such as the material they are made of and how they are disposed. Deforestation is not a big issue with paper towels because most are sourced from commercial forest where the trees are regularly replanted. However, the process of logging, milling, and transporting material consumes significantly more fossil fuels than electric hand dryers. Using recycled paper towels can cut energy usage up to 40%, but even with recycled paper towels, they were found to still create waste, consume more energy and water, and produce 3 times more carbon emissions than energy efficient electric hand dryers.

The picture on the right ranks the environmental impacts of various hand dryers. The Airblade aluminium and Airblade plastic are newer technology hand dryers that are cold-air driven and generate 70% less carbon emissions than the standard warm air dryers and paper towels. These two hand dryers rank the best, while standard warm air dryers and paper towels rank the lowest.

1 = lowest impact,
7 = highest impact

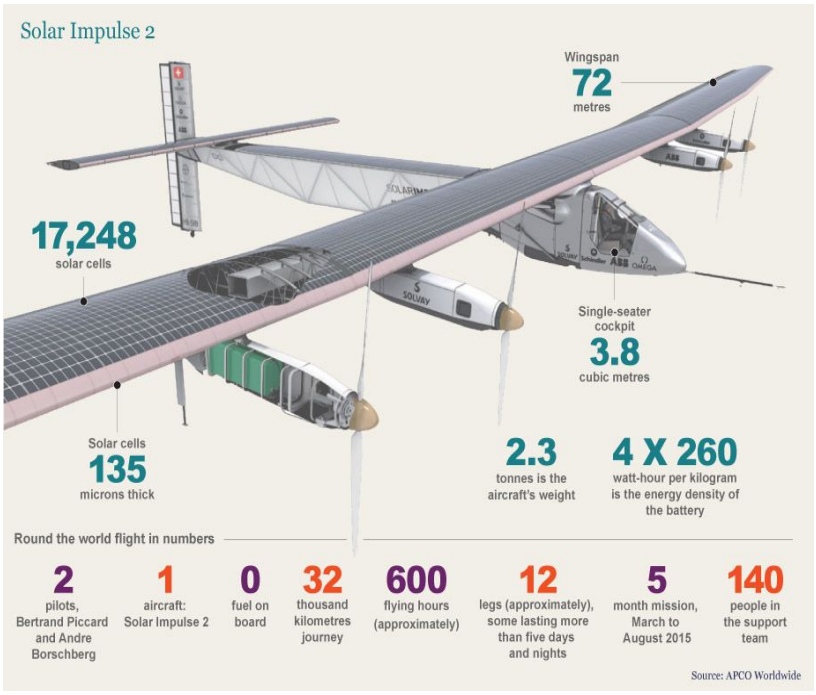
	Global warming potential	Human health	Ecosystem quality	Cumulative energy demand	Water consumption	Land occupation
Airblade™ aluminium	1	1	1	1	3	1
Airblade™ plastic	1	1	1	1	1	1
XLERATOR®	3	3	3	3	4	3
Standard warm air dryer	7	7	4	6	7	4
Cotton roll towels	4	3	6	4	1	6
Paper towels virgin	5	5	7	7	5	7
Paper towels 100% recycled	5	5	4	5	5	5

Solar Impulse Makes History

By: Fred Bishop

On December 17th, 1903, the Wright brothers successfully made their first flight. In 1924 the first plane circumnavigated the globe, and now, on July 26th, 2016, the first solar powered plane circumnavigated the Earth. Solar Impulse is an experimental solar-powered aircraft. André Borschberg, a Swiss engineer and businessman, funded the project along with aeronaut Bertrand Piccard with the goal of creating an airplane that could fully circumnavigate the globe, while only using solar power. They also wanted to bring more attention to clean technologies.

The Solar Impulse was able to reach speeds up to 87 mph, and would cruise around 56 mph. The plane would also harness the sun's energy and store it in batteries, so it could still fly during the night. Crossing the Atlantic and Pacific Oceans took the pilots about five days each. They would take 20 minute naps and do yoga in order to stay alert and keep their blood flowing. Together, Borschberg and Piccard completed the journey to circumnavigate the globe using only solar power.

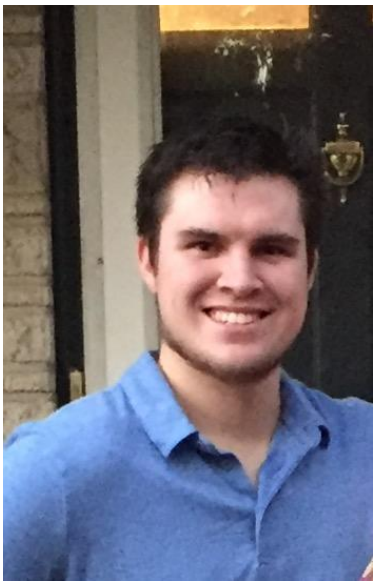


The Solar Impulse left departed from Abu Dhabi, in the United Arab Emirates, on March 9th, 2015. The plane followed a twelve (stage path, that spanned sixteen and half months. On July 26th, 2016, the Solar Impulse landed back in Abu Dhabi. The trip was approximately 26,000 miles. In July 2015, the plane took its longest leg of its journey, from Japan to Hawaii. After arriving in Hawaii, the batteries suffered thermal damage. This took months to repair and set the schedule back, but still the Solar Impulse was able to continue its journey once the repairs were finished.

Meet The Interns!

Katie Hollywood
Civil Engineering, Senior
“Hi! My name is Katie Hollywood and I enjoy hiking and spending time with my dogs in my free time. I like to travel to new places and hope to go back to the Grand Canyon again.”

Fred Bishop
Chemical Engineering, Senior
“Hi! My name is Fred and I like to swim, row and workout in my free time. It has always been my dream to travel to all 50 states in the U.S. I also like trying new foods from around the globe.”



Jeff Dib
Civil Engineering, Senior
“Hey! My name is Jeff and I enjoy playing sports with my friends and when I’m not playing, I’m watching my favorite teams, the Yankees, Knicks, and NYCFC. I also enjoy going on vacation to Disney World and on Disney Cruises with my family.”

NJARNG Energy Team

Want to know more?

❖ Contact the Energy Team!

Christopher Moore

Chris received his Bachelor's Degree in Civil Engineering from Rowan University and his Master's Degree in Sustainable Design from the Boston Architectural College. He has over 5 years of energy management and sustainability consulting experience with non-profit, private, and government organizations. Chris enjoys biking, drawing, and gardening.

Samantha Valentine

Sam received her Bachelor's Degree ('12) and Master's Degree ('14) in Civil Engineering from Rowan University. Her academic interests include sustainable design, low impact development, and climate science. Sam enjoys cooking, boating, and adventuring in the great outdoors.

For more information, please contact:

Christopher Moore
DMAVA Energy Manager
Please contact Chris if you would like to learn more about the *Clean Cut Campaign* at:
christopher.moore@dmava.nj.gov

Samantha Valentine
NJARNG Energy Intern Manager
If you would like to learn more about how Rowan University is helping NJARNG's sustainability efforts or to make suggestions for future issues of *Clean Cut Quarterly*, please contact Sam at:
valent80@rowan.edu