Clean Cut Quarterly

NJARNG Sustainability Newsletter

In collaboration with Rowan University

December 2015 Volume 1 - Issue 2

As everyone starts to get ready for the Holiday season, the NJARNG Energy Team has been hard at work closing out our fiscal year 15 efforts and preparing for the new year. Over the past 12 months, DMAVA and NJARNG have made tremendous strides in becoming more sustainable.

- Under the High Efficiency Lighting Program (HELP), over $45,000 in rebates were obtained to complete a full LED lighting upgrade at Atlantic City Readiness Center, Lawrenceville HSCOE and USPFO Warehouse, and West Orange Readiness Center and CSMS. As a result of these projects, over 1,200 light fixtures were upgraded.
- Rowan University interns completed energy audits for over 725,000 square feet of space. These audits resulted in finding potential energy and water conservation savings of over $425,000 per year! Rowan interns also assisted in the development of NJARNG's Comprehensive Energy and Water Master Plan, Energy Security Plan, and Energy Education and Awareness Program. Having these audits and completed documents puts NJARNG in compliance with Federal mandates. Page - 7.
- Sea Girt received a new 611 kW solar carport next to Building 35. In addition to providing free electricity, the carports provide shade for vehicles parked underneath of them. In order to lay the groundwork for future NJARNG electric fleet vehicles, 4 electric vehicle charging stations were also installed at the new and existing carports. Page - 14.
- Picatinny FMS underwent a conversion from heating oil to natural gas, which saved over $28,000 in heating costs in FY15 compared to FY14! Picatinny is currently undergoing a "reskinning" and solar wall system installation that will further reduce the facility's heating cost by 20% to 50%. Page - 15.

All DMAVA and NJARNG employees should be extremely proud of the accomplishments that the department has achieved. Energy efficiency and sustainability requires the participation of everyone in order to be successful and without the support and effort of all employees, we would not have been able to accomplish everything that we have. I am excited for the next year and beyond as we continue to make DMAVA and NJARNG a leading organization in energy and water efficiency, renewable energy, and sustainability.

Have a safe and happy holiday season!
Christopher Moore
Energy Manager
NJDMAVA – CFMO

IN THIS ISSUE...

Find out how energy efficient your building is in the CCQ Competition on **Page 3**!

Take a look at **Page 7** for information on the Bordentown and Fort Dix energy audits!

Do you know cyber security? What is it and what are the risks? Find out more on **page 13**!

Clean Cut Competition

Overview

As part of the Clean Cut Campaign, the NJARNG Energy Team has created the Clean Cut Competition for all NJARNG facilities. This competition is a yearlong energy and water reduction program with the purpose of incentivizing participation in energy and water reduction initiatives. Ultimately, the goal is to encourage employee participation and to cut utility usage and costs.

How it works…

- Throughout the 2016 fiscal year, energy and water consumption for each NJARNG facility will be tracked and recorded.
- The progress will be displayed in each issue of the *Clean Cut Quarterly*.
- Each facility will have a goal of reducing energy use by 2.5% and water use by 2.0% by the end of the year.
- Facilities that meet their goals will receive a certificate of achievement to display in the facility and will be recognized in the *Clean Cut Quarterly*.
- The facility that reduces energy and water consumption by the greatest percentage will win the title of "biggest loser" and will be given the Clean Cut Competition Trophy to display at their facility for 1 year.

Important Dates

- Competition *starts* 10/1/2015
- Competition *ends* 9/30/2016
- Checkpoints will be every 3 months
- Progress will be posted in the *Clean Cut Quarterly* newsletter

What to do...

There are many actions that building occupants can take to reduce energy and water use as well as the costs associated with these utilities. For example, turning off lights when leaving a room. Lighting accounts for 25%-30% of a building's energy use and minimizing unnecessary lighting is an easy way to reduce energy consumption. Each issue of the *Clean Cut Quarterly* will contain tips and strategies that occupants can follow to reduce their building's consumption.

In addition, the NJARNG Green Building Management Handbook is available at: http://www.nj.gov/military/installations/docs/CLEAN-CUT-Green-Management-Handbook.pdf

Average Facility EUI:
66 kBTU/SF

What is EUI?
EUI, or *Energy Use Intensity*, is a key metric for an energy manager to benchmark facilities with. Typically, EUI is used to express a building's energy use as a function of its size.

In terms of size, the Newark Armory is one of the largest NJARNG buildings at over 100,000 square feet of gross floor area. But, in terms of energy use, it ranks in the middle of the pack, resulting in the lowest EUI in fiscal year 2015.

The list on the right ranks NJARNG facilities from most energy efficient to least in FY 2015, and shows what each facility's EUI should be in FY2016.

In the next issue of *Clean Cut Quarterly*, look to see if your facility has improved, or gotten worse.

Rank	FACILITY	FY15 EUI (kBTU/SF)	2.5% Reduction
1	Newark Armory	22.5	21.9
2	Woodbury Armory	26.0	25.4
3	Woodstown Armory	28.9	28.1
4	Hackettstown Armory	30.7	29.9
5	Tuckerton Armory	31.7	30.9
6	Freehold Armory	34.1	33.3
7	Flemington Armory	38.8	37.8
8	Toms River Armory	39.3	38.3
9	Riverdale Armory	44.9	43.8
10	Westfield Armory + OMS	47.2	46.0
11	Woodbridge Armory	49.7	48.4
12	Washington Armory	50.2	48.9
13	Teaneck Armory	54.4	53.1
14	Jersey City Armory	54.7	53.3
15	Lawrenceville, USPF&O	56.1	54.7
16	Fort Dix - Headquarters	56.3	54.9
17	Somerset Armory + DTMB	59.6	58.1
18	Morristown Armory	62.1	60.6
19	Trenton Mercer AASF	65.6	64.0
20	Lawrenceville Armory	66.8	65.1
21	Vineland Armory	67.6	65.9
22	Hammonton Armory	69.5	67.7
23	Mt. Holly Armory	72.0	70.2
24	Bordentown WTC	72.1	70.3
25	West Orange Armory + CSMS	80.4	78.4
26	Picatinny - FMS # 7	81.5	79.5
27	Lakehurst CLTF	84.0	81.9
28	Fort Dix - T3BL	88.7	86.4
29	Dover Armory	91.6	89.3
30	Sea Girt Training Center	92.0	89.7
31	Lawrenceville DMAVA	102.4	99.8
32	Cherry Hill Armory	116.0	113.1
33	Cape May Armory	150.9	147.1
34	Atlantic City Armory	154.3	150.4

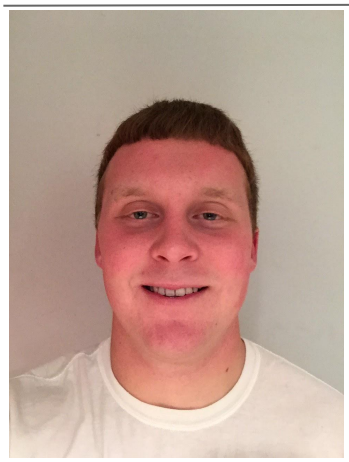
10 Energy Saving Tips

1.) Catch Those Drafts	If a dollar bill can pass through the crack in your door/window, then simply replace the weather-stripping to eliminate the draft. Do this in an office space to save energy.
2.) Programmable Thermostat	Make sure you use a programmable thermostat year-round. This helps save energy when the office is not in use. When no one is in the building, turn back the thermostat 10-15 degrees to save about 10% on energy bills.
3.) Water Heater Savings	There are rebates for replacing an old water heater with a new, more-efficient one. Other savings can be found by washing clothes with cold water, or turning off the water when scrubbing dishes.
4.) 3x Energy from Spare Refrigerators	Spare refrigerators and freezers can cost a good amount of money every month. If there is a chance to get rid of an old refrigerator in the office, or replace one then be sure to do so. There is a rebate where you get $50 for recycling an old unit, and another $50 for buying a new one!
5.) Energy Suckers	Devices such as TVs, phone chargers, and even computer monitors can all use electricity when not in use. When not using these devices make sure to unplug them from the wall. The easiest thing is to plug all these into power-strips, then turn that off.
6.) Use a Ceiling Fan	Make sure the fan is turning clockwise if you want to heat up a room. This pulls cool air up, and pushes hot air down so you can lower the thermostat and save up to 15% on heating bills!
7.) Heating/Cooling Costs	This accounts for almost half of people's energy bills. If possible in the office, replace old units with high-efficient ENERGY-STAR models. The cost is paid back in lower bills, and there are many rebates for these models.
8.) Furnace Tips	Be sure to have a HVAC technician come and inspect the furnace every year for gas leaks. Also make sure someone knows how to replace the filters (which should be done every month) in order to keep energy bills low.
9.) LEDs in Frequently Used Fixtures	Installing LED or CFL lights in just some of the most frequently used light fixtures in your office can save almost $30 a year,, and since the bulbs' life span is longer, you won't have to change them for years!
10.) ENERGY-STAR	Try and get an energy audit for the office. Iis the first step to see where you are wasting money. You can get 5-30% of your energy bills back by following a contractor's recommendations.

Meet The Interns!

Daniel Murray
Civil Engineering, Junior
“Hello! My name is Dan and I like to play games on my computer and run in my free time. I also work for the Office of Student activities at Rowan University.”

Fred Bishop
Chemical Engineering, Junior
“Hi! My name is Fred and I like to swim, row and workout in my free time. I am also currently working at a liquor store near Rowan and love to try new, rare drinks that come into my store.”



Paul McGonigle
Civil Engineering, Senior
“Hello! My Name is Paul and I like playing golf and working on cars. I work as a truck driver for a company in South Jersey.”

Jeff Dib
Civil Engineering, Junior
“Hey! My name is Jeff and I enjoy playing basketball and soccer with my friends. I enjoy trips to Disney World with my family and I work as an Umpire, Referee, and Mentor for youth athletes throughout South Jersey.”

MEET THE STUDENTS-BORDENTOWN:

Patrick Quirk
Electrical/Computer Engineering, Senior

William Butler
Civil Engineering, Junior

Becca Adamo
Civil Engineering, Junior

Deanna Dariano
Civil Engineering, Junior

MEET THE STUDENTS-FORT DIX:

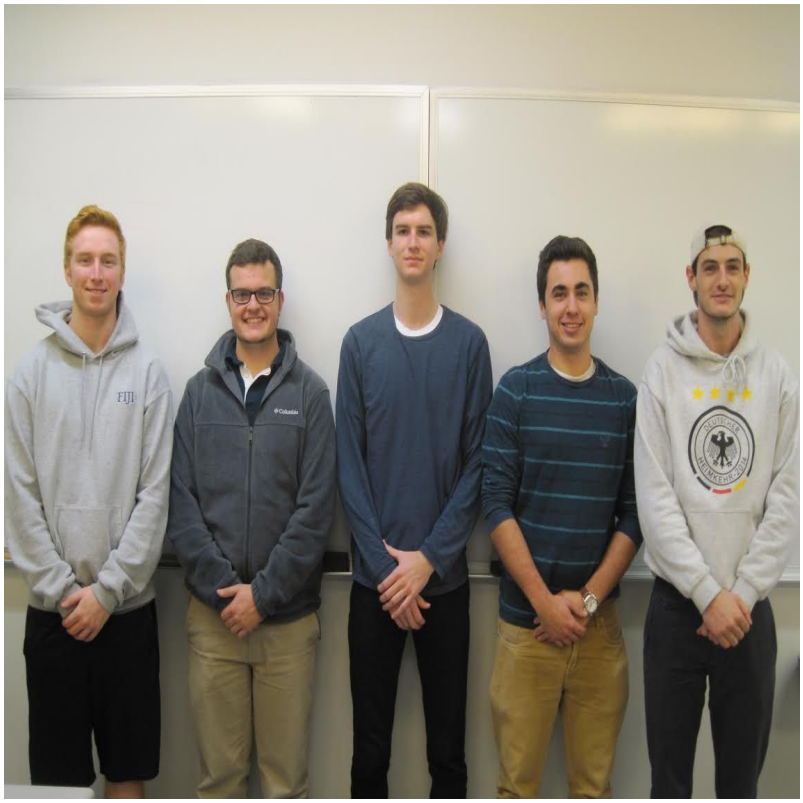
Sean Mading
Civil Engineering, Junior

Ryan McCarthy
Civil Engineering, Junior

Joe Tricarico
Electrical/Computer Engineering, Junior

Tim Bridel
Mechanical Engineering, Junior

Matt Stacker
Civil Engineering, Senior





Energy Audits

Overview

An **Energy Audit** is an inspection, survey, and analysis of energy use in a building. Energy audits can identify strategies to make a facility more efficient, healthy, and comfortable. As part of the Clean Cut Campaign, Rowan University established the "NJARNG-RU Energy Audit Center" with the purpose of providing resources and training to students so that they can conduct energy audits at NJARNG facilities. This program funds a graduate student who oversees and trains undergraduate students each semester and leads them during the audit. In addition, four professors oversee the program and ensure that NJARNG is receiving high quality data and results from the audits. Each year, 25% of NJARNG facilities must be audited.

Bordentown Audit

The Bordentown Warrior Transition Center is a 64,500 square foot facility made up of mostly office and classroom space. The Rowan audit team conducted a traditional energy audit at the facility and collected information such as number of computers, type of HVAC equipment, types and quantities of lights, etc. The team also assessed the building's sustainability by using the ISR-Energy and Guiding Principles for Sustainable Buildings requirements. Due to its recent renovation, the Bordentown facility is fairly efficient and in good condition. The building's overall energy rating is AMBER. Some of the recommendations to improve the efficiency of the building include:

- Install photovoltaic panels on the roof
- Install individual solar power for exterior lights
- Replace remaining exterior lights with LED fixtures
- Install occupant sensors in remaining rooms (10 rooms)
- Insulate network room
- Install an awning over the side of OMS room (OMS side door swells/sticks in the heat)

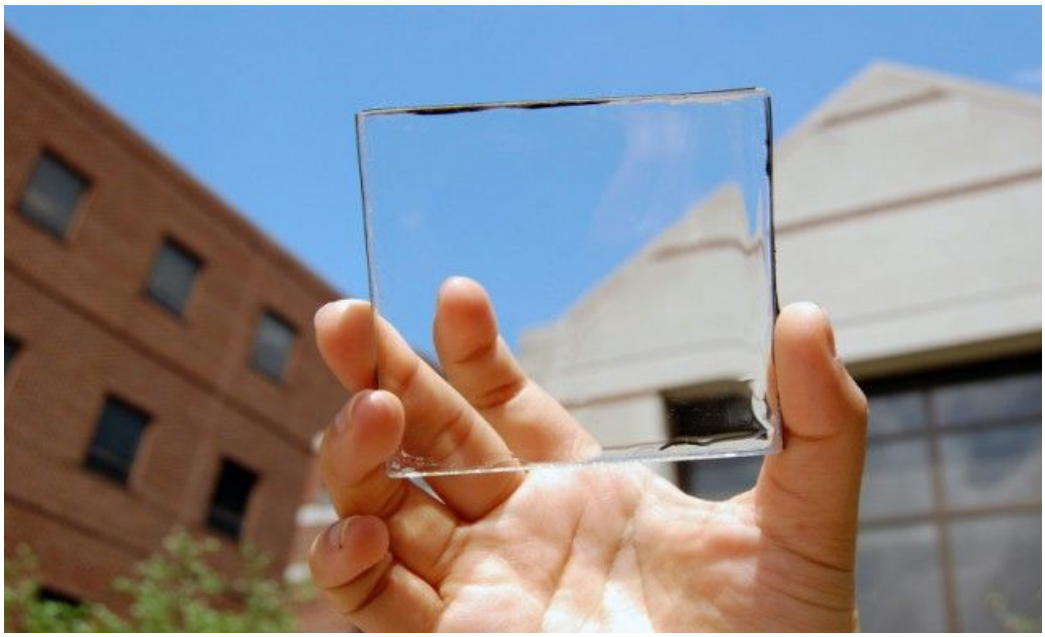
Fort Dix Audit

The Fort Dix Headquarters Building (3650) was previously audited in 2007 by Rowan University (Fun Fact: NJARNG's current energy manager, Chris Moore, was part of the team that first audited 3650). This time around, the interns conducted a remote energy audit on the building. A remote energy audit is an energy audit that is completed without actually visiting the building. The building is made up of mostly office space. This is the first time that Rowan has undertaken such an effort and the audit team learned a lot about the process that can be applied to future remote audits. While a remote audit is cheaper to complete, it may not be as accurate as an in-person audit. Some of the recommendations to improve the efficiency of the building include:

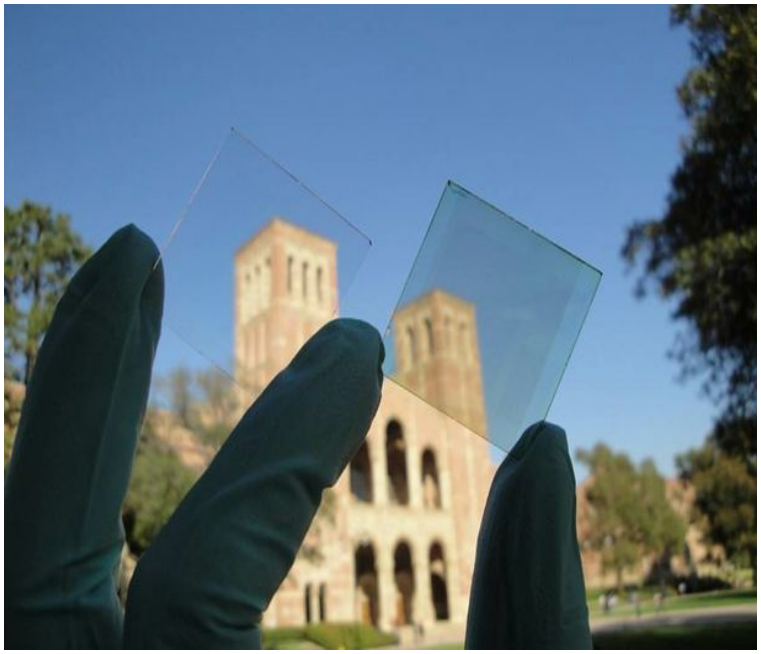
- Install LED bulbs
- Install programmable thermostats to allow temperature setbacks
- Install solar hot water heater
- Install rooftop solar panels
- Switch to 80 hour bi-weekly schedule with every other Friday off
- Minimize space heaters/ fan use

Cutting Edge Transparent Solar Cells Could Turn Every Glass Window and Screen into a Solar Panel

The idea of transparent solar panels may seem like a fantasy or something you see in science fiction. The term “fully transparent solar panel” may itself sound like a contradiction. But we may not have to look too far into the future to see this technology.

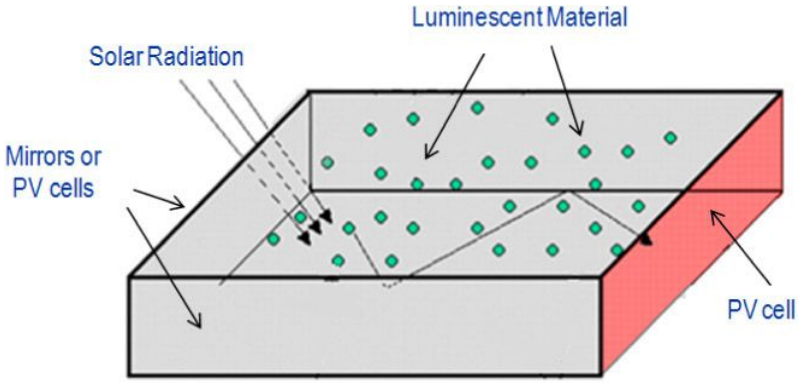


The solar panel created by Lunt and his team at MSU differs from previous transparent models in a number of ways. Previous solar cells (like the ones created at UCLA and UC Santa Barbara) were not completely transparent. They were close to 70% transparent to visible light, which for them was a huge breakthrough as most researchers had difficulty surpassing 10%-20% transparency for solar cells. This resulted in cells that were a shade darker and cast colorful shadows as well (seen to the left).



On Left: UCLA & UC Santa Barbara Solar Panel next to Clear Glass Plane

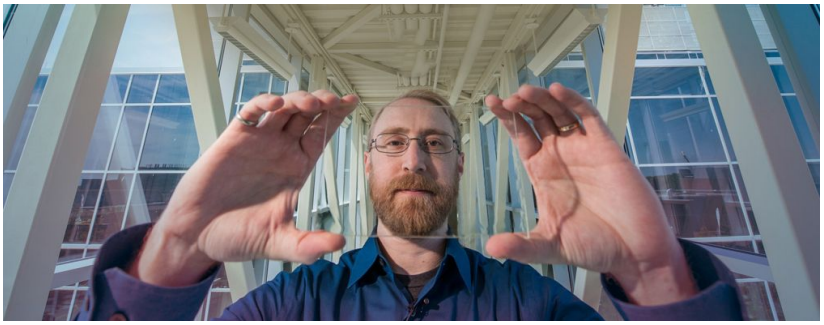
The model made by Lunt and MSU is noticeably more transparent (Seen on top right of previous page) and was achieved by using a different technique for their solar cell.



Rather than harnessing the visible sunlight to create energy, their model absorbs ultraviolet (UV) and infrared light with non-visible wavelengths. This technique uses a cell called a "transparent luminescentsolar concentrator" (TLSC). This requires organic salts to be arranged in the cell to absorb the light and pass it to the edges of the cell, where slim black strips convert the light to electricity. These strips represent the traditional photovoltaic solar cell and can be seen in the image above.

There are numerous applications for this technology, as Lunt has stated, and they can be seen all around us today. As Dr. Lunt describes, he wants to turn "solar farms into solar cities". From the screen of our phones to the windows of houses and buildings to possibly skyscrapers, this technology will generate an enormous amount of energy. He believes buildings could run completely off of the energy created from these transparent solar cells. He has also made this technology capable of being implemented in the production of windows as well as being made into laminates to be applied to preexisting windows in buildings. If you are excited to see this technology in your everyday life, don't worry, Dr. Lunt expects these transparent solar cells to be available in products within the next few years.

Dr. Lunt (MSU) with his Transparent Solar Cell



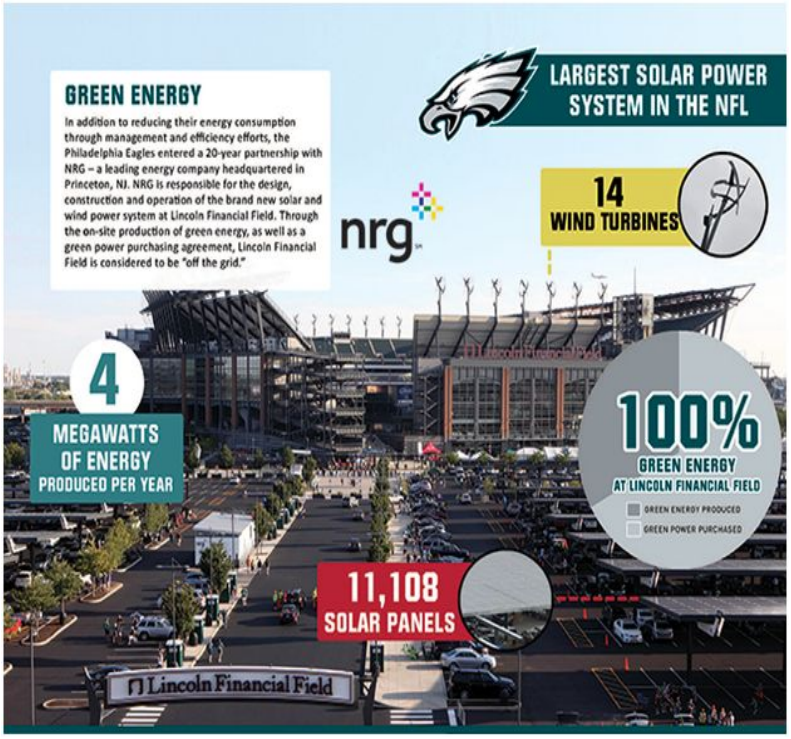
Putting this type of technology into our world today would greatly increase our use of solar energy and decrease our use of nonrenewable energy sources, such as oil and fossil fuels. These transparent solar panels will help us utilize "greener" energy sources, subdue climate change, and reduce our carbon footprint.

If you would like to find out more about this fascinating technology and others, visit: www.extremetech.com and www.digitaltrends.com

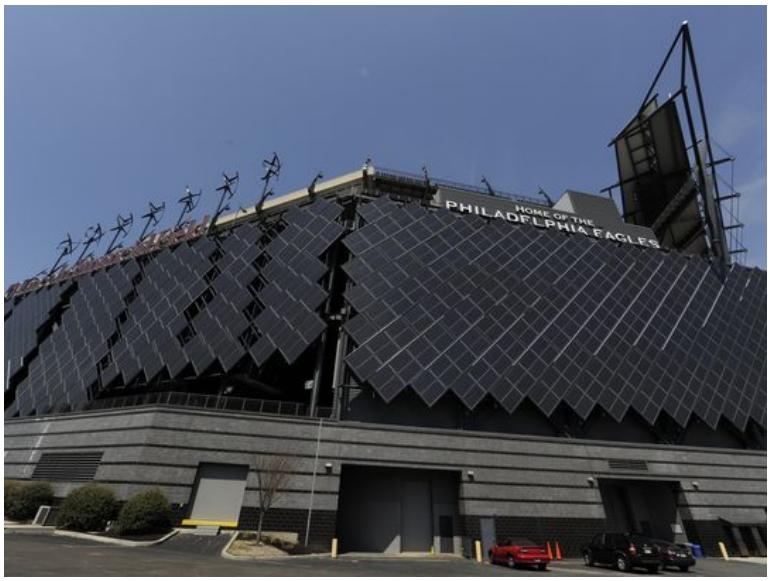
How Professional Sports Teams are Leading the Way in Sustainability

Energy efficiency is reshaping the world we live in and can be seen everywhere we go. From enhanced recycling programs to solar panels on our houses, we are making strides to make our lives “greener”. This impact can also be seen at our favorite sport team’s stadium, as well as stadiums across the country.

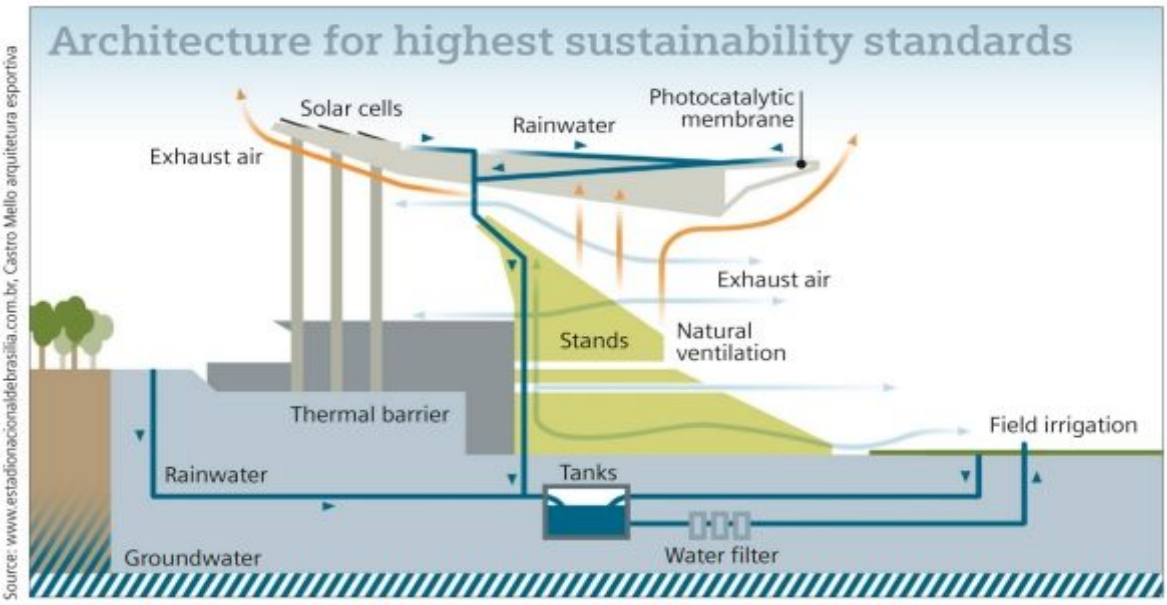
The next page shows a ranking of the top energy efficient stadiums in the NFL, MLB, and College Football. It shows that Lincoln Financial Field, home of the Philadelphia Eagles, is one of the “greenest” stadiums in the NFL and is a leader in energy efficiency for sports around the world. The Eagles “Go Green” program, launched in 2003, has a variety of environmental aspects to it, including over 11,000 solar panels, 14 wind turbines, recycled paper products, the conversion of cooking oil to biodiesel fuel, and 100% green energy at the stadium (just to name a few). Implementing this program earned Lincoln Financial Field a LEED Silver certification from the US Green Building Council. (usgbc.gov)



The Eagles aren’t the only team making strides to be more energy efficient. The St. Louis Cardinals have reduced their use of energy by 24% over the past 3 years. The Seattle Seahawks and Seattle Sounders have installed 2.5 acres of solar panels at their stadium, CenturyLink Field, which amounts to around 3,750 solar panels. The Minnesota Twins use rainwater to wash the seating area at Target Field. The Miami Heat have put in a reflective roof and underground parking in an effort to cut their energy costs. The San Francisco 49ers’ new Levi’s Stadium has a green roof of soil and plant life in addition to solar panels to help with insulation. The Seattle Mariners save $1 million by lighting their field exclusively with LEDs.



America is not the only place where energy efficient stadiums have been put into practice. In Brazil, the reconstruction of the Estadio Nacional Mané Garrincha in 2013, which was used for the 2014 World Cup and will be used in the 2016 Summer Olympics, saw major renovations, including increasing the capacity to nearly 73,000 people, as well as a number of "green" features. One of these features is the installation of over 10,000 solar panels, which generate 2.5 megawatts. This accounts for over 50% of the stadium's energy needs when operating at peak hours. Another feature is the angle of the roof, which prevent the stadium from overheating in the warm climate and makes it possible to capture the cooler coastal breeze. One of the most interesting aspects of the stadium is its use of rainwater. It collects rainwater in its seven million liter tank and uses it for sanitation systems as well as watering the grass. This accounts for over 80% of the stadium's water needs. All of these features helped the Estadio Nacional Mané Garrincha be the world's first LEED Platinum stadium.



It is clear that the entire world is making great strides to become "greener" and be more energy efficient. These iconic sports teams are in a great position to help make a difference and many of these teams are stepping up to lead this wave of environmentalism.

Rankings of Energy Efficient Stadiums

Top 5 NFL Stadiums	Top 5 MLB Stadiums	Top 5 College Stadiums
1. Lincoln Financial Field (Philadelphia Eagles)	1. Safeco Field (Seattle Mariners)	1. TCF Bank Stadium (University of Minnesota)
2. Soldier Field (Chicago Bears)	2. Target Field (Minnesota Twins)	2. Apogee Stadium (University of North Texas)
3. Levi's Stadium (San Francisco 49ers)	3. Busch Stadium (St. Louis Cardinals)	3. California Memorial Stadium (UC Berkeley)
4. Ford Field (Detroit Lions)	4. Nationals Park (Washington Nationals)	4. Amon G. Carter Stadium (TCU)
5. Metlife Stadium (New York Giants/Jets)	5. Marlins Park (Miami Marlins)	5. Husky Stadium (University of Washington)

http://www.siemens.com/innovation/en/home/pictures-of-the-future/energy-and-efficiency/efficient-energy-use-sports-facilities.html
http://www.siemens.com/customer-magazine/en/home/cities/building-a-better-green-future.html
http://www.usatoday.com/story/money/business/2013/04/21/clean-energy-sports-stadiums/2095355/

Electric Vehicles: Now More Affordable

Almost everyone knows that vehicles are one of the greatest contributors of greenhouse gasses. According to the US EPA, the average 2013 model year passenger car emits over 7,300 pounds of CO_2 per year. We can't stop driving vehicles to combat this problem, because most people are dependent on them for their daily commute. However, there is something that all of us can do to help reduce greenhouse gas emissions.

In the past, electric vehicles were only accessible for those that were both environmentally conscious and had the means to spend $40,000-$50,000 on a car. Today, electric vehicles can be purchased for under $30,000, and government incentives can save you even more money! In the state of New Jersey, most zero emissions vehicles are sales tax exempt, which will save a buyer 7% off of the total price of a car. The IRS also offers a model dependent income tax credit for the purchase of an electric vehicle, up to $7,500.

Chevrolet Spark EV

Nissan Leaf

Two of the most affordable electric vehicles on the market today are the Chevrolet Spark EV and the Nissan Leaf. Both of these cars are sales tax exempt in NJ and eligible for the maximum federal tax credit of $7,500. They also each offer a range of over 80 miles on a single charge. Both are estimated to save the owner thousands of dollars in fuel costs over the lifetime of the vehicle. The MSRP of the Spark EV and the Leaf are $27,645 and $29,860 respectively. After tax savings, this translates to a total cost in the low $20,000's, making electric vehicles more affordable than ever.

For more information and reviews you can visit the following websites:
www.motorward.com
www.caranddriver.com

Do you Know Cyber Security?

What is cyber security?

Cyber security focuses on protecting computers, networks, programs and data from unintended or unauthorized access, change or destruction.

What are the risks?

- Private information can be stolen
- Power grids can be hacked
  - A Denial of Service (DoS) attack can occur in which someone can force resources to perform on an arbitrary service, making them not used for their original purpose. They could be using up a lot of energy without anyone knowing.
  - Hackers can also force power outages on the grid. Energy generated from renewable sources could be shut off, raising the demand for nonrenewable energy.

Tips to Prevent Cyber Attacks

- Set secure passwords and passphrases and don't share them with anyone.
- Make sure a website is secure before you enter personal information.
- Keep your operating system, browser, anti-virus and other critical software up to date.
- Install IDS/IPS with the ability to track floods (such as SYN, ICMP, etc.)
- Have contact numbers for your ISP's emergency management or response team.

What is the Guard Doing?

The Army National Guard plans on creating ten Cyber Protection Teams (CPTs) over the next three fiscal years. CPTs will be stationed around the country and will be staffed by Guard soldiers.
The first three CPTS are planned for fiscal year 2016 and they will be hosted by Michigan, Indiana, and Ohio. The second by Georgia, and the third by California.

NJARNG Energy Project Spotlight!

New solar carport takes Sea Girt one step closer to net zero

If you've been to the Sea Girt Training Center, you may have noticed the large, 230 kW solar carport covering the parking lot near the campus entrance. Now, there is an even larger system located next to Building 35. The new 611 kW carport (pictured right) was installed under an Army Corps contract and is owned and operated by the NJARNG.

With the addition of this new carport, Sea Girt will be generating over 1 megawatt of free sun-produced electricity every year, which is approximately 40% of the total electricity use of the campus. The new carport was installed with a new design style that only covers the vehicle parking spaces instead of the entire parking lot in order to reduce material costs and prevent vehicles from hitting the structure.

As part of the Army Corps contract, 4 electric vehicle charging stations were also installed in order to lay the groundwork for future electric fleet vehicle adoption by NJARNG. Both the existing and new carports received 2 charging stations that can charge 2 vehicles at once. A total of 8 electric vehicles can now be charged at the same time at Sea Girt.

These initiatives will help the NJARNG in becoming more power resilient, which is extremely important in maintaining mission assurance. The solar arrays will reduce reliance on the Grid and the electric vehicles will help reduce reliance on fossil fuels, while reducing the NJARNG's negative impact on the environment.

NJARNG Energy Project Spotlight!

Picatinny SolarWall Provides Free Building Heat From the Sun

The Picatinny FMS#7 just got a makeover! Not only does it look more sleek and modern, but it helps make the shop more energy efficient. This is just the first step for the building, however. Soon the FMS building is also going to have its windows replaced, further improving energy efficiency. So how does it work? When the sun warms up the SolarWall, the heated air is drawn through thousands of tiny holes on the surface and then is ducted into the existing air intake. The solar heated air is then distributed throughout the building via the conventional ventilation system or dedicated fans and ducting. The SolarWall will provide the following:

- Displaces 20-50% of heating fuel consumption & corresponding GHG emissions
- SolarWall® systems require no maintenance and generate huge amounts of thermal energy over their 30+ year lifespan
- On a sunny day the air will be heated anywhere from 30-70˚F above ambient!

BEFORE

AFTER

NJ Clean Energy Program

The Home Performance with ENERGY STAR Program is offered through the NJ Clean Energy Program to provide homeowners with an easy way to upgrade the energy performance of their home. Installing energy efficiency upgrades in your home can save up to 30% of utility costs. NJ homeowners have until June 30, 2016 to participate in the program and receive up to $4,000 in financial incentives and a 0% interest free loan to help pay for the upgrades! The incentives are outlined in the table below. The more energy you save, the more incentives you become eligible for.

Residential Programs

Incentive Tier	Requirements	Customer Incentive
Tier 1	**Home Assessment:** Must have a home assessment by certified contractor to be eligible for incentives.	None
Tier 2	**Estimated TES of 5% - 19.9%**: Must install air sealing in one location and address health & safety issues. May also install insulation upgrades, or other items from eligible measures list.	$2,000 rebate and up to $5,000 loan at 0% with 7-year max term.
Tier 3	**Level 1 - Estimated TES of 20% - 24.99%:** Must install air sealing and insulation in at least one location and address health and safety issues. May also include additional measures from the eligible measures list	$3,000 rebate and $10,000 loan at 0% with 7-year max term or 4.99% financing with 10-year max term up to $15,000.
Tier 4	**Level 2 - Estimated TES above 25%:** Must install air sealing and insulation in at least one location, must address health and safety issues. May include other measures from eligible measures list.	$4,000 rebate and $10,000 loan at 0% with 7-year max term or 4.99% financing with a 10-year max term up to $15,000.

For More Info. on the NJ Clean Energy Program and its incentives visit:: http://www.njcleanenergy.com/residential/programs/home-performance-energy-star/benefits-and-incentives

Save More with WaterSense

What is WaterSense?

WaterSense is a partnership program by the U. S. Environmental Protection Agency with the goal of protecting the nation's water supply. It offers water-efficient products that helps save money for the consumer and the environment.

Water Saving Products

Water-Efficient Toilets

Toilets are one of the main sources of water use. Older toilets can use up to five gallons per flush, which if a single toilet is flushed only ten times a day, it will use approximately 18,000 gallons of water per year.

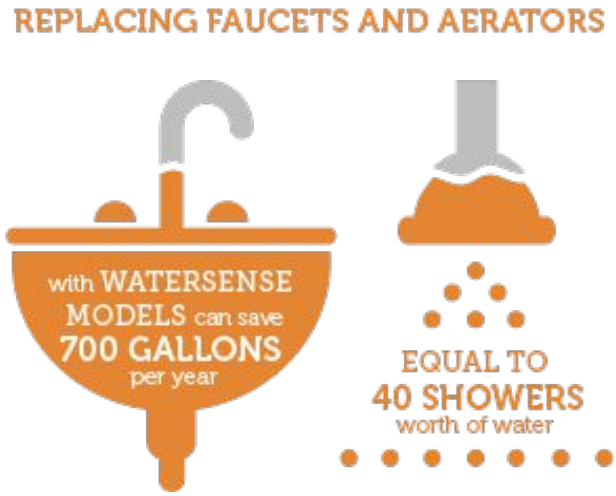
The current federal standard limits the gallons per flush to only 1.6 which translates to approximately 6,000 gallons of water per year

WaterSense toilets use only 1.28 GPF; twenty percent less than the federal standard. This is approximately 4,700 gallons per year. WaterSense toilets also provide equal performance compared to standard toilets even though they use less water.

Water-Efficient Faucets

Faucets and sinks make up another large portion of daily water use. The standard bathroom faucet uses around 2.2 gallons of water per minute where a WaterSense faucet uses only 1.5 gallons per minute.

Water savings also reduce the demand for water heaters, which will save energy as well.



Test your knowledge!

How much do you know about energy?

1. About how much of the US energy use is supplied by renewable forms of energy?

   a. 1% b. 5% c. 10% d. 15%

2. If every American household replaced 3 incandescent light bulbs with compact fluorescent light bulbs, how would much would carbon dioxide emissions decrease?

   a. 0.1% b. 1.5% c. 5% d. 7%

3. What is the leading source of renewable energy in the United States?

   a. Solar power b. Wind power c. Hydro power d. Biomass

4. What is an inspection, survey, and analysis of energy use in a building?

   a. Audit b. Electric survey c. Grid inspection d. Energy profile

5. How much water can be saved yearly if a 5 GPF toilet was replaced with a 1.28 GPF toilet that is used ten times per day?

   a. 50 gallons b. 7000 gallons c. 330000 gallons d. 14000 gallons

Answers
1)c 2)b 3)c 4)a 5)d

CCQ Word Search

Find the energy related words!

Z	Z	I	C	E	F	F	I	C	I	E	N	C	Y	O	F	Q	T	B	G
R	T	N	V	T	N	V	S	L	P	B	H	P	T	O	W	Z	H	G	I
H	U	V	H	W	F	K	P	K	X	Q	Y	V	U	V	A	O	K	Z	O
V	O	G	G	L	W	T	K	U	A	M	B	E	R	L	T	G	K	S	S
Q	I	P	R	D	E	T	E	U	Q	P	R	B	B	O	E	Q	R	L	V
L	U	T	N	X	V	P	A	N	E	L	I	V	I	L	R	T	N	I	J
D	E	Y	N	N	X	C	D	M	L	F	D	T	N	M	S	G	X	L	D
S	T	C	W	J	J	U	K	L	R	E	H	I	E	U	E	E	Q	V	V
C	X	A	X	I	K	Z	K	S	N	H	N	N	V	Z	N	S	T	J	U
A	Q	E	N	V	I	R	O	N	M	E	N	T	Z	M	S	Z	B	T	K
Y	X	Y	E	N	E	R	G	Y	X	V	Q	N	R	I	E	X	A	G	E
I	X	N	D	E	C	D	C	M	A	B	E	E	G	M	S	I	T	I	M
Z	X	X	T	R	C	R	E	W	B	E	C	F	L	O	H	O	T	O	M
K	C	N	U	J	S	O	L	A	R	F	B	M	V	E	O	E	E	U	X
E	Y	M	D	D	S	X	G	G	L	A	U	D	I	T	C	Q	R	I	C
L	E	S	J	S	U	S	T	A	I	N	A	B	I	L	I	T	Y	Y	J
T	X	R	X	Y	T	R	D	Q	H	O	C	G	X	A	J	K	R	R	I
M	C	M	J	H	Z	X	Y	W	W	Y	X	V	S	G	Z	I	A	I	V
P	L	O	R	H	D	R	E	N	E	W	A	B	L	E	L	G	N	H	C
H	X	J	N	O	U	J	T	S	N	T	A	V	I	F	P	R	H	I	E

AUDIT
BATTERY
EFFICIENCY
ELECTRIC
ENERGY
ENVIRONMENT
GREEN
GRID
HYBRID
LIGHT
PANEL
RENEWABLE
SOLAR
SUSTAINABILITY
TURBINE
WATERSENSE

The Clean Cut Campaign is a collaborative effort between the NJARNG Energy Team and Rowan University that started in 2007. As part of this relationship, Rowan University trains interns to assist NJARNG in its energy and water reduction initiatives. The interns, known as the Clean Cut Crew, are responsible for energy education and outreach, benchmarking and tracking energy and water use, conducting energy audits, developing the *Clean Cut Quarterly*, and providing other various services as needed such as solar research and energy modeling.

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 recently started a flag football team. He lives with his wife and 17 month old daughter.

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.

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