

UNEP Partners with CGTC to Advance Intensive Study on Solar Water Heating in the Region

The United Nations Environment Program (UNEP) has embarked on a small-scale funding agreement to accelerate the deployment and utilization of solar water heating (SWH) technologies in the Caribbean Region's residential, private service sector and public buildings. This effort is part of UNEP's Global Solar Water Heating (GSWH) Market Transformation and Strengthening Initiative that is being advanced in close collaboration with the University of the Virgin Islands' Caribbean Green Technology Center (CGTC).

The study consists of research across eight Caribbean countries: Aruba, Bahamas, Barbados, Dominican Republic, Grenada, Jamaica, and Trinidad & Tobago. The main objective of the agreement is to build Knowledge Management (KM) and Networking. A critical component of the program is to deploy the UNEP SWH TechScope Market Readiness Assessment tool to analyze SWH market conditions consistently across all countries.

The four main tasks to be completed under this study by December 2015 are:

- National Solar Water Heating TechScope Assessments including national profiles of the eight countries mentioned above;
- An Online Solar Water Heating Tutorial to explain the SWH Techscope Methodology and how to use the SWH Techscope Analysis Tool;
- Financing and Business Models for Solar Water Heating that provides a case study of different financing and business models for the deployment of solar water heating technology;
- Solar Water Heating (SWH) for the Tourism Sector report that highlights experiences to date with SWH deployment in the tourism sector, with a focus on the Caribbean region.

UNEP, CGTC, and a network of global and regional partners, such as the United Nations Development Program and the International Copper Association have been working to co-coordinate the delivery of these studies and its various country specific SWH activities.



Dr. Wayne Archibald
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WHAT IS SWH TECHSCOPE?

SWH TechScope is a replicable and public method to evaluate solar water heating policy, investment, business, and quality control infrastructure across countries. Countries receive scores based on the presence or absence of 18 different SWH criteria. TechScope has previously been used to successfully assess the SWH markets around the world, including island states such as Seychelles and Mauritius.



Vision

The vision of CGTC is to serve as a vibrant intellectual hub for learning, networking and innovation in and across the Caribbean, in all areas pertaining to green technology.

Summer of Sustainability

This past summer, CGTC hosted a two week workshop that introduced teachers to the science behind renewable energy. The workshop provided educators with the knowledge, tools, and confidence needed to effectively incorporate renewable energy into their classroom curriculum. The course covered the historical evolution of sustainability and sustainable development ideas and linkages to issues such as phenology, consumerism, environmental degradation, environmental ethics, cultural diversity, political structures, and equity around development. Topics relevant to small island environments such as climate change, biodiversity and island biogeography, water availability, ecotourism, cultural heritage, sustainable agriculture and alternative energy were also discussed. A major objective of the workshop was to increase awareness of the importance of education as an empowerment tool for individuals and communities working for a sustainable future. The workshops were facilitated by Fenda A. Akiwumi, Associate Professor in the School of Geosciences at the University of South Florida and Mel Morris PhD, Educational Programs Administrator, Brookhaven National Laboratory in Upton, New York.

CGTC Leads the way for Solar Workforce Development in the U.S. Virgin Islands

The Caribbean Green Technology Center completed its third offering of the NABCEP entry-level solar certificate course recently on St. Croix. To date, about 40 residents have completed the course and the program has been a tremendous success. The week long, forty-hour course was held at both campuses of the University of the Virgin Islands. The program turned out to be a success as a diverse group of individuals registered for the program; from engineers, electricians, coast guard officers, and teachers to even home makers, all of whom possessed different levels of knowledge when it came to photovoltaic (PV) solar systems. Dr. Wayne Archibald, Director of CGTC explained the importance of peak oil, which is the point in time when the extraction of petroleum reaches its maximum, leading to an increase in oil prices. Being that the Virgin Islands is such a small territory of islands, "they will be one of the first to suffer from the high prices, near unaffordability of oil which will in turn affect the economy on a whole." Dr. Archibald believes this to be one of the reasons the course will be beneficial to the U.S Virgin Islands as it will help expand the knowledge of the solar industry and give citizens an opportunity to become certified in the field. Upon completion of the solar project on both campuses, the CGTC will offer more advanced NABCEP certifications.



Mission

To foster research, education and public service on sustainability; to promote Caribbean inter-islands' cooperation; to advance interdisciplinary investigations and learning; to collaborate with governmental agencies and industry partners and to research, develop, demonstrate and monitor green technology.

Energy Workshops Hosted for Government Officials

The Caribbean Green Technology Center in partnership with the VI Energy Office and Meister Consultants Group from Boston, have led several trainings for policymakers. Participants included Senators, representatives from the VI Energy Office and the Water and Power Authority (WAPA). Some of the topics included:

- ◇ Making the case for renewable energy
- ◇ An introduction to renewable energy policy options
- ◇ Overview of the local energy policy
- ◇ Renewable energy resource potential in the Virgin Islands
- ◇ Policy considerations and implications of creating smart grids
- ◇ Policy trends and experiences in the Caribbean region

The training sessions were made possible through assistance from the U.S. Department of Energy's SunShot Initiative. The SunShot Initiative is a collaborative national effort that seeks to make unsubsidized solar energy cost-competitive with other forms of electricity by the end of the decade. The initiative supports research, manufacturing, and market solutions to help make solar energy resources in the United States more affordable and accessible for all Americans. The efforts and partnerships of a diverse array of stakeholders are already achieving success. For example, since SunShot's inception, the national average price of a utility-scale solar photovoltaic (PV) project has dropped from about \$0.21 to \$0.11 per kilowatt-hour (kWh), driven in large part by reductions in the cost of the module (panel) and hardware.

This cost reduction constitutes a significant step towards achieving the SunShot goal of a national average of \$0.06 per kilowatt-hour by 2020, the point where solar is cost-competitive with other resources. However, it is important to note that all electricity prices are local, and range from about \$0.07 to \$0.34 per kWh across different regions of the country. Additionally, the costs for new and existing electricity sources are local (including those for solar), all of which will determine the point where solar becomes locally cost-competitive.

The electricity rates in the Virgin Islands (VI) are three times the average rate paid on the continental United States and are among the highest in the Caribbean region. At \$0.51/kWh for residential electricity and \$0.56/kWh for commercial electricity, the reliance on imported fossil fuel greatly affects the economy of the VI. CGTC and the VI Energy Office have taken several steps to reduce the territory's reliance on imported fuel and the cost of electricity by promoting a range of measures such as energy efficiency, fuel supply diversification and the promotion of renewable energy resources.

CGTC will continue its efforts to help chart the course for the VI to become energy independent. Dr. Archibald stated that "the training will lay the foundation for dialogue and further activities, whether it be policies or programs to reduce the barriers to solar development." The solarize program would be supported by an associated communication campaign aimed at deepening the public sector's experience in working with and promoting residential solar development along with engaging and educating VI residents to participate in the solar PV market.



What is MRSEC?

MRSECs support interdisciplinary and multidisciplinary materials research and education of the highest quality while addressing fundamental problems in science and engineering that are important to society.

UVI Partners with Columbia University's Materials Research Science and Engineering Center (MRSEC)

Columbia University in partnership with City College of New York, Harvard University, Barnard College, and the University of the Virgin Islands, received \$19 million from the National Science Foundation (NSF) to pursue cutting edge research on two dimensional materials. The research areas are built around techniques pioneered by members of the team and bring together researchers with diverse capabilities, strong accomplishments, and an exemplary record of collaboration.

The unified center will enable formation of the interdisciplinary teams required to undertake the proposed research; implement a multi-faceted program of education and human resources development; and focus efforts to improve diversity. Brookhaven National Laboratory, IBM, DuPont, and other industrial partners will provide the partnerships and educational opportunities in support of the MRSEC.

Dr. Wayne Archibald, who previously received the NSF Research Initiation award, has been studying the effects of doping in graphene and will play a key role in this new research initiative. He has built a very vibrant research group at UVI and has trained several students, many of whom have gone on to pursue Ph.Ds. at various institutions.

The importance of this work lies in its potential to open up new opportunities for learning new physical phenomena and understanding which doping mechanism is best suited for graphene, or what combination of mechanisms are necessary for graphene to maintain its dopant state. The results will lead to a new understanding of the properties of graphene for device applications, thus contributing to the advancement of the field and materials science in general.

This past summer, three UVI students were afforded the opportunity to work alongside some of the top scientists in the world at Brookhaven National Laboratory and some of the United States' most renowned professors at Columbia University. The students were Darnel Allen, Ykeshia Zamore and Keturah Bethel, all of whom are in the dual degree engineering program. The 10-week summer program was designed to help students gain an understanding of the nature of research at the graduate level. One of the students, Darnel Allen, who has worked with Dr. Archibald for the past 5 years has received a full research fellowship to pursue a Ph.D. in Mechanical Engineering at the University of Wyoming.

This award will ensure that students at UVI will continue to be afforded opportunities to engage in cutting edge research and hopefully increase the number of students who wish to pursue an engineering degree.

Past Meets the Future

Doug White has been driving solar powered mini trucks for about 15 years. Doug had a desire to drive a zero emission vehicle that runs on sunshine. Some solar-powered vehicles like the Global Electric Motors (GEM) didn't quite fit the bill as its 7 HP, 72 volt DC system with heavy lead acid batteries, severely limit range and speed on the territory's hilly terrain. And so, the idea to do a conversion was born!



A Classic 1967 Austin Mini Moke Electric Vehicle (EV) Conversion by Doug White

My fascination with the Mini Moke started in the mid 1970's in Tortola, BVI where I was chartering my classic wooden ocean racing yawl "Stormy Weather" and needed a vehicle on land. A Moke was the first car I owned when I moved to the Caribbean. I loved having a Mini Moke! You could drive anywhere on the island, beaches, cow pastures, etc. and never get stuck! And of course if you did, you just pick the back end up and move it over a bit...and off you go. In those days one could drive into Road Town and leave keys and belongings in the car and never worry.

Fast forward: Forty years. I am now a retired architect living on St. John and St. Thomas in the US Virgin Islands, where life is easier for a US citizen. I have been driving solar powered, (with PV modules on the roof) GEM (Global Electric Motors) NEV (Neighborhood Electric Vehicles) mini trucks for about 15 years. The GEM's are a 7 HP, 72 volt DC system with heavy lead acid batteries, which severely limit range and speed on our hilly terrain.

The Virgin Islands also has very regressive auto dealerships that do not sell electric cars or even hybrids! So, wanting to drive a zero emission vehicle that runs on sunshine, I decided to do a conversion! I wanted to make an "all island, go anywhere" electric vehicle (EV). Of Course, to start an EV conversion, one needs a donor vehicle. I asked myself. What is the best "island" car I have ever owned? And BOOM! A Mini Moke popped into my mind. Instantly I made the decision to make an electric Mini Moke! That, in my opinion, would be the perfect island car!

I had seen a YouTube video of a classic VW Beetle conversion (another 'cult car') done by an EV conversion shop in southern California. I called them and asked if they might be interested in doing a Mini Moke conversion. They said. "Funny you should ask. We were just talking about it. We think a Mini Moke would make a good conversion, and we don't think anyone has ever done one before. So, yes if you have patience (and money), we will do one."

So, my search for a Moke began! I had seen a Moke advertised online several months before and called the owner to see if it had been sold. Nope, not yet was the answer. It was a 1967 Austin Mini Moke and he was only the second owner. Luckily my cousin happened to live in the same town in Florida where it was located. He gave it a green light. The Moke was in remarkably good condition for its age, with only 21,000 miles on the odometer, having spent much of its life in storage in a barn, I was told. So sight unseen, but with a lot of faith, I bought it and shipped it to California for the conversion. The six months that I was told the conversion would take, slowly turned into a full year before I would see my Moke EV!

To read the rest of Doug's story, visit the CGTC website at <http://cgtc.uvi.edu>.



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Off-Grid Options

**RURAL ELECTRIFICATION
GOES LOCAL**

**ADVANCED CONTROL
SOLUTIONS FOR OPERATING
ISOLATED POWER SYSTEMS**

**BUILDING RESILIENT
INTEGRATED GRIDS ONE
NEIGHBORHOOD AT A TIME**

**LOCALLY MANUFACTURED
SMALL WIND TURBINES**

UNIVERSITY of the VIRGIN ISLANDS

UVI FEATURED IN THE MARCH 2015 ISSUE OF IEEE MAGAZINE

The University of the Virgin Islands was featured on the front cover of the March 2015 issue of the IEEE Magazine. The Institute of Electrical and Electronics Engineers is the world's largest professional association dedicated to advancing technological innovation and excellence for the benefit of humanity. The article entitled "Solar Power Deployment Initiative at UVI" was written by Wayne Archibald, Zuyi Li, Mohammad Shahidehpour, Steve Johanns and Tom Levitsky.



About CGTC

CGTC serves as an important clearing house for information and processes geared towards supporting and protecting natural resources and the development of alternative and renewable energy technologies.

Overview of the CGTC & UVI Solar Project

The Caribbean Green Technology Center (CGTC) at UVI was created in 2011 to advance energy and environmental sustainability in the U.S. Virgin Islands and its neighbors throughout the Caribbean Basin. In the face of severe economic pressures, urbanization and energy and water insecurity, the CGTC serves as an important clearing house for information and processes geared towards supporting and protecting natural resources and the development of alternative and renewable energy technologies. With the goal of establishing vibrant, energy sufficient communities, the vision is for the CGTC to serve as an intellectual hub for learning, networking and innovation in and across the Caribbean, in all areas pertaining to green technology. The CGTC serves as a vibrant intellectual hub for learning, networking and innovation in and across the Caribbean, in all areas pertaining to green technology. Its main purpose is to foster research, education and public service on sustainability, to promote Caribbean inter-Islands cooperation, to advance interdisciplinary investigations and learning, to collaborate with governmental agencies and industry partners and to research, develop, demonstrate and monitor green technology. The CGTC addresses scientific, policy and implementation issues around the topic of green technology and sustainability, especially as it pertains to living in the Caribbean. The CGTC brings together groups of researchers, industry leaders and policy makers to address and solve problems, and implement solutions that lead to better lives for the people of the Caribbean.

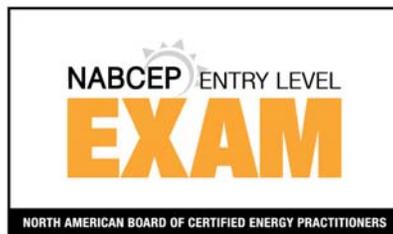
In an attempt to reduce energy consumption, UVI started examining firms to provide alternative renewable energy solutions. The paper that was published in the March issue of IEEE magazine titled **“Solar Power Deployment Initiative at the University of Virgin Islands”** discusses this initiative. An ongoing project will deploy 3.3 megawatts of solar power at UVI, both on St. Thomas and on St. Croix. The paper also presents an analysis of the project needs, project benefits, project design, and project financing for the initiative. A brief introduction to the U.S. Virgin Islands is presented first, which provides background information on the energy need and partially explains why the solar power deployment initiative is necessary for UVI.

The solar power deployment initiative is also in line with the University's current *Goes Green* Initiative, which is a sustainable, environmentally friendly initiative that promotes responsible environmental policies and practices. The *Goes Green* Initiative currently includes Recycling, Reusable To-Go Containers, Green Cleaning, Electric Vehicles, and Alternative Energy. Through the *Goes Green* Initiative, UVI is exploring various opportunities for the production of solar energy on campus. The initiative signifies an opportunity for distributed solar to unshackle energy consumers from the grips of traditional models of energy generation and distribution. It also represents the beginning of a new future leading to cleaner, more efficient, reliable, and lower cost energy solutions for the U.S. Virgin Islands. As UVI President, Dr. David Hall correctly puts it, “Energy consumption and costs are crippling challenges facing the Virgin Islands and the broader Caribbean, and this initiative creates a pathway for addressing the problems.” The solar power deployment initiative is “a historic and transformative development for the University and the Virgin Islands,” and “once this project is completed, UVI will have blazed a trail that many universities throughout the world are destined to follow.”

UVI is a Registered NABCEP Entry-Level Exam Provider

Obtaining your first level certification with the North American Board of Certified Energy Practitioners (NABCEP) is only a few steps away! Start with our *Introduction to Photovoltaics (PV)* course held here at the University of the Virgin Islands, over the course of five days. From there, you're ready to take the NABCEP entry-level exam, which is offered here on site three times a year. Interested in taking your solar education further? We will also offer an Advanced PV Systems class and can help point you in the right direction to get hands-on, rooftop installation experience.

Whether you are just curious about solar energy, preparing for a career transition, desiring quality training for your employees, looking to start or expand a business, or advance within the solar industry, we have a course to meet your needs.



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Contact Us

Give us a call for more information on the services offered.

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