

Welcome

6th Annual Clean Energy & Sustainability Extravaganza

Friday, February 28, 2020

11 am – 6 pm

A. James Clark Hall
The Forum, #1101
University of Maryland
8278 Paint Branch Drive
College Park, MD 20742



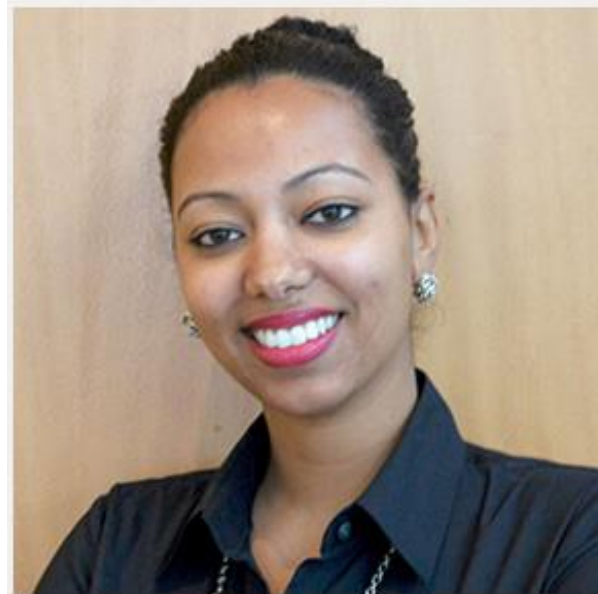
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Master of Ceremonies – Solome Girma

**Master of Ceremonies, Director of the Program Management Office at the
DC Sustainable Energy Utility (DCSEU) and Association of Energy Engineers
National Capital Chapter (AEE NCC) Board**





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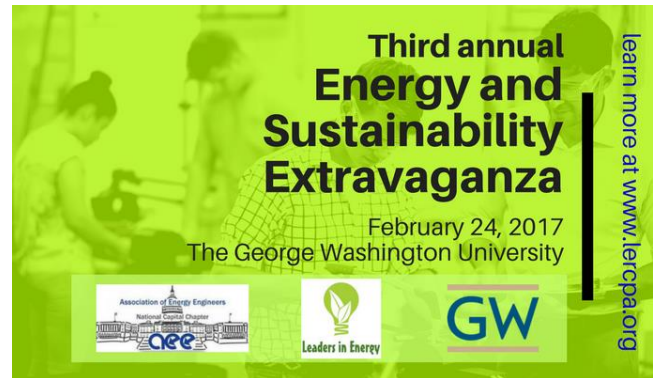
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Leaders in Energy   

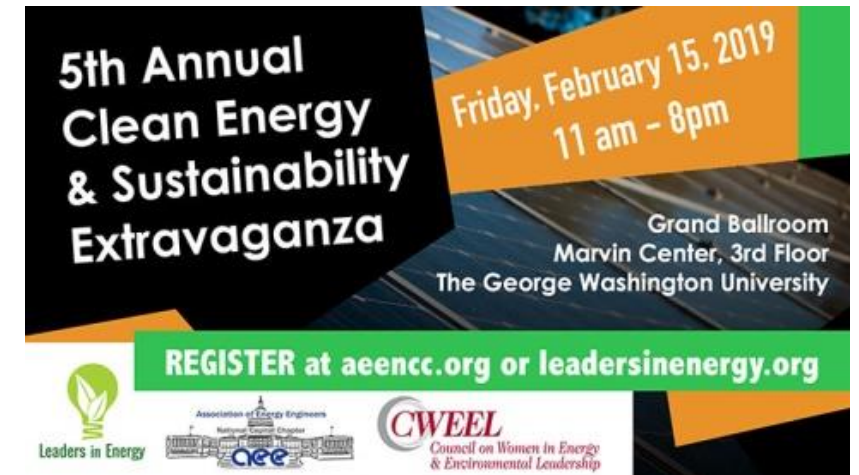
6th Annual CWEEEL Clean Energy & Sustainability Extravaganza



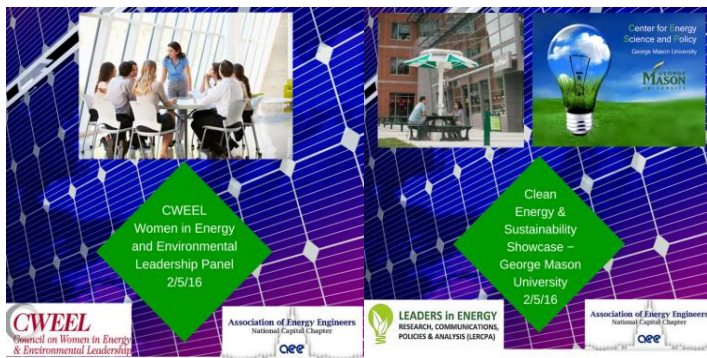
George Washington University,
February 2015



George Washington University,
February 2017



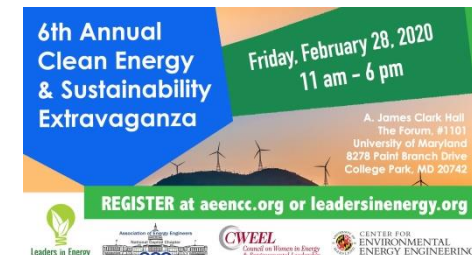
February 2019



George Mason University,
February 2016



U of Maryland-College Park,
February 2018

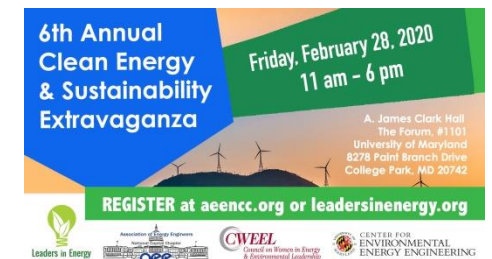


Innovative Trends on University Campuses in Clean Energy & Sustainability

Welcome and thank you for coming!

Schedule

Showcase Exhibitors (except when panels in session)	11:00 am – 6:00 pm
CWEEL Luncheon Panel <i>Advancing Gender Perspectives in the Energy Industry</i>	11:30 am – 1:45 pm
University and Business Showcase Keynote & Panels <i>Innovative Trends on University Campuses</i>	2:00 pm – 5:15 pm
Refreshment Break	3:40 pm – 4:00 pm
Networking & Exhibitors - plus Door Prizes	5:15 pm – 6:00 pm



Thanks to Our Showcase Sponsors and Exhibitors



Your Business Our World



With support from the AEE/Baltimore Chapter

Welcoming Remarks – Ida Namur

Associate Vice President and Operations Manager for AECOM's Southeast Energy Services group and Vice President, AEE NCC



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Welcoming Remarks – Dr. Farah Singer

Research Associate, A. James Clark School of Engineering, University of Maryland and
Student Advisor, AEE NCC Student Chapter



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Leaders in Energy

Association of College Engineers
AEE

CWEEL
Center for Environmental & Energy Leadership

CENTER FOR ENVIRONMENTAL
ENERGY ENGINEERING

Thanks to Our CWEEEL Luncheon Sponsor – Edison Energy

Welcoming Remarks – Doug Millar, Regional Director at Edison Energy and AEE NCC Board Member



CWEEL Panel: Perspectives in Advancing Gender Diversity in the Energy Industry



Janine Finnell,
Executive Director,
Leaders in Energy (LE)
and AEE NCC and
National CWEEL Board
Member



Janine Helwig,
Director of
Utilities and
Engineering in
Facilities
Planning,
Construction,
and
Management at
The George
Washington
University



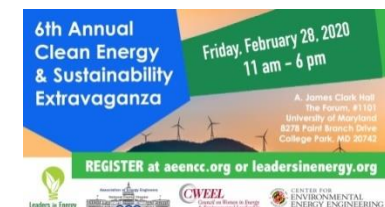
Ben Rupert,
BJR Energy
Management,
AEE NCC Board
Member and past
president of the
AEE Pacific
Northwest
Chapter



**Laurie Wiegand-
Jackson,**
Owner and President,
Utility Advantage and
Chair of The Board Of
Directors at Council
for Women in Energy
& Environmental
Leadership



Ida Namur,
Associate Vice
President and
Operations
Manager for
AECOM's
Southeast Energy
Services group and
Vice President,
AEE NCC



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AEE & CWEEEL Update

by Laurie Wiegand-Jackson

February 2020

AEE Strategic Objectives

AEE Mission

“to promote the scientific and educational interests of those engaged in the energy industry and to foster action for Sustainable Development.”

Strategic Objectives

- *Connect our members globally, while meeting their needs locally.*
- *Addressing the urgent global environmental and energy needs with certified and qualified professionals*
- *Enhancing and solidifying the value of AEE membership*

2020 AEE Officers

2020 President
Samer Zawaydeh



2020 President-Elect
Buster Barksdale



2020 Secretary
Fotouh Al-Ragom



VP Region I
Maryanne Strobel



VP Region II
Ray Segars



VP Region III
Rick Lubinski



VP Region IV
Jerry Casey



VP Region V
Cynthia Martin



AEE Member Benefits

- *Energy Journals*
- *Training & Certification Programs – US & Global – **Online** & in Person*
- *Member Webinars*
- *Conferences - advance notice with significant discounts to members*
- *Networking with Global Energy Leaders*
- *Scholarships – AEE Foundation – over \$1 million in awards*

Energy Journals

AEE members receive complimentary subscriptions to leading edge professional online publications

- International Journal of Energy Management
 - Volume 1, Issue 1 Released July 2nd
 - Volume 1, Issue 2, to be released August and bi-monthly going forward (October, December)
- International Journal of Strategic Energy & Environmental Planning
 - Volume 1, Issue 1 Released July 2nd
 - Volume 1, Issue 2, Released July 22nd and bi-monthly going forward (September, November)



- Alternative Energy & Distributed Generation Journal
 - Volume 1, Issue 1, Released July 15th
 - Volume 1, Issue 2, to be released in October 2019 and quarterly in 2020.

Member Webinars

2019 Member Webinars

- Member benefit
- 18 Webinars in 2019
- 3,980 webinar attendees
- 5 more webinars planned

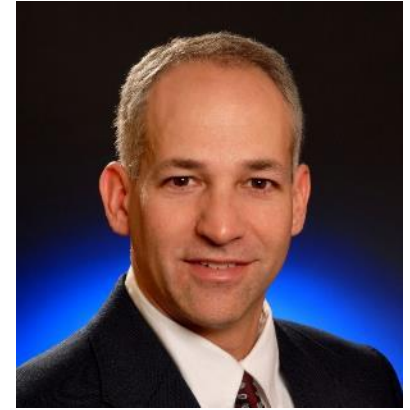
Recent & Upcoming Webinars



Lessons Learned in Measurement & Verification of C&I Projects

Kimia Yeganeh

Wednesday 10/09/19



Real World Industrial Energy Efficiency - How McCormick Sustainability Produces Your Favorite Spices & Seasonings

Jeff Blankman

Wednesday 10/23/19

<https://www.aeecenter.org/membership/benefits>

AEE Events 2020



April 21-22, 2020

Duke Energy Convention Center
Cincinnati, OH

<https://east.aeecenter.org/>



June 24-25, 2020

Washington State Convention Center
Seattle, WA

<https://west.aeecenter.org/>



October 28-29, 2020

City West Hotel and Conference Center
Dublin, Ireland

<http://aeeeuropeenergy.com/>



September 23-25, 2020

Colorado Convention Center
Denver, CO

<https://world.aeecenter.org/>



A Clear Purpose...

....The Council on Women in Energy & Environmental Leadership supports women in the energy & environmental sectors. It provides networking and support in career development for established professionals and young women aspiring to leadership.



CWEEL


Become a Member to Network & Grow...

...by meeting and participating in

- Local and Regional CWEEL events
- Mentoring Programs
- Scholarships
- Training & Certifications
- Quarterly Newsletters
- Visit www.cweel.org for information

We have over 25 participating AEE Chapters
in US and 10 International CWEEL groups





INVITATION TO PARTICIPATE:

Study on Women as Levers of Change

Today, women remain severely under-represented in a wide range of traditionally-male dominated industries, despite their great potential to advance innovation and transformation in these industries.

Women account for only 23% of the workforce in manufacturing and 18% of the leadership	Companies with at least one woman on the board are 17% more transparent than those with none	Companies that increased the percentage of female employees over 2013-2018 were 14% more likely to improve profitability than those that did not
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FP Analytics asked CWEEL to participate in this study on Women as Levers of Change. Will be released at the end of March 2020

For information, contact yuxin.lin@foreignpolicy.com

- *10,000 members globally*
- *Leading Organization devoted to increasing and empowering women in the energy & related environmental fields*
- *Integrated Organization of Men and Women*
- *Focus on Increased **long-term** participation of women in technical, professional, management and executive positions in the energy & related environmental industries –*
- *Support these sectors: Clean Energy, Clean Tech, Energy Efficiency, Utilities, Power & Natural Gas Retail Suppliers, ESCO's, Consultants, Entrepreneurs, Government, Regulatory, Non-Profits, Corporate Energy Management & Sustainability*
- *Cooperate with UN on Sustainable Development Goals, USAID and other NGO's to achieve gender parity objectives in US and globally with training, mentoring, career development, new policies and other initiatives*



*Laurie Wiegand-Jackson
President, Utility Advantage
Board Chair, CWEEL*

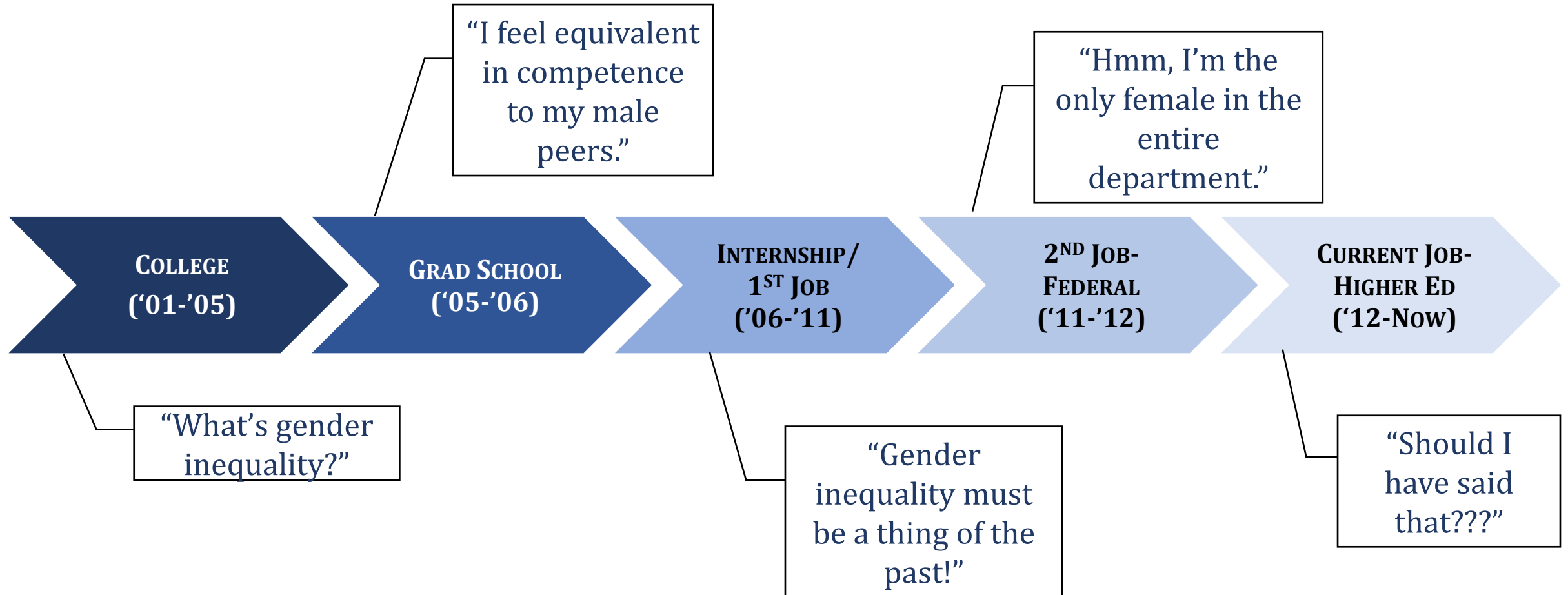
lwiegand@utilityadvantage.com

1-848-565-1212 mobile

JANINE HELWIG, P.E., C.E.M., CEFP

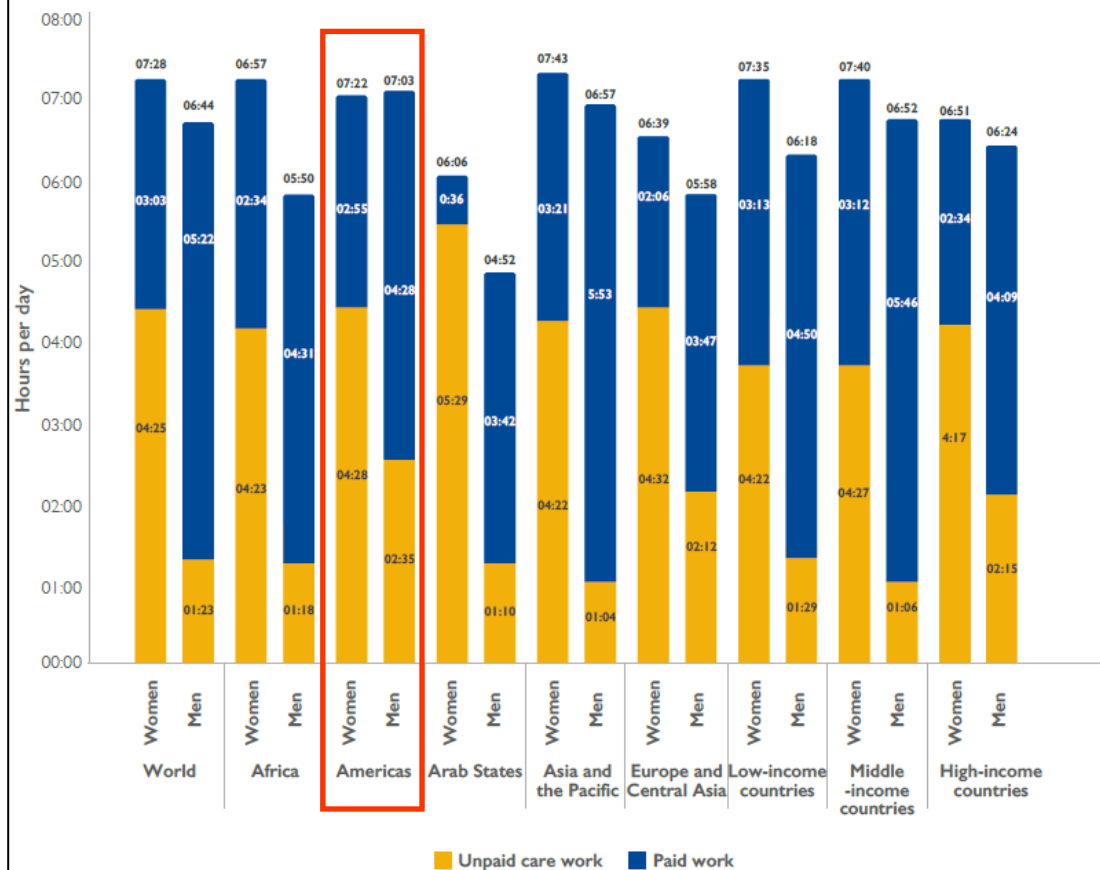
The George Washington University

Evolution of My Gender Parity Experience



My Pursuit for “Work-Life Balance”

Figure I.17. Time spent daily in unpaid care work, paid work and total work, by sex and income group, latest year



- **Americas: Women still disproportionately spend more time doing unpaid care work (60% of total time)**
- **Working “two shifts”**
- **Not “one-size-fits-all”**
- **Give 100% to both**
- **The “IKEA Effect”**

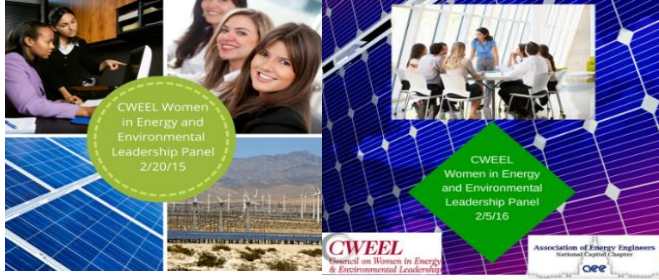
“There's no such thing as work-life balance. There are work-life choices, and you make them, and they have consequences.”

--Jack Welch

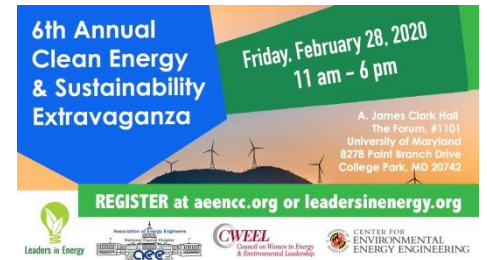
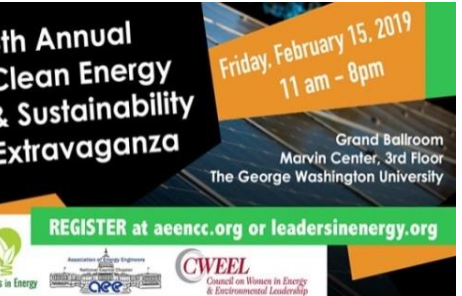
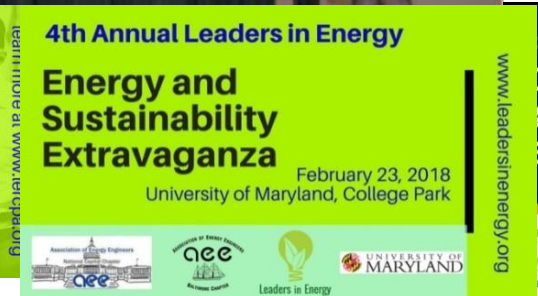
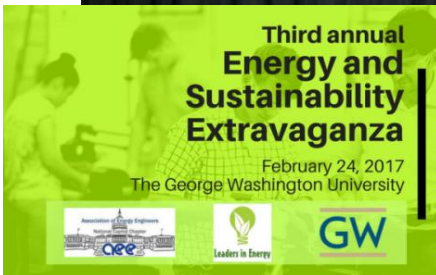
JANINE FINNELL

Leaders in Energy

Spearheaded CWEE Annual Events Featuring Women in Energy & Sustainability Careers



- Conducted at George Washington University, University of Maryland-College Park, and George Mason University
- Panelists included women working in nuclear energy, solar, biofuels, sustainability, green buildings, energy efficiency, and more!
- Included government, private sector, NGOs, and academic.
- Purpose to help guide others in their careers



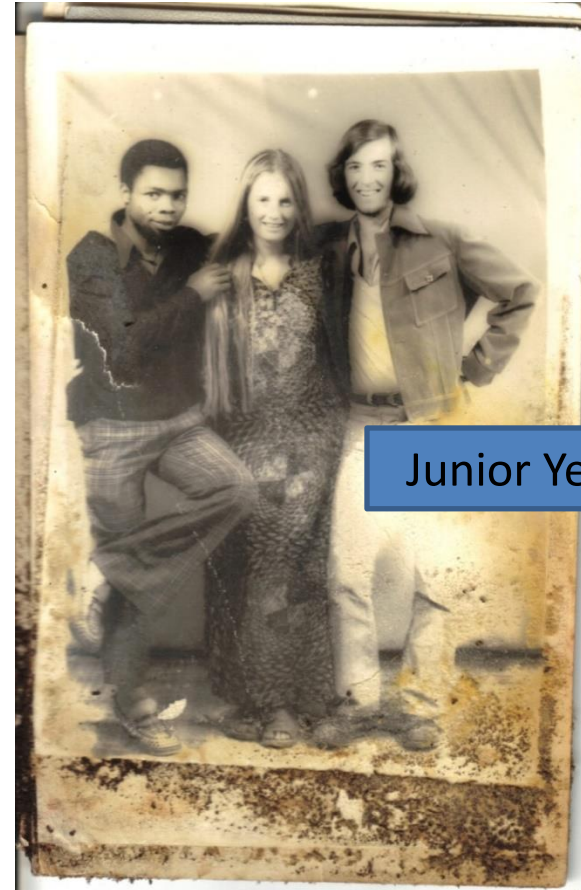
Love of Adventure Plus Vision and Determination



THE BLADE: TOLEDO, OHIO, MONDAY, AUGUST 26, 1974

Cross-Country By Bike Beats Mundane Job

"I did it just for the fun of it," she said. "I wanted to see the country." Her parents,



Junior Year Abroad in Nigeria

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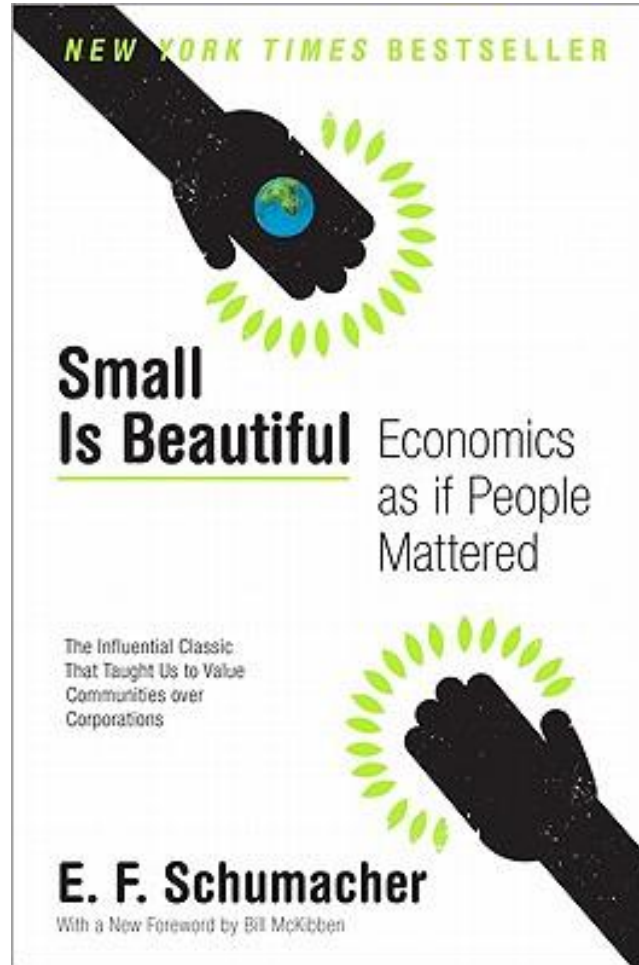
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Leaders in Energy

CWEL
Center for Women in Energy & Environmental Leadership

CENTER FOR ENVIRONMENTAL
ENERGY ENGINEERING

Discovered My “North Star” in Graduate School



“Concept of Appropriate Technology”
Masters thesis on methane digesters in India to
provide biogas and fertilizer





Sustainable Communities



Green Economy and Jobs



**Multigenerational Leadership
and Talent**



Leaders in Energy

Building a community of leaders to advance clean energy and sustainable solutions

*Join us on-line and at our events on cleantech,
green jobs and finance, and leadership at:*





leadersinenergy.org

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Barriers to Entry and Retention for Women and Advancement in the Energy Sector

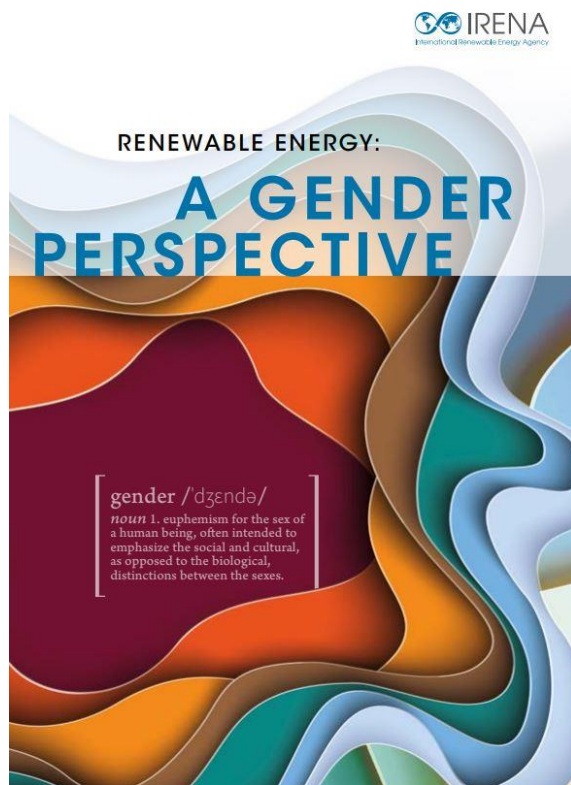
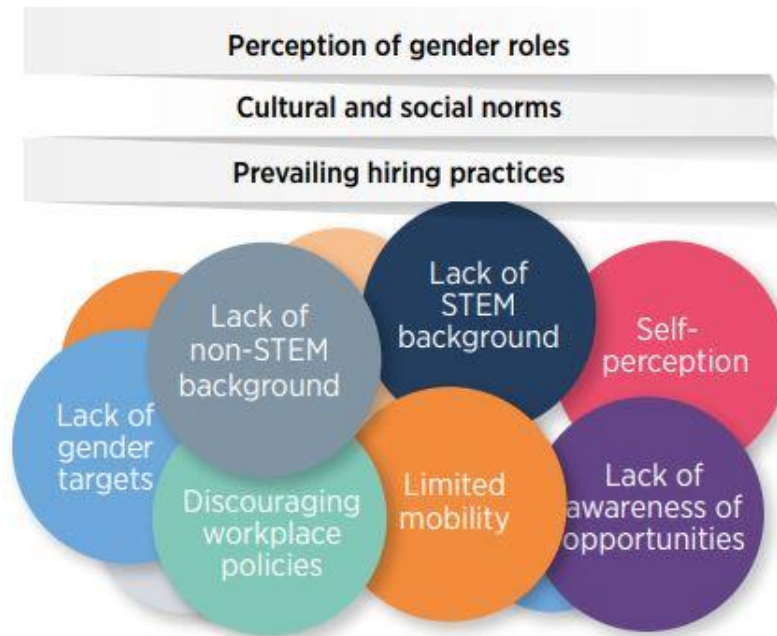


Figure ES.2 Barriers to entry for women in the renewable energy sector



Source: IRENA online gender survey, 2018.

Note: STEM = science, technology, engineering and mathematics.

Figure ES.3 Barriers to retention and advancement for women in the renewable energy sector



Source: IRENA online gender survey, 2018.

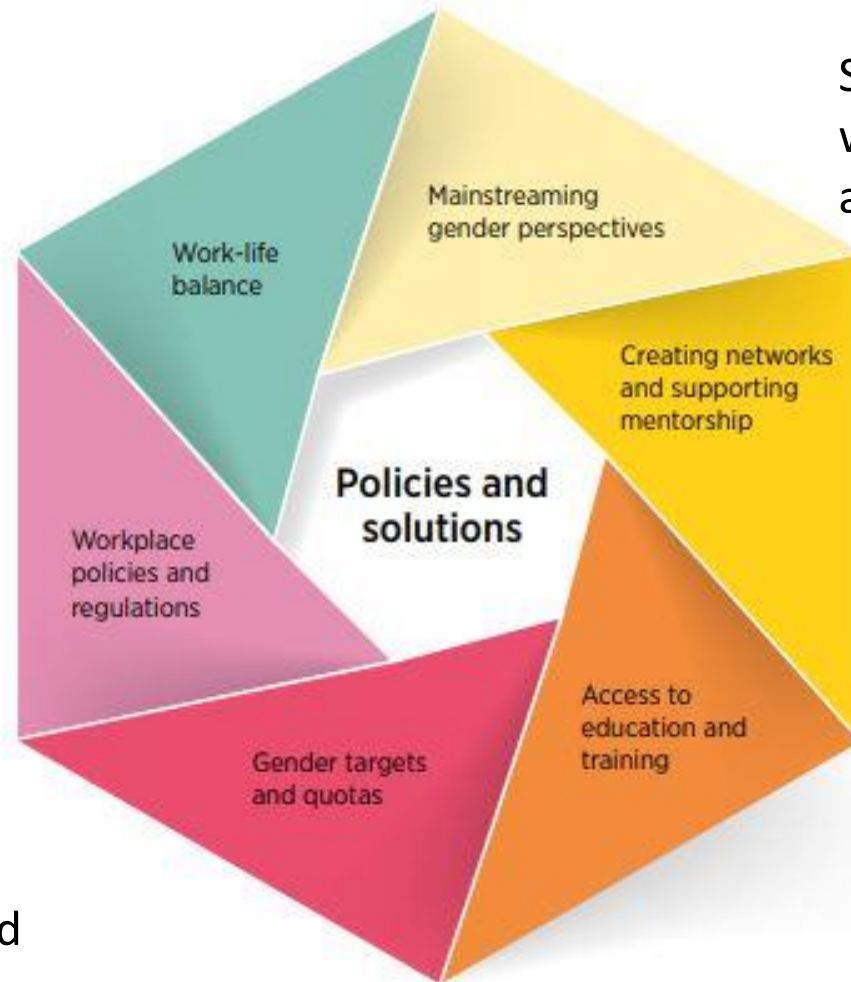
Solutions: Increasing Women's Participation in the Energy Industry

Flexible work and part-time schedules. Benefit disparities for full vs. part-time workers

The U.S. is the only country among industrialized countries that does not mandate any paid leave for new parents.

Engineers Canada 30 X 30

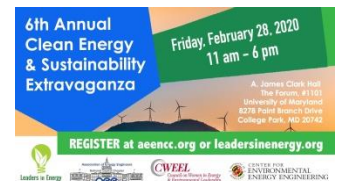
France, Germany, and Norway – Quotas for corporate boardrooms



Seeing more examples of women working in STEM and energy fields

IRENA list of 20+ organizations helping women in energy, e.g. CWEEL working to get more women on boards of AEE chapters

MIT's Dept. of Mechanical Engineering has 49.5% women as opposed to 13.2 % nationally
King's College London- "Women in Science Scholarships"



My Experience – Observations & Advice on Solutions



Importance of federal, state, local policies

Role of energy policy in providing jobs – case in point , key fed energy legislation being passed at federal level that led to me being hired in the state of Wyoming to write manual on energy management in agriculture
Benefited from graduate school department recruiting more women in a traditionally male department.
Are we creating enough of these opportunities today? Green New Deal?



Importance of innovative workplace policies

Able to work part-time child-rearing years, thanks to companies providing part-time/flexible work schedules with prorated benefits - Very innovative at the time and had to be a “trail blazer” – Also benefited a male colleague who needed more time for parenting
Take advantage of workplace-paid education, paid conferences, training, etc.



Benefited from having a number of male sponsors

Sponsors (as opposed to Mentors) who can help place you in jobs

Education

Continuing education – take advantage of workplace–paid education – other programs such as Toastmasters to improve leadership and communications skills, certifications



Networking and Educational Events

Never know what you might learn or who you will hear or meet that might move you in next direction – e.g., heard speaker on the social costs of energy....led to project work at a California utility

Helping Others and Volunteering

Help others to find their purpose and make a positive difference. Also includes volunteering and serving on Boards. Helps you and helps to give back. Involvement in Arlington EcoAction on developing sustainable communities via biodiversity and sustainable landscaping.



BEN RUPERT

President, BJR Energy Management

Career and Family = Adapting and Evolving



What's the SCAP and Why Should I Care?

News King County Executive
Dow Constantine

King County adopts one of the boldest climate action plans in the nation

November 16, 2015

Summary

Local climate action supporters joined the King County Executive and Council Chair to cheer the signing of King County's 2015 Strategic Climate Action Plan, a bold blueprint for reducing carbon pollution and preparing our region for the impacts of climate change. It's a plan the co-founder of Earth Day has described as the best he has seen.



FMD ESCR Project:

Jail Plumbing Valve Controls

Scope: Install valve controls on toilets at both jails and showers at the downtown jail which will limit the number of times devices can be operated hourly.

- \$554,508 total estimated project cost
- \$82,588/year estimated savings
- Working with SPU on potential rebate



6.7 year payback before rebate

BenningfieldGroup
[energy, software, service]

SOUTHERN CALIFORNIA EDISON
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Statewide Codes & Standards

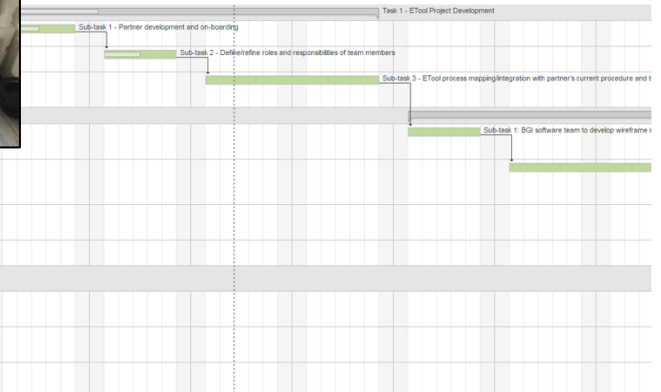
Multifamily Low Vs High Rise Demarcation and the CA Energy Code


FOR OVER 100 YEARS...LIFE. POWERED BY EDISON.

1



Sub-task 2: BGI software team will translate final design into a scalable, embeddable, mobile friendly permit guide and application tool	05/09/16	05/27/16
Sub-task 3: BGI software team will deliver preliminary product and ensure it is functional and ready for acceptance testing	05/30/16	06/03/16
Milestone - ETool Initial Development Complete	06/03/16	06/03/16
Task 3: Implementation and acceptance testing	06/06/16	07/01/16
Sub-task 1: BGI will work with partner jurisdiction on-site to demo the tool and obtain feedback from customers	06/06/16	06/17/16
Sub-task 2: BGI will refine tool as necessary/feasible per acceptance testing phase feedback	06/06/16	06/17/16
Sub-task 3: BGI will work with partner jurisdiction to create a report detailing successes, challenges, and scalability	06/20/16	07/01/16




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Suzan Song, MD


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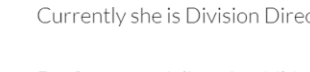
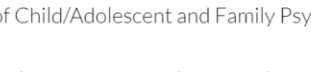
Suzan Song, MD, MPH, PhD was trained at the University of Chicago, Harvard, and Stanford, and is double board-certified in adult and child/adolescent psychiatry. She has also trained in systemic family therapy and parent-infant therapy from the University of California San Francisco/Child Trauma Institute. Currently she is Division Director of Child/Adolescent and Family Psychiatry at GW.

Dr. Song specializes in children, adolescents and adults and takes a conservative approach to medications. She specializes in issues including depression, anxiety, grief, life transitions, relationship and school/work stress. With a public health background, Dr. Song's holistic approach includes incorporating family/relationships and school/work information into the life of each person and encourages clients to be active participants in treatment.

Dr. Song earned her PhD from the University of Amsterdam, on the effects of trauma on families affected by war, and is a consultant in humanitarian protection for the United Nations. She was formerly a: White House Asian Pacific Islander Fellow, Harvard Humanitarian Initiative Fellow, President of the Northern California Region of Child and Adolescent Psychiatrists, and has over 25 publications and book chapters, multiple invited lectures and interviews with National Public Radio and Public Radio International, and serves on committees for the American Academy of Child/Adolescent Psychiatrists.

Podcast

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Dr. Song earned her PhD from the University of Amsterdam, on the effects of trauma on families affected by war, and is a consultant in humanitarian protection for the United Nations. She was formerly a: White House Asian Pacific Islander Fellow, Harvard Humanitarian Initiative Fellow, President of the Northern California Region of Child and Adolescent Psychiatrists, and has over 25 publications and book chapters, multiple invited lectures and interviews with National Public Radio and Public Radio International, and serves on committees for the American Academy of Child/Adolescent Psychiatrists.

A woman with dark hair is smiling broadly while holding two young children. The child on the left is a girl with pigtails wearing a striped shirt and red pants, sitting in a stroller. The child on the right is a boy in a blue shirt and patterned shorts, standing and leaning against the woman. They are in a park-like setting with a large, ancient-looking tree in the background and other visitors walking on a path.

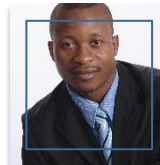
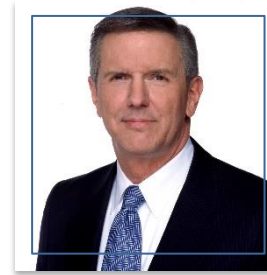


Panel Discussion: Advancing Gender Equity in the Energy Industry



Goals of the panel discussion

1. Share perspectives
2. Open a conversation
3. Challenge perceptions

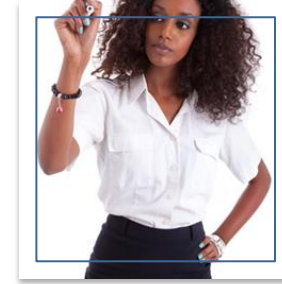


Panel Discussion: Advancing Gender Equity in the Energy Industry



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University and Business Showcase

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Showcase Welcoming Remarks – John Gaffigan

Leaders in Energy, Green Tech Lead and
Director of Sponsorship and Membership







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Leaders in Energy    



Sustainable Communities



Green Economy and Jobs



**Multigenerational Leadership
and Talent**



Leaders in Energy

Building a community of leaders to advance clean energy and sustainable solutions

*Join us on-line and at our events on cleantech,
green jobs and finance, and leadership at:*





leadersinenergy.org

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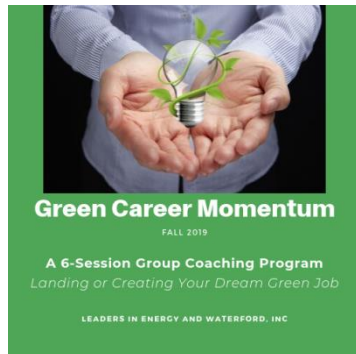
Leaders in Energy Mission



Leaders in Energy is building a global action network to advance clean energy and sustainable solutions.

We are seeking to:

- foster economic transformation that regenerates, rather than destroys our global ecological systems;
- enable more people to work in and create clean/green economy jobs and enterprises; and
- grow related business, economic development, and entrepreneurship opportunities in our local areas, and then in regions, nationally, and internationally



Industrious Ballston
4201 Wilson Boulevard
Arlington, VA 22203

May 29, 2019
5:30 - 8:30 pm

Reducing the Carbon Footprint of Fossil Energy
Searching for the Next Better

Carbon Capture | Renewable Hydrogen | Synthetic Products

Register at: leadersinenergy.org

CO₂ + H₂

INDUSTRIOUS



Leaders in Energy - 4 Pillars, Stakeholders, & Programs

	PILLAR 1	PILLAR 2	PILLAR 3	PILLAR 4
MISSION (4 pillars)	Connect Employers + Green Talent/Job Seekers	Connect Suppliers + Market	Connect Innovators + Investors	Connect Thought Leaders + Action Network
STAKEHOLDERS (PARTICIPANTS & PARTNERS)	Employers in Clean Energy & Sustainability Industries Recruitment Agencies Sector Professionals University/College Career Services Apprenticeship Programs Economic Development Offices	Sector Trade Associations Chambers of Commerce Local Suppliers Project Developers Regulatory Agencies Sector NGOs/Non-Profits City/Municipal Councils	Business incubators VCs and Financiers Entrepreneurs	Academic Programs and Research Industry Executives & Consultants Senior Technical Experts Grant Providers Universities Think Tanks
OUR PROGRAMS	Green Jobs Forums, Green Career Workshops, Green Career Momentum, Green Jobs Working Group	Clean Energy & Sustainability Extravanzas, Utility Industry & Alternative Fuels Events, Circular Economy Workshops, Working Group & Technical Tours	Green Finance Events	Four Generations of Leaders in Clean Energy Awards, Green Leaders Retreat, Building Consensus Through “Undebate” Other Industry Sector Events Including Technical Tours



March 14 and 28 Green Career Workshops

Co-hosted by Leaders in Energy and Waterford, Inc.

*More than 175 participants to date
in our Green Career programs*

Green Career Workshop 1.0:

What's Your Green Career Plan? on **Sat Mar 14**

Green Career Workshop 2.0:

What's Your Green Search Strategy? on **Sat Mar 28**

Held via Zoom, Early Bird through Fri Mar 6, Job Seeker/Student rates

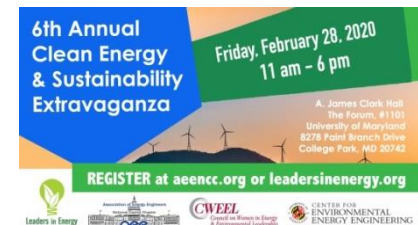
Register at www.waterfordinc.com/green-career-workshops

Led by LE's Director of Training & Development Beth Offenbacher, PhD



[Information Session about Green Career Workshops 1.0 and 2.0](#)

Monday, March 2, 8:00-9:00pm EST via Zoom



PLNT BURGER & LEADERS IN ENERGY AND THE CIRCULAR ECONOMY WORKING GROUP INVITE YOU TO FRIENDS, FUN & FUNDRAISING COMMUNITY NIGHTS MARCH 9TH & 10TH 5 PM - 9 PM

PLNT Burger | 833 Wayne Ave, Silver Spring, MD
(inside Whole Foods Market)

20% of the proceeds from these 2 events will
go to benefit Leaders in Energy's efforts to
emulate nature by closing the loop of resource
use and recycling, where nothing is wasted
and everything serves a purpose!

Say "EAT THE CHANGE" at checkout to get
a FREE small cone with your burger!



Leaders in Energy



6th Annual
Clean Energy
& Sustainability
Extravaganza

Friday, February 28, 2020
11 am - 6 pm

A. James Clark Hall
The Forum, #1101
University of Maryland
8278 Paint Branch Drive
College Park, MD 20742

REGISTER at aeencc.org or leadersinenergy.org



JOIN LEADERS IN ENERGY, DC ECOWOMEN, AND THE ASPEN INSTITUTE GREEN TEAM FOR

WORKING CIRCULAR

- PANEL & NETWORKING -
INCORPORATING CIRCULAR
ECONOMY PRINCIPLES IN THE
WORKPLACE

March 26, 2020

6-8 PM

The Aspen Institute
Free & Open to the
Public



Leaders in Energy

ecowomen
washington, dc



THE ASPEN INSTITUTE

6th Annual
Clean Energy
& Sustainability
Extravaganza

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A: James Clark Hall
The Forum, 3015B
University of Maryland
8276 Point Branch Drive
College Park, MD 20742

REGISTER at aeccc.org or leadersinenergy.org

Leaders in Energy

AECC

CWEL
Center for Workforce
Education & Learning

INSTITUTE FOR
ENVIRONMENTAL
ENERGY ENGINEERING

Keynote Address – Dr. Reinhard Radermacher

Director, Center for Environmental Energy Engineering, University of Maryland-College Park



University Showcase Panel



Greg Farley,
Director of
University
Sustainability,
George Mason
University in
Fairfax, VA



Tanvi Gadhia,
Sustainability
Outreach
Coordinator at
University of
Maryland



**Guy
Kilpatrick,**
Lead
Agricultural
Technician,
UMD Terp
Farm



Marta Woldu,
Sustainable
Transportation &
Bicycle
Coordinator at
the University of
Maryland
Department of
Transportation
Services
(DOTS)



**Andrew
Nixon,**
Sophomore
Electrical
Engineering
major at the
University of
Maryland



Pat Fox,
Senior
Aerospace
Engineering and
Sustainability
student at the
University of
Maryland



**Moderator: Dr. Elvin
Yuzugullu,** Project
Manager, General
Dynamics Information
Technology (GDIT),
Adjunct Professor at
George Washington
University's
Engineering
Management and
Systems Engineering
Department, Leaders in
Energy Zero Waste
Coordinator

Student Research Initiatives



George Mason University

Office of Sustainability

Greg Farley, *Director*
February 28, 2020

Sustainable Mason

- AASHE STARS Gold Rating
- Sierra Cool Schools & Princeton Green Schools rankings
- Over 125 Green Leaf Courses
- Multiple Student Groups
 - *Living Learning Community*
- Greenhouse & Gardens
 - Food production, composting
- Patriot Green Fund (PGF)
 - Student led projects, 80% Infrastructure, 20% research



COURSE OFFERINGS

18 UNDERGRAD DEGREES
& MINORS
GRADUATE DEGREES **5**
+ SUSTAINABILITY
FOCUSED/ RELATED
125 COURSES

2,000  **LBS** PGF success story:
FRESH PRODUCE/ YR & \$20K REVENUE/YR
HYDROPONIC GREENHOUSE

\$100K
ANNUAL FUND 

Climate Action Plan Progress: Campus Highlights



46 MILLION KWH
OF RENEWABLES BOUGHT

3.5⁺
MILLION



**BOTTLES REPLACED
@ WATER BOTTLE
REFILL STATIONS**



**BUILDING
ENERGY**

**23 STORMWATER
MGMT FEATURES**



- 30% per sq ft
- 18% per student

2006-16 GHG REDUCTION
FROM BUILDING ENERGY

LIGHTING



**REPLACED OVER
2,000 BULBS
WITH LED BULBS**



BIKING



Refuse, Reduce, Reuse, Recycle... & Conserve

★ ZERO-WASTE EVENT ★



MEN'S BASKETBALL GAMES

GOAL: 90+% diverted from trash

2019 RESULTS:

Percentage of Diverted Waste 92.3%

➤ % of Recycled Material 59.8%

➤ % of Compost 32.5%

2020: March 4, 2020

Goal: Zero Waste Event *without monitors!*

Goals for 2020 & Beyond

- **Strategic Plan** for Sustainability
 - **Integration** with academic units
 - Institute for a Sustainable Earth (ISE)
- Accelerated **carbon neutrality** (2030) ?
- Post-consumer **composting**
 - Anaerobic **biodigestion**?
- Distributed **renewable energy**
- Transportation reform

IDIA: net-zero/high performance building



Contact us!

Greg Farley

Director of University Sustainability

Email: gfarley@gmu.edu or gogreen@gmu.edu

Phone: 703-993-5315

green.gmu.edu



George Mason University

Office of Sustainability

Greg Farley, *Director*
February 28, 2020

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Email: gfarley@gmu.edu or gogreen@gmu.edu

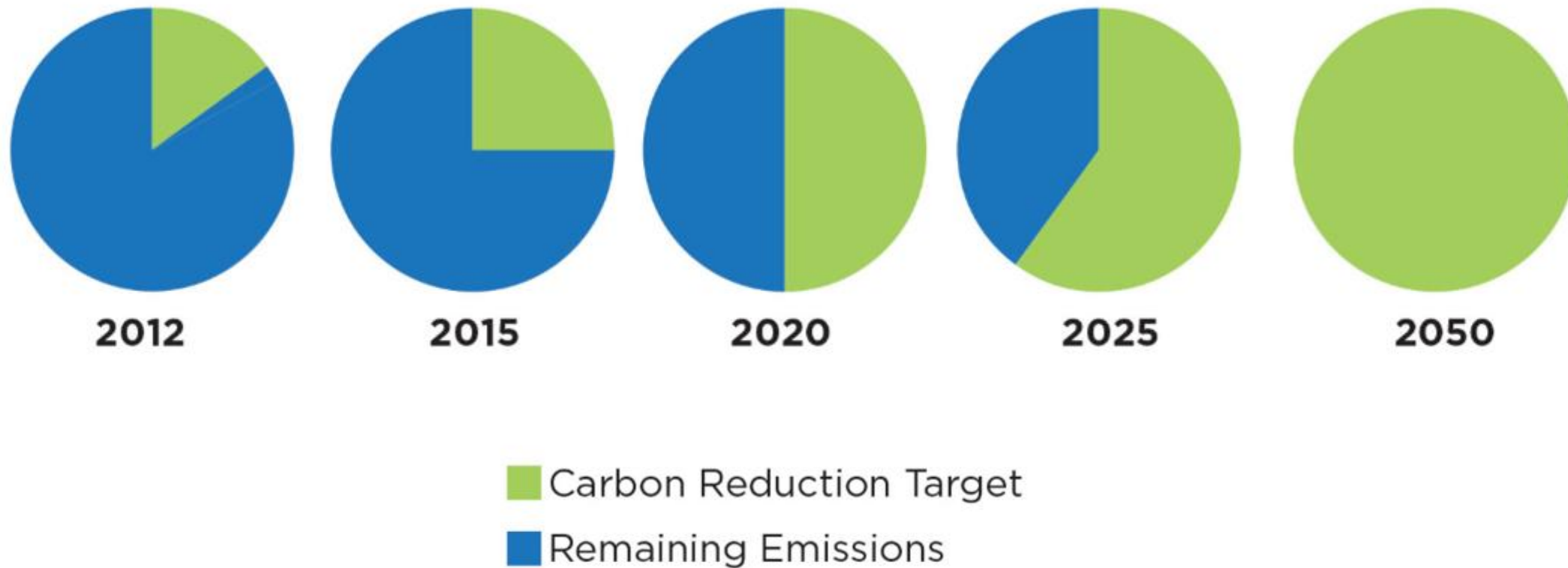
Phone: 703-993-5315

green.gmu.edu



sustainableumd

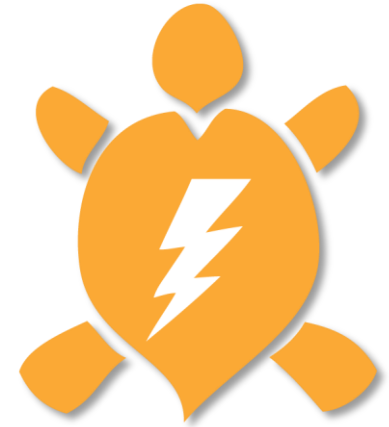
GHG EMISSIONS REDUCTION GOALS



CLIMATE ACTION PLAN 2.0

38 STRATEGIES:

- ENERGY & POWER
- TRANSPORTATION
- WASTE & RECYCLING
- LAND USE
- PURCHASING
- EDU. & RESEARCH



**ESTIMATED TO SAVE \$120 MILLION
& CUT CO² BY 4.3 MILLION TONS
(FROM 2016 TO 2040)**

ON CAMPUS RENEWABLE ENERGY

Campus buildings and parking areas generated **1.5 million kWh** of renewable energy in 2017 from the almost **3 MW of solar panels** mounted on the **Severn Building, Terrapin Trail, Mowatt Lane, and Regents Drive parking garages**, and the parking lot at the **Institute for Bioscience and Biotechnology Research**.



OFFSETS FOR AIR TRAVEL





**40% LESS CHEMICALS
75% WATER SAVED
>\$10,000 SAVED**

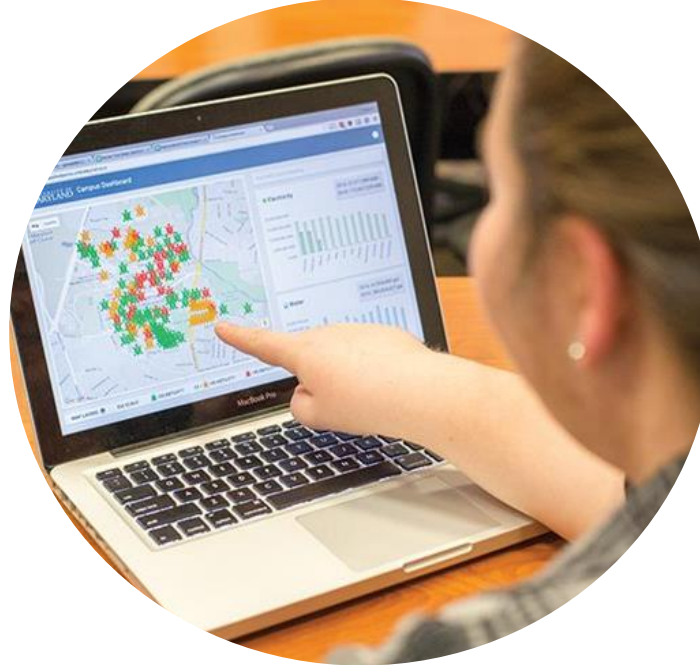


POOL WATER TREATED WITH MOSS

CAMPUS AS A LIVING LAB



Stormwater Maryland
Sustainability Engineering



Energy Dashboard
Center for Sustainability in the
Built Environment



Energy Audits
Center for Environmental
Energy Engineering

SUSTAINABILITY OUTREACH

**Green Office
Interns**

**Outreach
Interns**

Teaching Fellows

**Sustainability
Advisors**

GO Reps

Ambassadors

Chapter Chairs

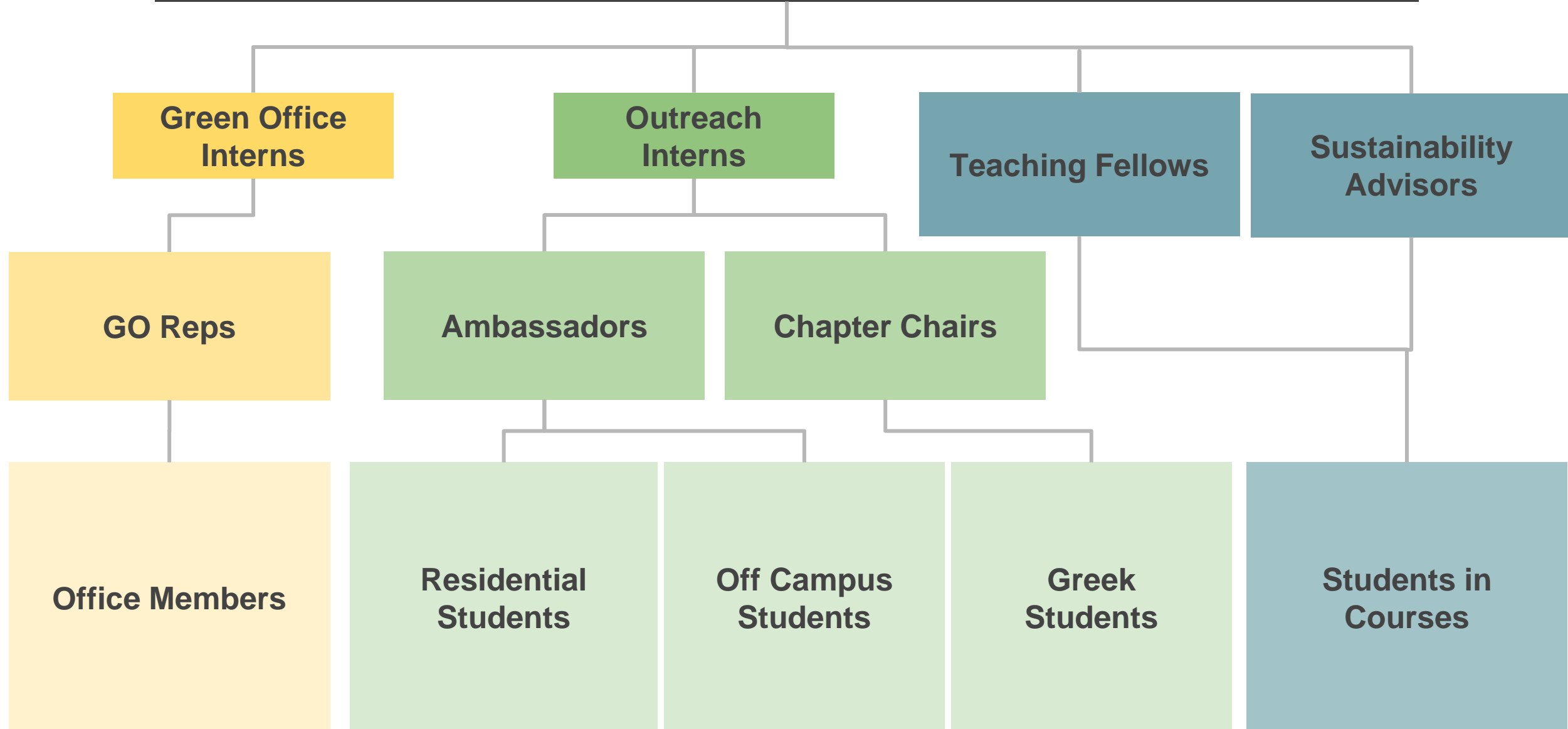
Office Members

**Residential
Students**

**Off Campus
Students**

**Greek
Students**

**Students in
Courses**





CONTACT US

sustainability@umd.edu

sustainability.umd.edu



The University of Maryland Terp Farm



History and Goals

Sustainable Food Commitment

- 1-4% annual increase in sustainable foods purchases (meeting the criteria identified for sustainable food categories including local, fair, humane, and ecologically sound) based on financial feasibility and product availability
- Annual, incremental increases in sourcing from local growers, with special emphasis on Maryland growers and harvesters
- Annual, incremental increases in sourcing unprocessed, whole foods
- 20% sustainable food by 2020

Sustainable Food Action Plan

- Mitigate environmental impact by using local and sustainable food sources
- Leverage buying power to encourage availability of healthier food choices
- Make changes in healthy food availability and promotion to increase UMD community health and wellness
- Promote community engagement and education about sustainable food issues

History and Goals



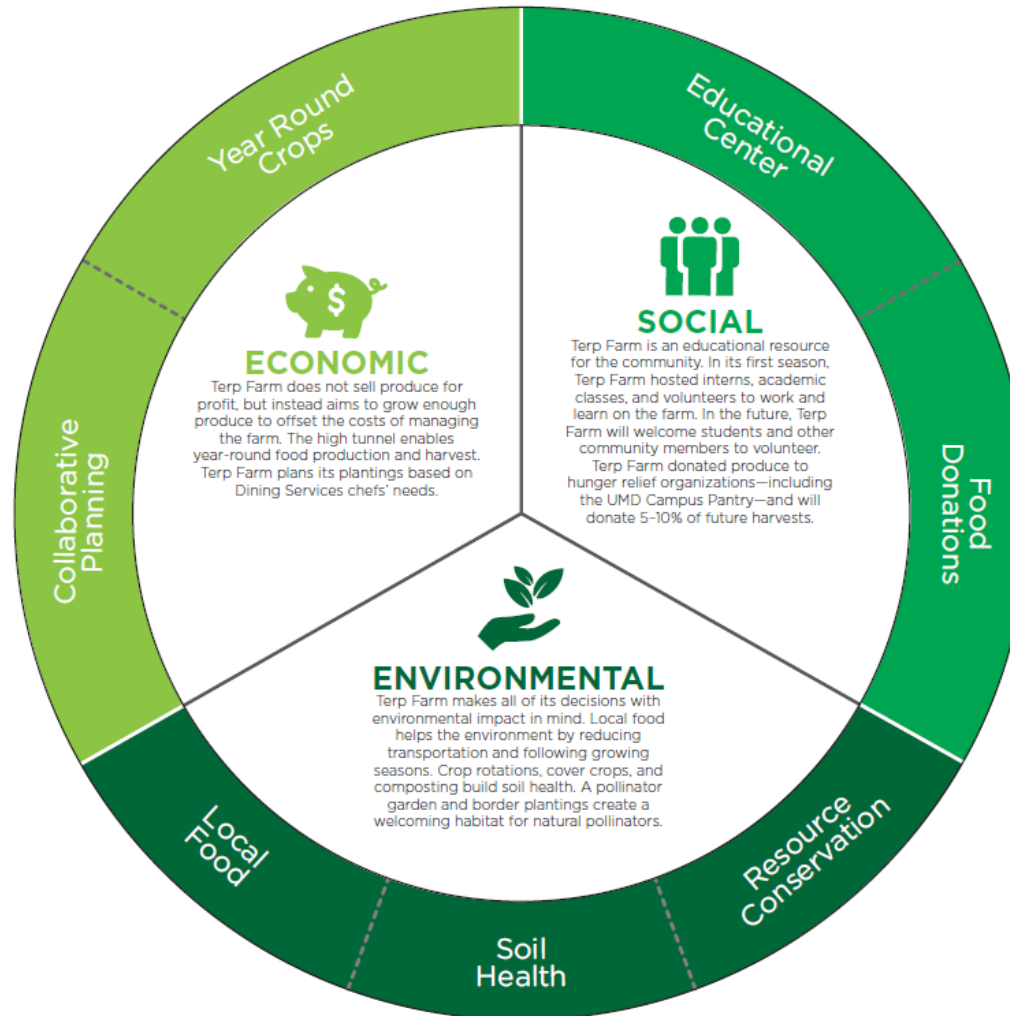
- The Student Sustainability Fund is supported by student fees and administered through a student-majority subcommittee of the University Sustainability Council

Motivated by student interest in:

- Food Systems
- Climate Change
- Farm-based Education

SUSTAINABILITY AT TERP FARM

Terp Farm is supported by the University Sustainability Fund, and our mission is to be a model of environmental stewardship. Here's how we practice sustainability on Terp Farm.



Partnerships

Primary



Secondary

- Other campus departments
 - Student Affairs
 - Honors College
 - Scholars Program
 - School of Public Health
 - And more
- Future Harvest – Chesapeake Alliance for Sustainable Agriculture
- Maryland Department of Agriculture
- Accokeek Foundation
- Chesapeake CRAFT







UNIVERSITY OF MARYLAND

Guy Kilpatric, Terp Farm Manager

1109 South Campus Dining Hall, College Park, MD 20742

240.688.9133 / ghkilpat@umd.edu

Sustainable Transportation at the University of Maryland

— Marta Woldu —

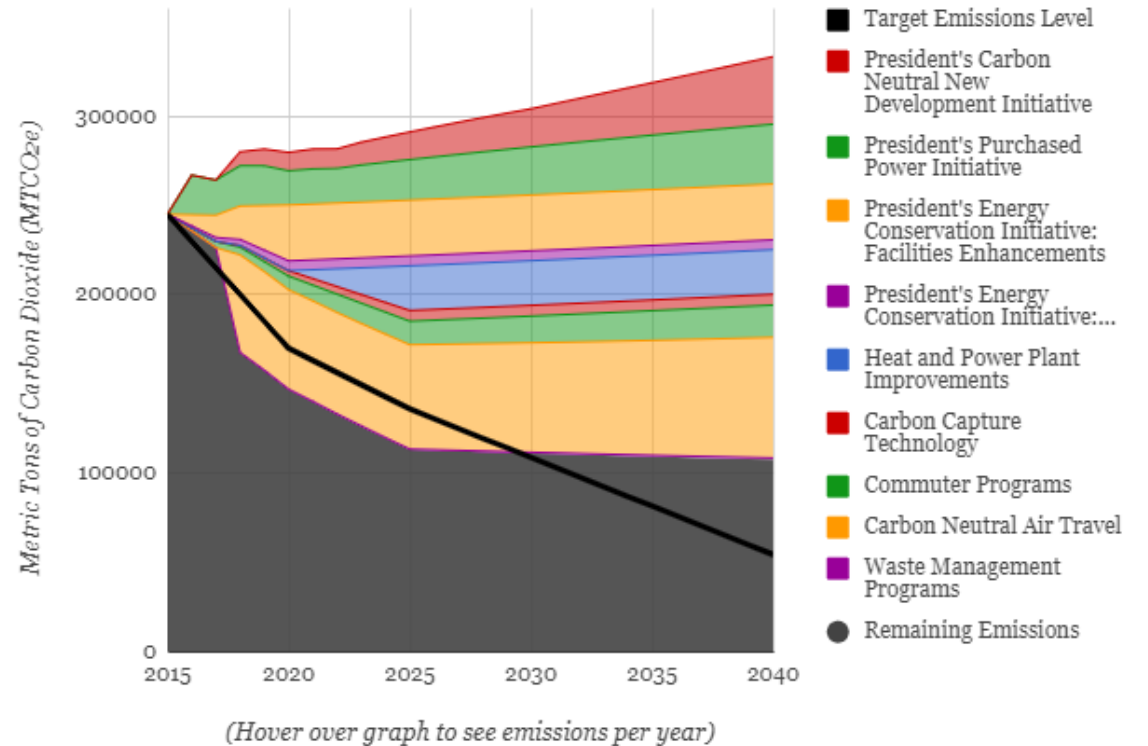


TRANSPORTATION
SERVICES

Climate Action Plan Strategies - Commuting

- Transportation Demand Management
- Undergrad commuting offset goals
- Increase use of carpools and vanpools
- Student Housing On and Near Campus
- Purple Line Light Rail Service
- Bicycle Connectivity
- Improve Fuel Efficiency of Commuter Vehicles
- Electric Vehicle Charging Stations
- Offer Voluntary Carbon Offsets

UMD's Carbon Reduction Strategies

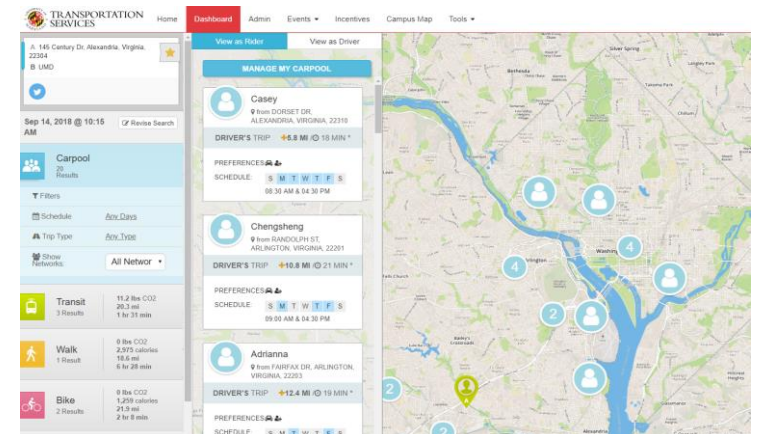


Smart Commute

Rethink Your Ride



- Toolbox of transportation incentives and programs that empower commuters to leave their cars at home
 - RideAmigos Platform - Rewards Program, Trip Planning Carpool Matching
 - Parking Cash Out Program
 - Pre-Tax Transit Deductions
 - Carpool/Vanpool Permit Discounts
 - Guaranteed Ride Home
 - Bike Commuter Incentive Program
 - Rideshare (car, bike, scooters)



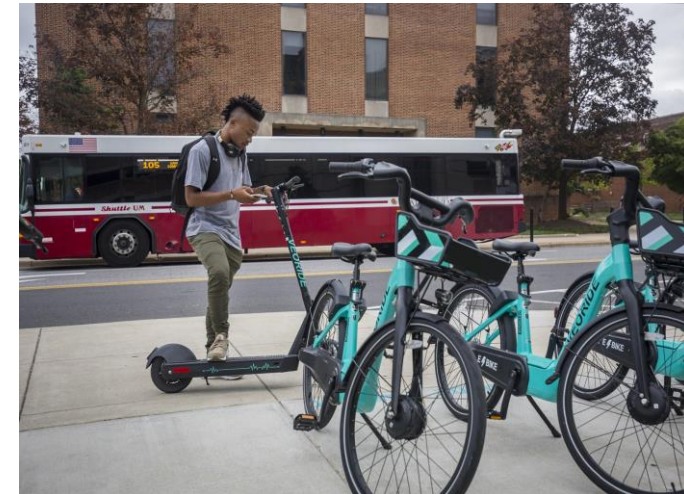
Shuttle-UM

- Fleet size: 88 | FY19 Ridership: 3 million +
- 25 Commuter Routes
- 24/7 Paratransit Service
- Nite Ride Service
- Grant applications for Electric Bus Fleet



Bicycle Friendly University

- **6 Es** - Education, Encouragement, Enforcement, Engineering, Evaluation, and Equity
- New efforts in micro-mobility programs
- Improving connections on campus and with neighboring jurisdictions



Garage Rooftop Solar Canopies



- Facilities Management Project
- Installed in 2017
- Mowatt, Regents, and Terrapin Trail Garage
- Generated 5.69 GWh to the grid to date



UMD Solar Dashboard - sustainability.umd.edu

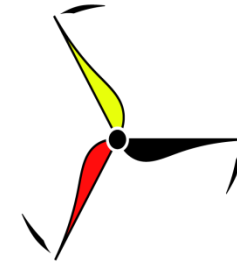
Marta Woldu
UMD Department of Transportation Services
TDM and Bicycle Coordinator
mwoldu@umd.edu



TRANSPORTATION
SERVICES



A. JAMES CLARK SCHOOL OF ENGINEERING



MARYLAND
WIND
TERPINES

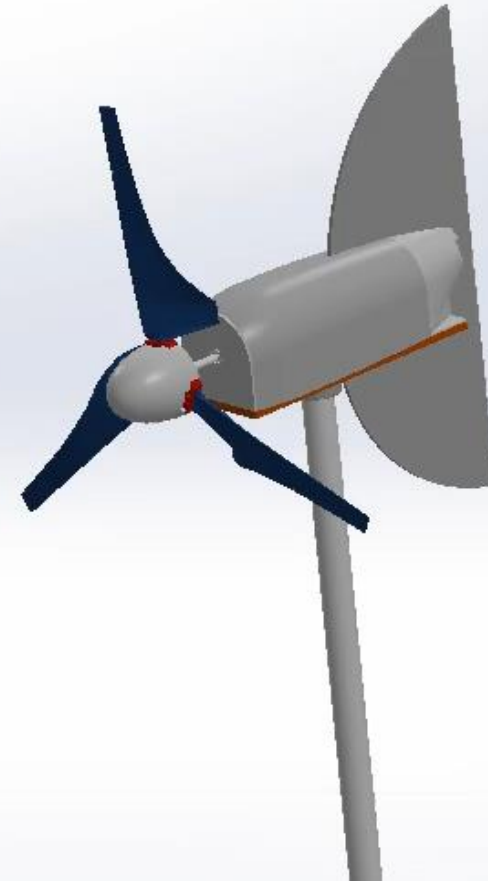


Andrew J. Nixon

University of Maryland :
Electrical Engineering

anixon13@terpmail.umd.edu

254-654-2988



A person in a blue shirt is seen from behind, standing in a large green field and flying a kite. The kite is yellow and blue and is high in the sky. In the background, there is a large, modern building with a brick section on the left and a glass section on the right. The sky is blue with scattered white clouds. The text "The UMD Kite Energy Project" is overlaid in large green letters across the bottom half of the image.

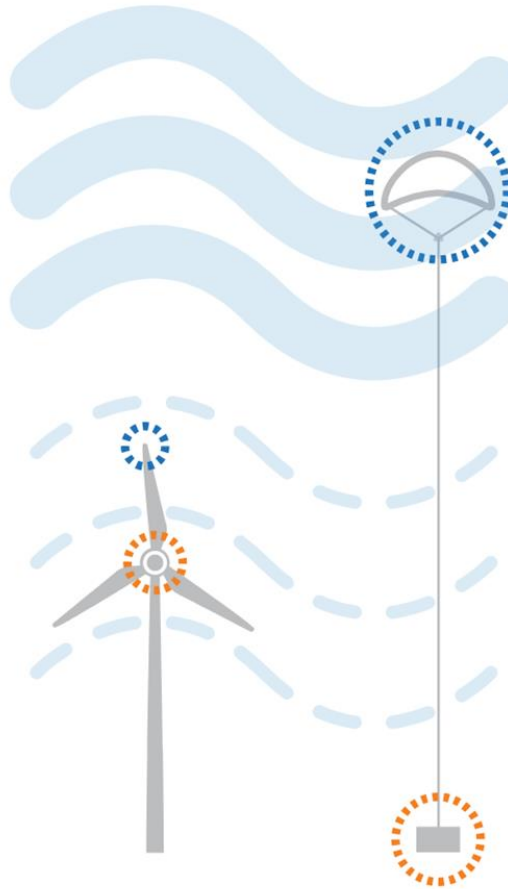
The UMD Kite Energy Project

Camilo testing kites at UMD's engineering field.

Introduction To Kite Energy



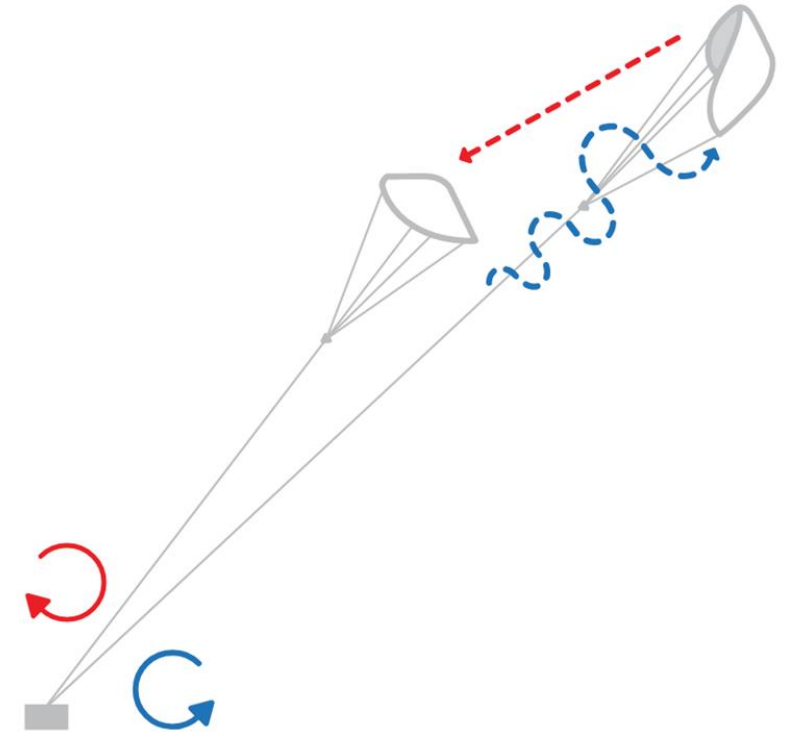
TAKING ONLY THE BEST OUT OF WIND TURBINES



||||| Drum/Generator

||||| Lifting Surface

PUMPING CYCLE OPERATION



■ Traction = Reel Out = Energy Production

■ Retraction = Reel In = Energy Consumption

What's Our Project? Our Goal?



Establish a well-funded research group to develop a kite wind energy testbed system at UMD.

But Why?

Renewable energy is necessary for a sustainable future.

- Cost of Energy is critical for changing market
- Great potential to radically change how wind energy is generated
- UMD is an ideal university to do this.
- Severely under-researched field, with very little investment in the U.S.



Why Wind Energy Is Important

Comparison of habitat impacts of wind energy to other energy sources [17].

Habitat impacts	Coal	Natural gas	Oil	Nuclear	Hydropower	Wind
Air and water pollution	✓	✓	✓			
Global warming	✓	✓	✓			
Thermal pollution of water				✓		
Flooding of land					✓	
Waste disposal	✓			✓		
Mining and drilling	✓	✓	✓	✓		
Construction of plants	✓	✓	✓	✓	✓	✓

Technology	gal/kWh
Nuclear	0.62
Coal	0.49
Oil	0.43
Combined cycle gas	0.25
Wind	0.001
Solar	0.030

Less environmental impact!

Advantages of Kite Energy



Wind Turbines

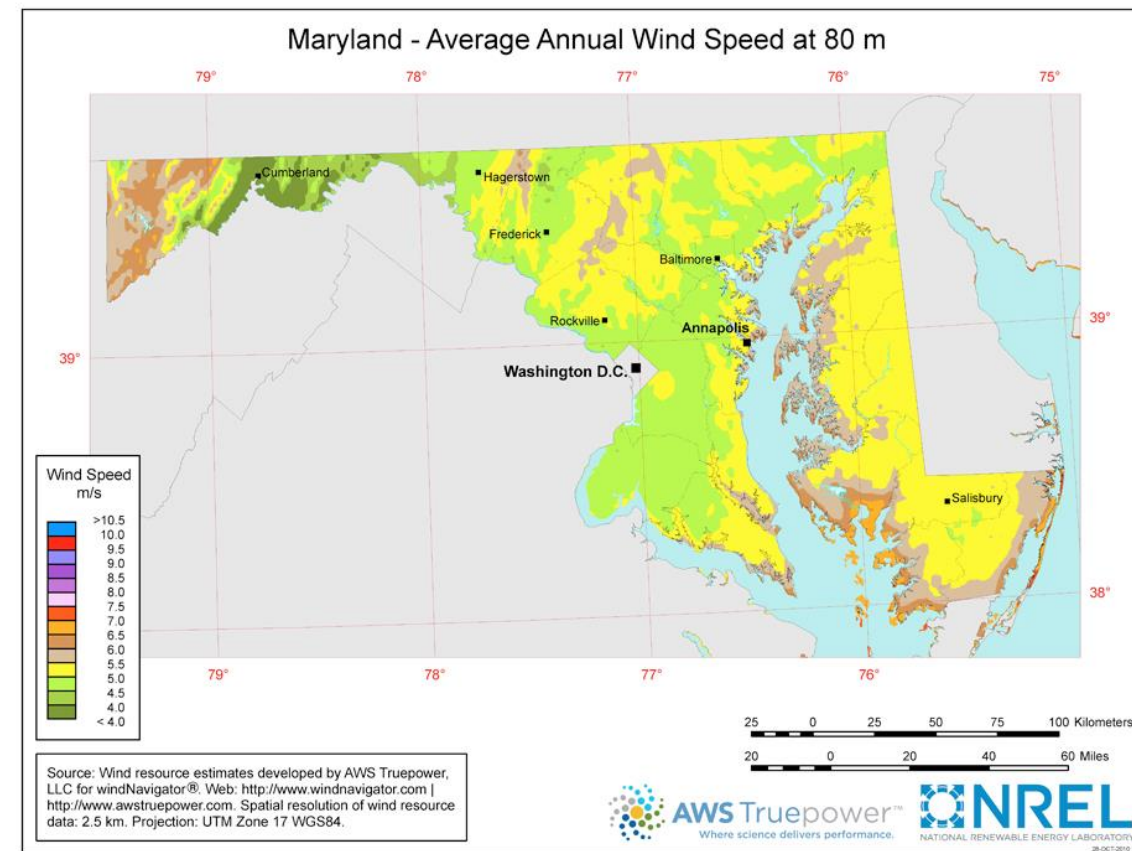
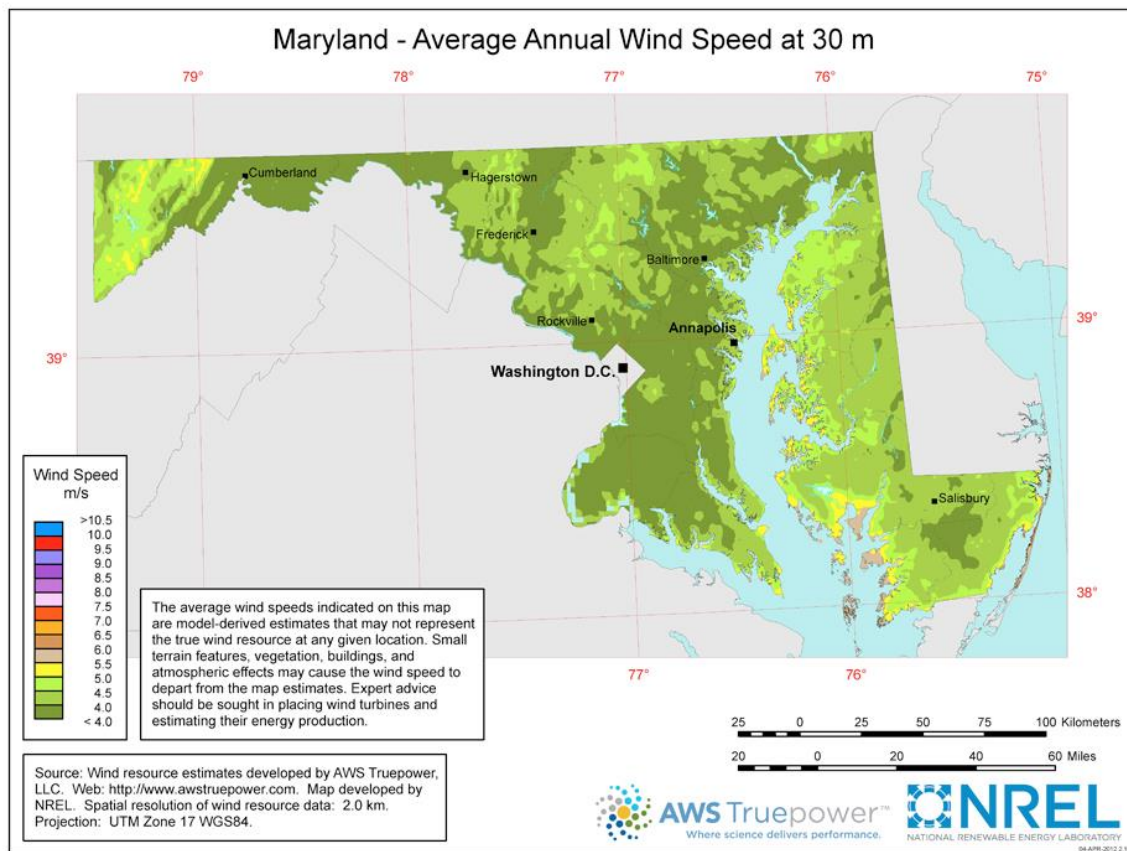
- Restricted height limits wind harnessed to inconsistent low-altitude winds
- Expensive building materials
- Vulnerable to extreme weather events
- Requires robust anchoring
- Limited to shallow offshore areas
- Fixed location
- Potential eyesore
- Harms wildlife

Kite Generators

- Can take advantage of persistent high-altitude winds
- Low material requirements
- Operational in weather events, or can be retracted to be redeployed later
- Floating platforms only need simple weight anchoring
- Deployable far offshore
- Mobile generator base
- Further removed from eyesight
- Potentially safer for wildlife



Advantages of Kite Energy

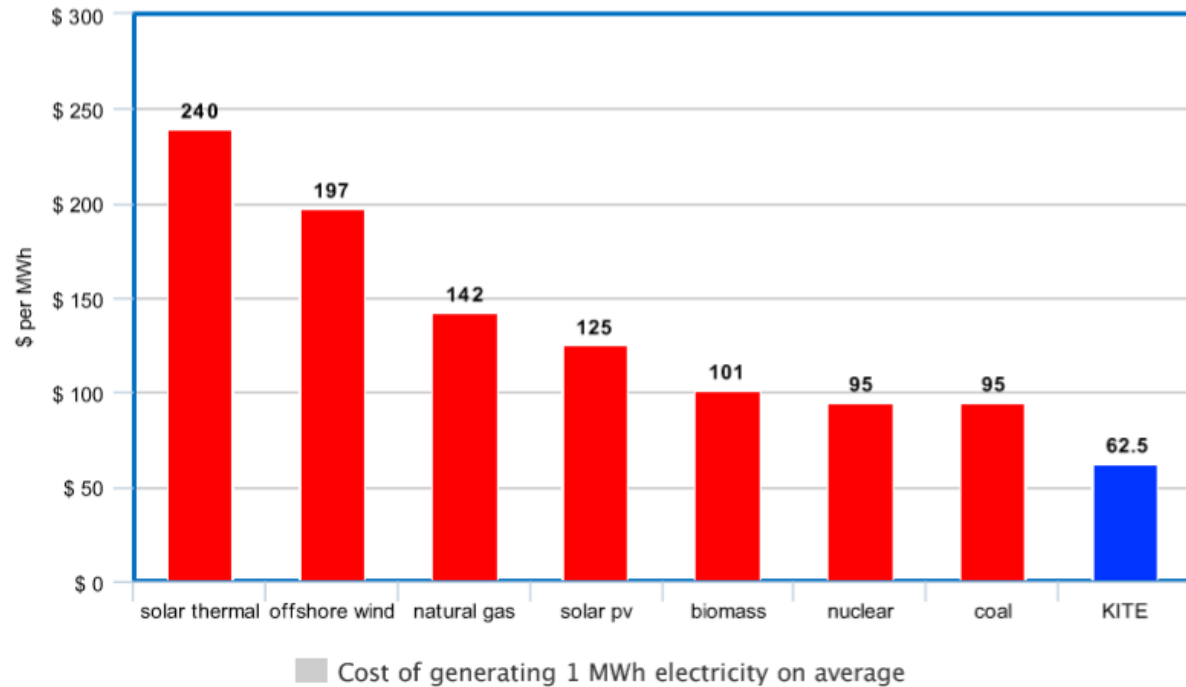


<https://earth.nullschool.net/>

<https://windexchange.energy.gov/states/md#maps>

Infographics

Cost of electricity from different sources
https://en.wikipedia.org/wiki/Cost_of_electricity_by_source



Source for KITE \$/MWh: <http://www.kps.energy/kite-power-systems-secures-2m-investment-from-scottish-investment-bank/>

Onshore Wind Turbine

- less expensive than offshore wind turbines
- depend heavily on wind speed and direction
- may harm animals



Offshore Wind Turbine

- don't require land usage
- more prone to damage from ocean and wind, thus higher maintenance cost
- need to be in shallow water



KITE

- can be deployed in a short time(1 day)
- cheaper energy compared to offshore wind turbine
- improvement to the technology is needed



Current Research



Figure 3: Crosswind device with on-board generation.
Image: Makani



Figure 4: Crosswind device with ground-based generation. Image: KPS

Company	Location	Wing Type	Generation	TRL	Device Scale
Makani	USA	Hard	On-board	7	600kW
Ampyx	Netherlands	Hard	Ground	5-6	250kW*
KPS	UK	Soft Rib	Ground	5-6	250KW*
Kitepower	Netherlands	Soft	Ground	5	100kW
Enerkite	Germany	Hybrid	Ground	4	100kW*
TwingTec	Dubendorf	Hybrid	Ground	4	100KW*
E-Kite	Netherlands	Hard	Ground	4	100kW*
Skysails	Germany	Soft	Ground	4**	1.5MW
Kitegen	Italy	Soft	Ground	4	40kW

Table 1: Airborne wind developers and TRLs

* In production

** Generator at TRL 4, kites currently used in shipping propulsion at 1.5MW, and not for electricity generation,

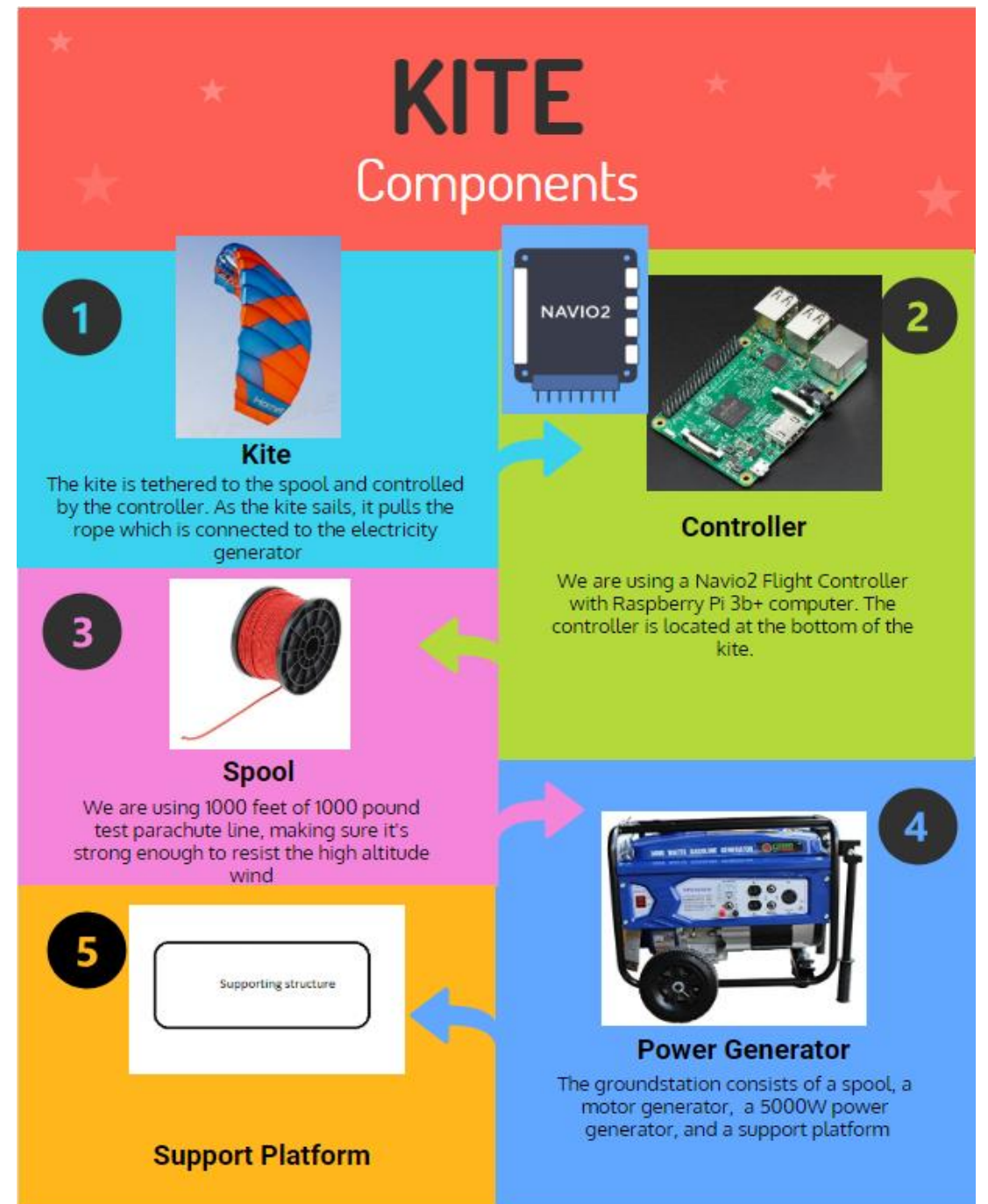
Mann, Stephanie. *An Introduction to Airborne Wind: Technology and Cost Reduction Trends*, Offshore Renewable Energy Catapult, 2019.

Our Proposal

Initial Design

- Low-Cost hardware setup aimed at making it easier for universities to begin their own research into AWE
- 5 meter Kite
- Integrated controller hardware
- Estimated 5 kW theoretical power generation
- Autonomous kite system using existing control technology

$$P = \frac{2}{27} \rho A \frac{c_L^3}{c_D^2} w^3.$$



Thanks to Our Showcase Refreshment Sponsor

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Leaders in Energy

Association of College Engineers

CWEEL
Center for Environmental & Energy Leadership

CENTER FOR ENVIRONMENTAL
ENERGY ENGINEERING

5 Minutes to a Better Building



Julie Wolfington

Energy & Sustainability Leader

BOLAND

Outside Factors

Economy

Political climate

Market

Regulatory

Business goals

Functional
building needs

Occupant
needs

Technology

Inside
Factors

BOLAND

5 Steps to YOUR Better Building

1. Communicate business goals across your organization
2. Determine a building baseline
3. Evaluate internal and external factors
4. Set building goals accordingly
5. Develop a plan

BOLAND

☎ (240) 306-3000

✉ info@boland.com

🌐 www.boland.com



BOLAND

Business Showcase Panel



Sean Casey,
Energy
Engineer,
AECOM



Tom Horner,
VP and Co-
founder, Water
Management



**Aakansha
Lam,**
Founder, and
Managing
Director of
Energy
Scalable



**Mike
Makofsky,**
Northeast
Regional
Manager
of Shannon
Global
Energy
Solutions,
Inc



Eric Oliver,
Founder of
Earthwide, LLC



**Moderator:
Cara Martin,**
COO, Optimized
Thermal Systems,
Inc.

Mr. Sean Casey

AECOM

Engineering
Manager –
AECOM

8+ years
experience in the
energy sector

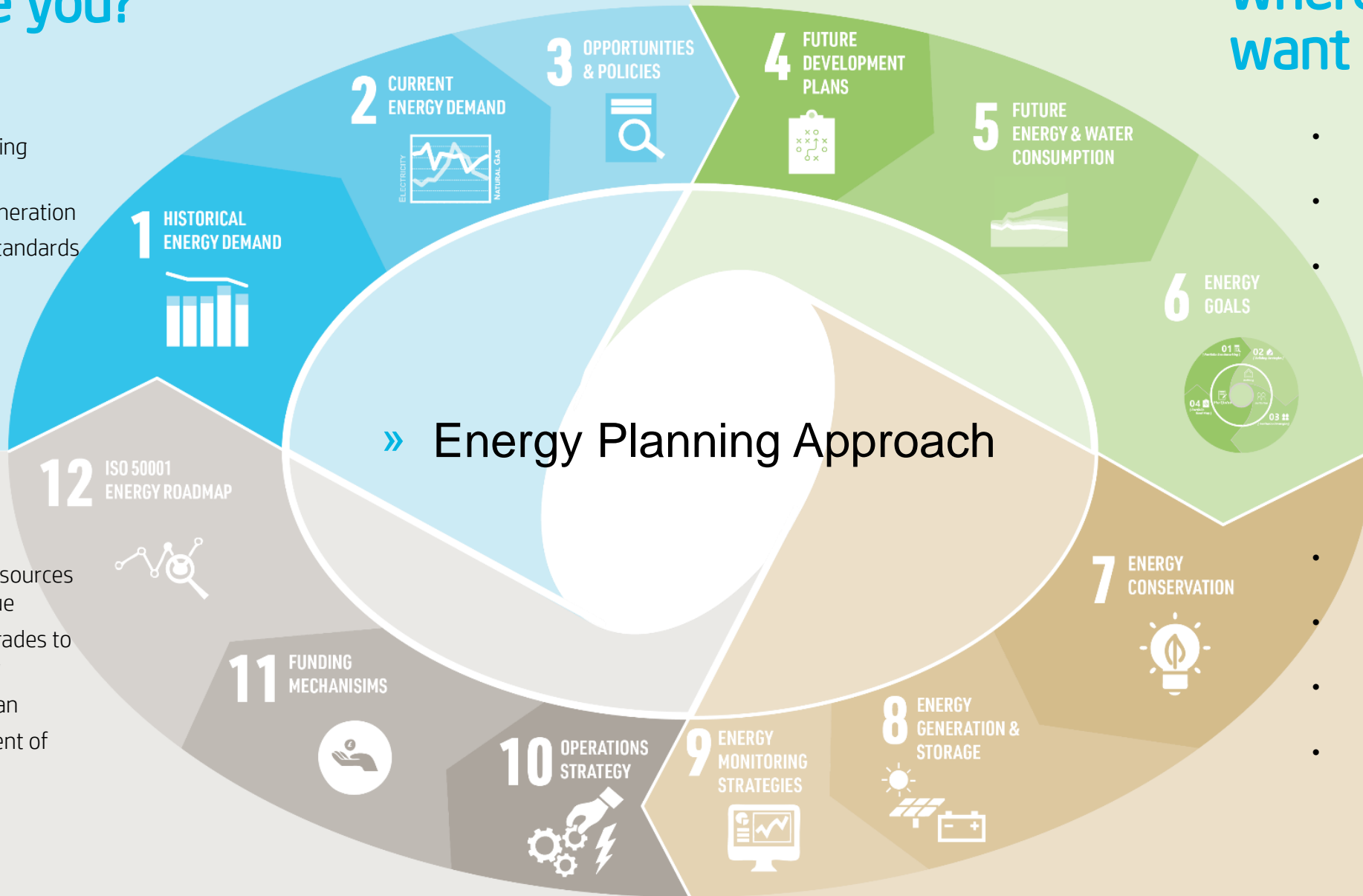
- Provides energy and environmental program management support
- Energy engineer for strategic energy master planning
- Leads energy resilience assessments for DOD/IC

Washington
Capitals fan
(Let's Go Caps!)



Where are you?

- Assess energy-using systems
- Assess on-site generation
- Evaluate design standards



Where do you want to go?

- Evaluate CU's sustainability goals
- Evaluate Federal/State/City goals
- Define resiliency

What are your opportunities?

- Evaluate renewable generation and storage
- Quantify efficiency opportunities
- Coordinate with local utility programs and incentives
- Recommend smart energy applications, including EnMS

How do you get there?

- Identify alternate sources of funding/revenue
- Recommend upgrades to support resiliency
- Develop action plan
- Assess engagement of students

Energy Management Strategic Vision



SMART ENERGY



Boston Smart
Utilities Vision
Boston, MA



SMART MOBILITY



Smart
Electrified
Mobility
IL State



SMART WATER



Pumping
Station
Electrification
Chicago, IL



SMART PUBLIC SERVICES



Bronzeville
Community of
the Future
Chicago, IL



SMART BUILDINGS & CAMPUSES



University of
Colorado
Boulder Energy
Master Plan
Boulder, CO

The creation of a robust energy management strategic vision requires a practiced and progressive methodology, empowered by analytical rigor, but also flexible to adjust priorities and capture unique program opportunities.

Thank you

Questions?

For more information, contact:

Sean Casey CEM, LEED AP

Team Manager,
Advanced Energy Solutions
AECOM

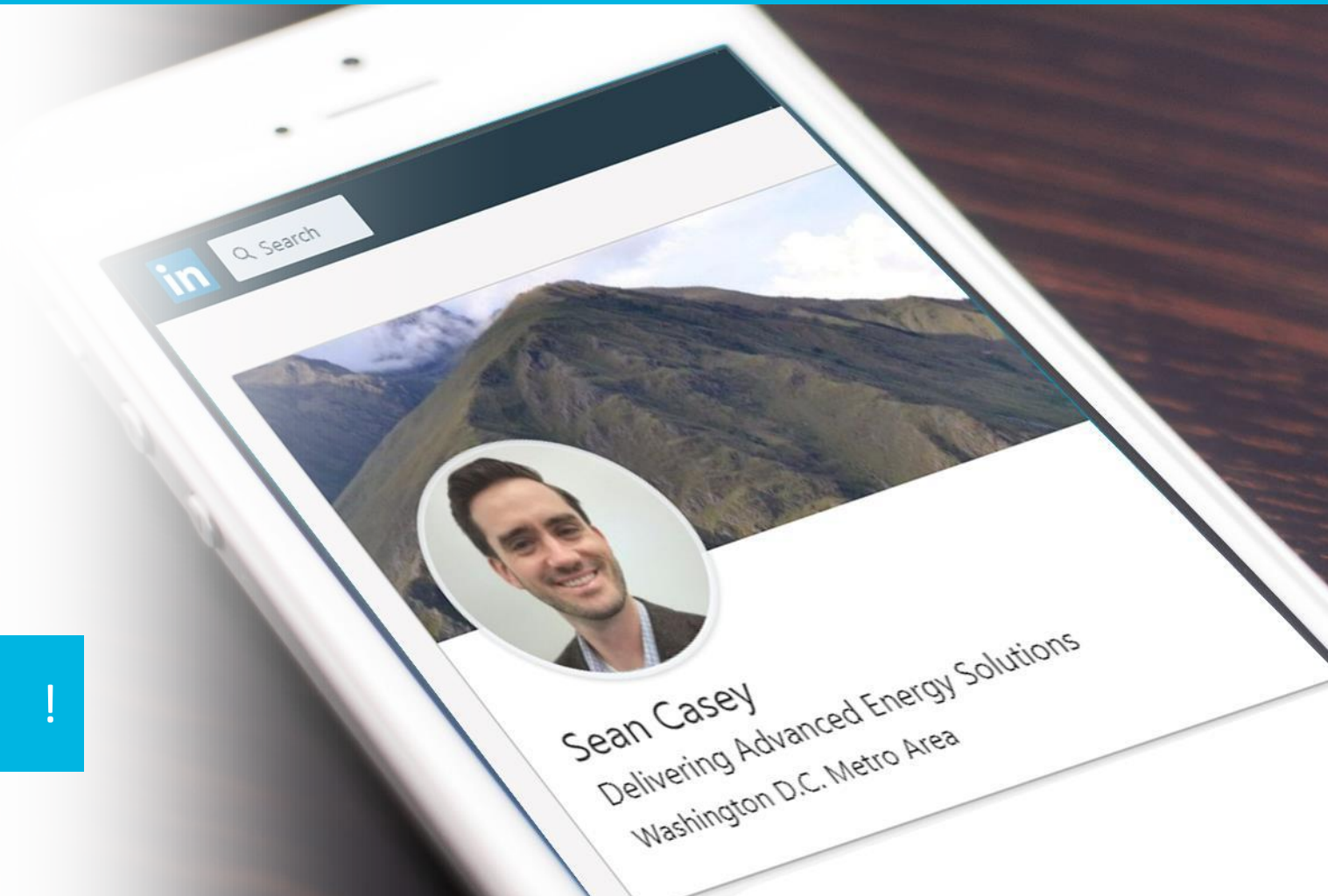
[Email: Sean.Casey@aecom.com](mailto:Sean.Casey@aecom.com)

Phone: (202) 930-3399



Connect with me on

!



Water:
The Most Important
Substance Known to Man
and Womankind

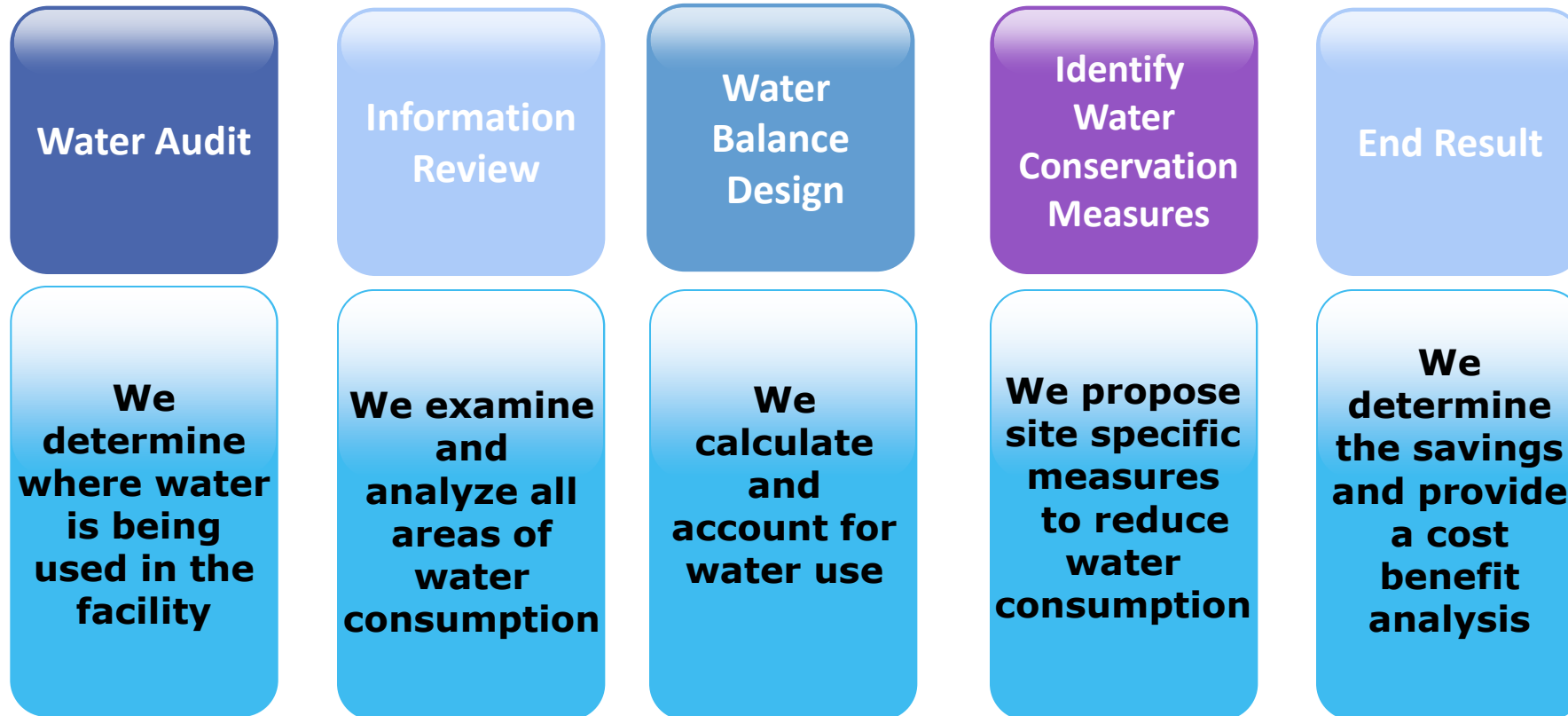
Thomas Horner
Water Management, Inc.



703-370-9070
tom_horner@watermgt.com

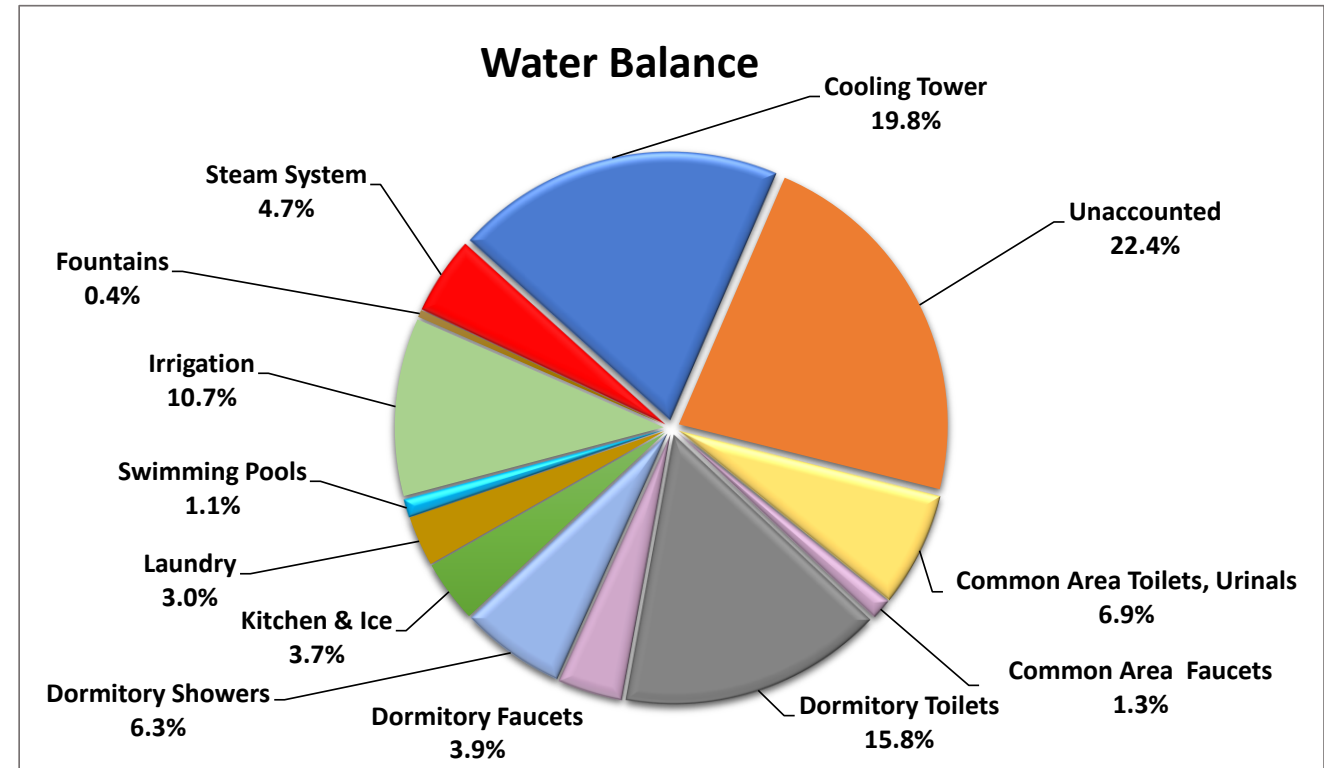


Steps in a Water Management Program





Water Balance	% of Total Use	Consumption (gallons)
Common Area Toilets, Urinals	6.8%	6,031,440
Common Area Faucets	1.3%	1,112,500
Dormitory Toilets	15.8%	13,908,830
Dormitory Faucets	3.8%	3,388,203
Dormitory Showers	6.3%	5,531,760
Kitchen & Ice	3.7%	3,288,504
Laundry	3.0%	2,657,200
Swimming Pools	1.1%	956,059
Irrigation	10.7%	9,405,116
Fountains	0.4%	375,287
Steam System	4.7%	4,107,418
Cooling Tower	19.7%	17,355,148
Unaccounted	22.3%	19,712,248
TOTAL		88,205,000



2018 Rates = \$1,392,000, at 2019 Rates = \$1,550,000

Our Customers Demand

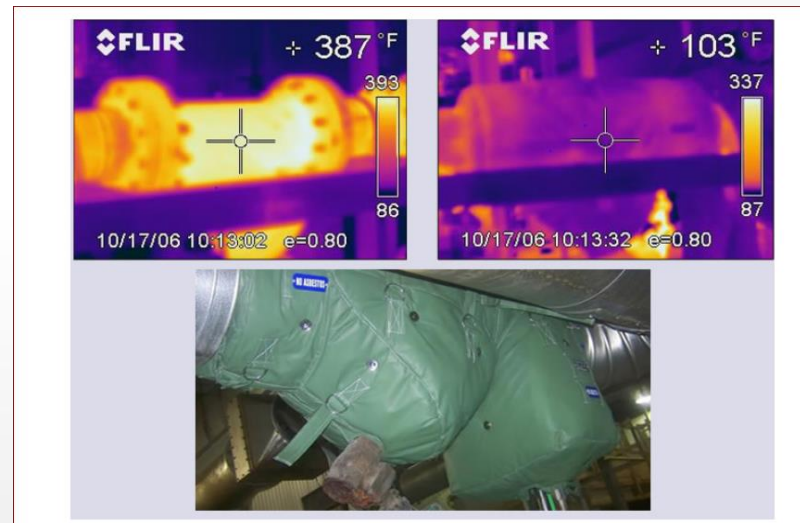
- ✓ *Energy Efficiency*
- ✓ *Sustainability*
- ✓ *Low Paybacks*
- ✓ *Resiliency*
- ✓ *Safety*

Let's Rethink How We Can *Easily & Affordably* Get There – Ready?

Cost Analysis

Surface Area is Compelling

Bare Fittings	LF Bare Pipe	Facility Size	Investment	Annual Savings
60	334	Mechanical Rm	\$18,000	\$12,000
600	3,340	Hospital	\$180,000	\$120,000
1600	8,896	Small College	\$480,000	\$320,000
3200	17,792	University	\$960,000	\$640,000
6400	35,584	Large Campus	\$1,920,000	\$1,280,000



Return on Investment -

Financial results	10 Years	15 Years
Payback Period	22.2 Months	22.2 Months
Net Present Value Project	\$ 162,214	\$ 209,855
Return On Investment (ROI) Including Operating Cost	53%	53.0%
Return on Investment (ROI) Simple – No Operating Costs	60%	60%
Cash Flow	\$ 253,893	\$ 413,705



How many people would invest \$200,000?

- 20 month payback
- Internal Rate of Return (IRR) 63%
- Annual Energy Savings \$175,000 for 15 years

What other projects deliver IRR 63%?



Energy Survey Sample

Presented By: Shannon Global Energy Solutions
Phone/Email: (716) 693-7954
Project Name: Sample Steam System
Project Contact:
Phone/Email:
Shannon Project #: 2535

Survey Date: 7/18/2019
Proposal Date:
Fuel Cost (\$/mmBTU): \$9.60
Steam Cost: \$12.80
Product Specification: (M) LT450TT
Insulation Thickness: 1.5 Inches
Fastener Type: (M) Velcro® Flaps/Wiretwists

QTY	Description / Location	Amb. Temp	Meas. Surface Temp	Operating Hours	Bare Heat Loss (BTU/Hr)	Bare Oper. Cost (\$/Year)	Insulated Heat Loss (BTU/Hr)	Insulated Oper. Cost (\$/Year)
Main Boiler Room								
3	Valve, Gate, 150#	90	360	8760	23,916.06	\$2,681.66	2,104.95	\$236.02
3	6" 300# Stop Check Valve	90	360	8760	39,463.20	\$4,424.93	3,473.31	\$389.46
6	44" Dia. Steam Drum (6"-10" Deep)	90	345	8760	108,201.60	\$12,132.43	10,667.76	\$1,196.15
6	44" Dia. Mud Drum (6"-10" Deep)	90	330	8760	101,836.80	\$11,418.76	10,040.25	\$1,125.79
Steam Header								
6	Valve, Gate, 150#	90	350	8760	23,362.56	\$2,619.60	2,303.35	\$258.27
4	Valve, Globe, 150#	90	350	8760	15,575.04	\$1,746.40	1,535.57	\$172.18
2	Flange, 150#	90	345	8760	10,874.53	\$1,219.34	1,072.14	\$120.22
Steam Tunnel								
6	Exp. Joint, Single	90	342	5834	22,837.25	\$1,705.38	2,251.56	\$168.14
4	Valve, Gate, 150#	90	342	5834	18,321.41	\$1,368.15	1,806.34	\$134.89
3	Blind Flange Cap, 300#	90	348	5834	7,928.06	\$592.03	781.64	\$58.37
PRV Station to Deaerator								
1	Strainer, 150#	110	325	8760	3,219.84	\$361.03	317.45	\$35.59
1	Pressure Reducing Valve, 150#	110	325	8760	6,123.20	\$686.58	603.70	\$67.69
1	Valve, Globe, 150#	110	315	8760	3,070.08	\$344.24	302.68	\$33.94
1	Flange, 150#	110	315	8760	2,784.90	\$312.27	274.57	\$30.79
1	Valve, Gate, 150#	110	315	8760	3,070.08	\$344.24	302.68	\$33.94

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Energy Survey Summary

Total Heat loss - Bare (BTU/Year):	3,277,893,469.42
Total Heat loss - w/ Insulation (BTU/Year):	317,299,858.47
Heat loss Savings - w/ Thermal Blanket (BTU/Year):	2,960,593,610.95
Total Annual Operating (Steam Cost) - Bare:	\$41,957.04
Total Annual Operating (Steam Cost) - w/ Insulation:	\$4,061.44
Annual (Steam Cost) Savings - w/ Thermal Blanket:	\$37,895.60
*Lifetime (Steam Cost) Savings (15 Yrs):	\$537,402.96
Total Cost (Thermal Blanket System):	\$26,231.01
Installation (By Shannon):	\$4,800.00
Total Cost:	\$31,031.01
Payback (Months):	10
Number of Fittings:	48

Emissions Savings #1 Natural Gas (mm BTU):	2960.59	Emissions Savings #2 #6 Fuel Oil (mm BTU):	2960.59
CO2 (tons)	444.21	CO2 (tons)	264.43
NOx (lbs)	444.21	NOx (lbs)	1163.55
N2O (lbs)	6.42	N2O (lbs)	< 0.05 Lbs
SO2 (lbs)	1.66	SO2 (lbs)	3318.72
PM10 (lbs)	5.47	PM10 (lbs)	211.40
VOC (lbs)	15.93	VOC (lbs)	34.01
CO (lbs)	71.10	CO (lbs)	105.82

Heat Loss Calculation $Q = K (\Delta T) / L + (K / Ht)$

Q	=	Heat loss (BTU / Hr / SF)
K	=	Bare Surface Thermal Conductivity (K = 26.9)
ΔT	=	Surface Temp - Ambient Temp
L	=	Insulation Thickness
K	=	Insulated Surface Thermal Conductivity (K = 0.525 @ 300°F)
Ht	=	Combined Coefficients (Ht = 3.2 @ 300°F) (Radiation, Convection & Conduction)

Plant Conditions

Perform Energy Survey

Best Practice

Calculate the ROI

ROI

Pay Attention to the “Un-Insulated” Surfaces

Treat All Surfaces

Methodology

Apply a “Proven” Design Standard

Relationship

Assure a Quality Installation

Specification

Nomenclature

Manage the System (Check every 2-3 yrs)

Applications

Contact Information



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Mike Makofsky, North East Regional Manager
(VT – DC)

Email: mmakofsky@shannonglobalenergy.com

Website: www.shannonglobalenergy.com



Earthwide, LLC

because Global
problems require
Earthwide solutions

Most climate scientists now agree that the tipping point for irreversible climate change is here or almost here. The major governments of the world are not doing enough to mitigate human-related impacts, leaving the solutions to us. At Earthwide we focus solely on reducing CO₂ emissions to protect the environment for future generations



A focus on reducing CO₂

ENERGY AND SUSTAINABILITY MASTER PLANNING

We will work with your organization to develop a 10-year Master plan for cost-effectively reducing energy and water consumption and improving your organization's sustainability.

- Energy and Water Assessments
- Renewable Energy Analysis
- Sustainability and Environmental Impact Analysis
- Net-Zero Energy Action Plan

CO₂ REDUCTION PLANNING

We will provide you with a Baseline study detailing exactly how many tons of CO₂ you are responsible for, and develop a 10-year plan for reducing your net climate impact to zero.

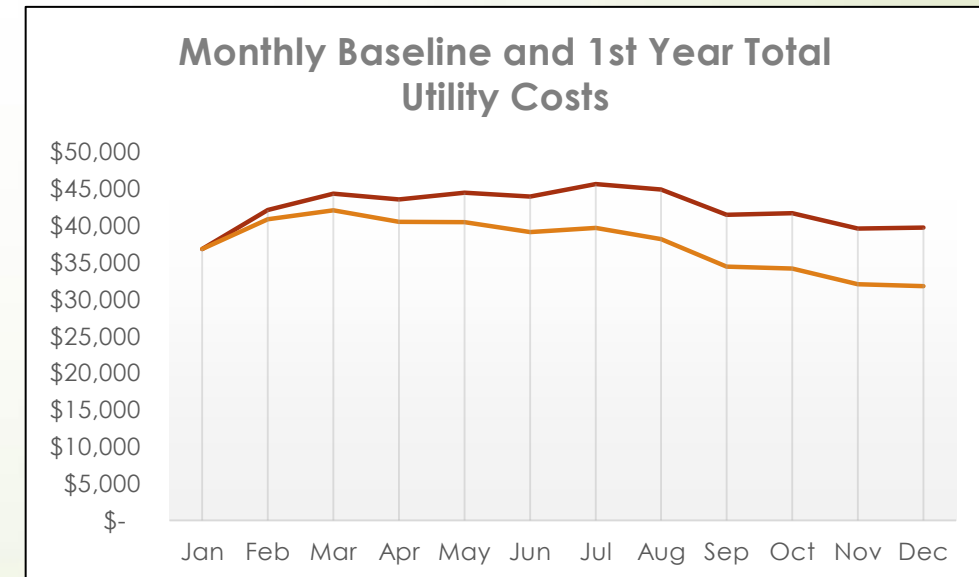
- CO₂ calculator
- Green Procurement Analysis
- Carbon Offset Action Plans

CO2 Tracking software

Building											
CO2 Emissions Responsibilities				2018	CO2 Emissions Credits				2018		
End Use	Units	Qty	tons CO2		End Use	Units	Qty	tons CO2			
Electricity	kWh	1,396,836	5,863		Green Power Procurement	kWh	500,000	2,908			
Natural Gas	therms	53,727	690		Foliage Absorption	lb CO2	120,000	60			
Disctict steam	MBTU	5,430,028	12,900		Other CO2 credits procured	lb CO2					
District Chilled Water	MBTU	5,786,710	16,891								
Water consumed	kgal	6,074	2,909								
Delivery Fuel	gal	-									
Paper Products consumed	lb	1,255,100	224		Paper product recycling	lb	600,000	112			
Other products consumed	lb	205,005	235		Other products recycled	lb					
Transportation Fuel	gal	800	65								
Travel Fuel	gal	250	76								
Annual CO2 Responsibilities				2018	39,853	Annual CO2 Credits				2018	3,080

Financial Model: Guaranteed Savings Service Contract

- Step 1: Baseline annual utility expenditures (\$/yr)
- Step 2: Monthly fees equal to 5%-10% of baseline
- Step 3: Fees will be used to fund improvements (no additional cost)
- Step 4: Annual Guarantee
 - *If annual cost reduction does not exceed the fees after 12 months, the difference will be refunded*





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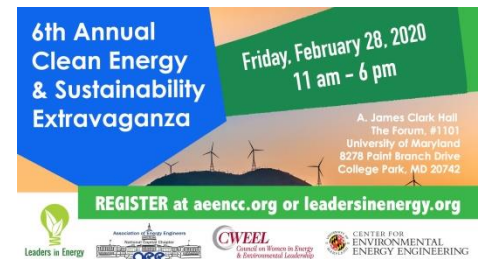


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11 am - 6 pm

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College Park, MD 20742

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