

EFFICIENCY

THE OFFICIAL MEMBER MAGAZINE OF THE
ASSOCIATION OF ENERGY ENGINEERS

Technical Articles
Member Stories
Events Run Up
Chapter News

Plus+



CELEBRATING 40-YEARS

How it got started, how it developed,
and the individuals that made it happen



BREAKING BARRIERS

The true value of maintaining
a certification



WHEN PASSION DECIDES A PATHWAY

A young professional's unusual journey
to energy management

<< COVER IMAGE STORY

Issue #2 2021



HALL OF FAME AEE's
Highest Award

EFFICIENCY

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Contents

4 WHY DO WE CALCULATE UNCERTAINTY?

John Avina critiques the latent and overlooked inconsistencies associated with uncertainty calculations.



10 THE POWER OF COMMUNITY

Laurie Beth Nix, describes how AEE's Social Media channels bring to light the best of our network.

12 WHEN PASSION DECIDES A PATHWAY

The inspirational story of Elayne Blancas the 2021 Al Thumann scholarship recipient.



16 PROPELLING THE INDUSTRY FORWARD

We recognize two Energy Managers Hall of Fame members and welcome the inductees for 2021.



23 AN ATTENDEE'S EVENT GUIDE

30 CELEBRATING THE CEM®

We take a look at how it got started, how it developed and recognize the individuals that made it happen.

40 Years

36 BREAKING BARRIERS

Michael Hewson talks about his professional development and the true value of certification.



42 KIDS FUN PAGES

It's never too early to get involved and learn about energy efficiency.



44 AN OPEN ROAD

Ray Segars looks at Advances in Sustainable Transportation.



IN EVERY ISSUE

MEMBER NEWS

TRAINING CALENDAR

EVENT NEWS

CHAPTER NEWS

THE OFFICIAL MEMBER MAGAZINE OF AEE

Welcome

From Michael Hewson,
Marketing Director, Association of
Energy Engineers

As AEE's Marketing Director, I am constantly questioning the value we bring to our members. We often find it hard not to talk about all the benefits and give each an equal measure. But when I ask members why they joined or what benefits them the most from being a member, the value of AEE's network always comes out on top. I think the content, articles, and stories in this issue shed light on AEE networks and communities.

Starting with the Power of Community, Laurie Beth Nix, AEE's Social Media guru, takes an inside look at the AEE social media channels. More than ever, these tools allow us to communicate not only with our networks but with individuals outside them. We can now reach people that would not normally interact with us, start a conversation, and learn from each other.

As a marketer, I find starting communication with someone outside of your circle as a constant challenge. For AEE, how do we reach more potential members and grow our network to benefit the network? Especially non-energy engineers and young professionals. That's why I am pleased to share the unusual pathway that brought Elayne Blancas to AEE.

Social networks give us new avenues for connectivity, but it is also important to realize where you have come from, how you got there, and who helped you along the way. This magazine will come off the printing press, almost 40 years to the day, from when the first energy managers took the first-ever CEM® certification exam. It fascinated me to delve into old notes and documents and speak

to some individuals who helped create the certification program. But more importantly, 40 years ago, they started one of the most robust global networks, which is a testament to CEMs communicating with each other. We all know the saying, "CEMs all speak the same language." Likewise, the article truly was a collective effort. We also know a CEM will tell you "never to let your certification lapse," mainly because you do not want to repeat the exam. In another article, I point out alternative reasons why someone seeks certification, the benefits, and why they should maintain it.

Another strong AEE community is the Energy Managers Hall of Fame. It is the highest accolade someone involved with AEE can achieve. Individuals that make it to the HoF have contributed to the industry and the AEE network over their entire careers. The spotlight on Jack McGowan shows how being involved can impact your whole career and beyond.

Lastly, we have some light reading that you can enjoy with a coffee, such as the short chapter stories or content that is not so technical but a starting point for your discovery, such as Ray Segars' article on transportation.

However you digest it, I hope the magazine brings you a step closer to the global AEE community you and other members worldwide have helped create.



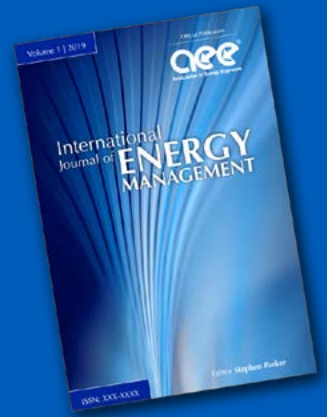
Connect with Michael



Why Do We Calculate Uncertainty?

Measurement and verification have become more complicated in recent years to address the concerns of utility energy efficiency practitioners. Their concerns, outlook and background are different than those of performance contractors. Many of the concepts that are applicable to the utility energy efficiency practitioners are not useful to performance contractors. One example is uncertainty calculations which are not necessary for a performance contract. This article critiques the latent and overlooked inconsistencies associated with uncertainty calculations.

This article was originally published in the *International Journal of Energy Management* (Vol 3. Issue 3)



WHY ONLY ONE MENU FOR LOW BROWS AND HIGH BROWS?

I come from an energy service company (ESCO) background. I used to do measurement and verification (M&V) for a large ESCO. I relied on the North American Energy Measurement and Verification Protocol (NEMVP) and later the International Protocol for Measurement and Verification (IPMVP) and the U.S. Department of Energy, Federal Energy Management (FEMP) Measurement and Verification (M&V) Guidelines. These documents were fairly straightforward back then. Then, the American Society of Heating, Refrigeration, and Air Conditioning (ASHRAE) Guideline 14, Measurement of Energy, Demand, and Water Savings, came out, which added more complication, some of which didn't necessarily make our jobs any easier. It seems the latest document revisions from the Evaluation Efficiency Organization (EVO) have made the issue more complicated rather than more understandable.

I think I am starting to understand it all now. You have to take a step back and see it from afar. It seems so obvious now.

There are two different worlds of people who do M&V, and they do M&V for different reasons. These two distinct worlds are the ESCOs and their clients in one world, and the utility energy efficiency people in another world. Individuals from these two different worlds have different jargon that are often incomprehensible to each other when they try to communicate. ESCOs try to keep M&V simple to both cut down on engineering costs and to communicate

clearly to their clients, who are usually administrators, not statisticians, engineers, or Ph.Ds. An ESCO M&V practitioner reports how much energy and costs were saved, and that is about it. If there is not enough savings, the ESCO writes a check to the client. The utility people are more interested in determining how effective energy efficiency (EE) programs are run, how many building owners would have done EE projects without the EE programs, the impact of the programs on the state, and how the programs transform the market for EE. Clearly ESCOs and utility people see M&V differently. Given their objectives, the utility world is much more statistics oriented. Generally, the utility people, but not the ESCO people, speak of uncertainty.

The utility world produces dozens of papers on M&V, and they generally contain many concepts and statistical complexity that are not useful to ESCO M&V practitioners. I get it. Utility people write for utility people. They are not writing for ESCO people.

Although this is now obvious to me, it is often not taken into account that the ESCO and utility worlds do not interface much, nor should they. Occasionally ESCO practitioners read utility-oriented M&V papers and either become confused or try to apply these concepts, which are generally not useful in their work. M&V budgets are tight. ESCOs keep it simple—report the savings, explain it clearly in terms the client understands, and move on. On the other hand, the budgets in the utility world are relatively lavish,

and seem to have no problem paying for this added complexity. For example, what ESCO client is going to want to hear that you are 68% confident that the savings is within 57% of this number. How do you write a shortfall check based on that? The ESCO client wants to know what they saved ... period!

"...what ESCO client is going to want to hear that you are 68% confident that the savings is within 57% of this number."

One of the reasons ESCO people are reading more and more about uncertainty is that the utility people and their ideas have slowly taken hold in EVO. The original IPMVP (the NEMVP) was released in 1996, and it wasn't until 2012, that uncertainty appeared in an appendix of the IPVMP.

So, the first point I would like to make is that M&V is different for ESCO people than for utility people. EVO doesn't seem to take this into account when they write guidelines, as their documents are including more and more esoteric M&V and statistics concepts, which just do not apply to ESCOs. As a result, I don't recommend EVO manuals to new M&V practitioners anymore. FEMP Guidelines are straight-forward and perfectly suited to the ESCO world.

It's akin to having a restaurant that serves corn dogs and tater tots to the low-brow clients, along with cognac shrimp with beurre blanc to the high-brow clients. Maybe it would be better to have two separate restaurants for the two different clienteles. They don't often mix well together.

(continued on page 6)

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WHY DO WE CALCULATE UNCERTAINTY?

As most in the industry are aware, M&V protocols define 4 primary options: A, B, C, and D. **So why is it that people only talk about uncertainty for Option C M&V and not for Option A, B, and D M&V?** I mean, really? We invalidate Option C models because there is a high uncertainty, yet we go forward with Option A models, which we do not even calculate uncertainty for? Think about it. That doesn't make any sense at all. There is a reason behind this, but if you think about it on a meta-level, perhaps the entire discussion about uncertainty is moot.

We all know that Option A M&V is usually not very accurate. Large assumptions are made, which, if uncertainty were calculated, would embarrass everyone concerned in most cases. By agreeing on Option A, the parties are agreeing that they are willing to tolerate inaccurate savings numbers.

Option B should be more accurate than Option A. There should be less uncertainty, but due to interactive effects, say of various measurements, calculating uncertainty is not done. It is too difficult.*

Option D, although rarely done, contains measurements, which again, could be interactive, greatly complicating the calculation of uncertainty. There is also measurement error to consider because the instruments are not perfect. There is modeling error. How many inputs are there to consider? Each assumption, and there will be many, has great uncertainty. But really, how does one go about calculating the uncertainty of a building model? How do you know if your model's chiller usage is high, and your air-handling unit (AHU) usage is low? You might if you had interval data to compare against. But what if your chiller usage is close and the AHU usage is off, and there was no way to get them both close to your measured data. (This happens.) There is so much complexity here. When you do Option D, there often are no utility bills to compare the model to. How did you disaggregate the usage for that one building when you had no bills? How do you put an uncertainty number on that? Again, the uncertainty would be so great, as to be laughable.

So, why do people get all bent out of shape calculating uncertainty for Option C? This is totally inconsistent. From a birds-eye view, it does not make sense to care about uncertainty for one M&V option but not for others, especially when Option C appears to have the most certainty of any method. Uncertainty is performed on Option C (by the utility people) because it is the only option of M&V in which it can be done relatively simply. It is just too difficult to do using the other options. That makes no rational sense whatsoever. The ability to calculate uncertainty should not be used as an impediment to Option C.

"Option C appears to have the most certainty of any method' in most cases, which is why I focused my work on it"

I was communicating about this with Bill Koran, a known expert in the M&V statistics field. He wrote: "I have often, in comparisons of Option C to D said, 'why should I have to model every wall, window, and door to estimate energy use? I have real data!' With that, I agree that 'Option C appears to have the most certainty of any method' in most cases, which is why I focused my work on it."**

In addition, when calculating uncertainty for Option C, we do not consider metering error, and as you get to the interval data level, metering error is substantial. Interval data often will have hours or days with no readings, or impossible readings near zero. Software applications that use interval data have to "scrub" or "massage" the data to render it workable. Often, they use data from the prior week, even though the weather is not the same.

*An argument can be made that Option A and B only measure the retrofit in question, and therefore much uncertainty has been taken away. Option C and D measure the entire building, which means, all the noise associated with unrelated things is wrapped up into the measurement. So, conceptually, then you may be able to claim that uncertainty for Option A or Option B is less than it is for Option C. On the other hand, Option C measurement is done on an ongoing basis, whereas the measurements for Option A and B may be done during a short period and may be extrapolated over an entire year. How do you estimate the uncertainty associated with extrapolation? So many questions, and it all seemed so simple.

Does uncertainty handle this? Even monthly bill data often will have estimated and actual bills. These estimated/actual bills will drop the R2 values and increase the coefficient of variation of the root mean square error (CVRMSE) values unless we drop them from the fit. This source of uncertainty is not even mentioned in the literature that I have seen. This means that our uncertainty calculations that statisticians have taken great pains to develop for our industry are only addressing part of the story. So even if we decided we should calculate uncertainty with Option C, why would we accept these uncertainty values when large determinants of uncertainty are left out. Maybe there should be an uncertainty calculation of the uncertainty calculation.

But the biggest disqualifier of the entire uncertainty issue is how do you handle non-routine adjustments?*** How do you assign uncertainty to these? Often the calculations for non-routine adjustments are done using spreadsheet models with many assumptions. Sometimes non-routine adjustments are made using building modeling programs. I have yet to hear of anyone calculating uncertainty on either of these methods for creating non-routine adjustments. Over the life of a 10-year contract, it is likely that there will be at least one non-routine adjustment applied to every meter being tracked. So, why are we so focused on uncertainty of a regression equation, when whatever uncertainty we have estimated will likely become invalidated by a non-routine adjustment uncertainty before the contracted savings period expires?

I think we in the industry need to take a step back from all of these unnecessary details and look at the big picture here. **Why are we doing M&V in the first place?** For ESCOs it is a contractual thing. We need an understandable and dependable yardstick with which to measure a project's performance. How can we improve the M&V with this in mind? I suggest that we drop all this needless complexity like uncertainty. As I hope I have demonstrated, uncertainty is not applied to all M&V options, and for no good reason. It does not handle metering error or non-routine adjustments. It is an arbitrary concept, which really should not be applied at this time.

**From an email conversation with Bill Koran, 10/20/2020.

***A non-routine adjustment is added to the savings equation to address changes in building usage patterns that have nothing to do with the energy efficiency retrofits that were installed. For example, if the building owner adds 4 hours to the AHU schedules, then the building is using more energy, and you will have to make an adjustment in your savings equation to remove the effect of this scheduling change.



AUTHOR BIOGRAPHY

John Avina, CEM, CEA, CMVP, CxA, has worked in energy analysis and utility bill tracking for over 25 years. During his tenure at Thermal Energy Applications Research Center, Johnson Controls, SRC Systems, Silicon Energy and Abraxas Energy Consulting, Mr. Avina has managed the measurement and verification (M&V) for a large performance contractor, managed software development for energy analysis and M&V applications, created M&V software that is used by hundreds of energy professionals, taught over 250 energy management classes, created hundreds of building models and utility bill tracking databases, modeled hundreds of utility rates, and has personally performed energy audits and RCx on over 25 million square feet. He currently chairs the Certified Energy Auditor Exam Committee for the Association of Energy Engineers, has a MS in Mechanical Engineering from the University of Wisconsin-Madison and may be contacted via email at john.avina@abraxasenergy.com.



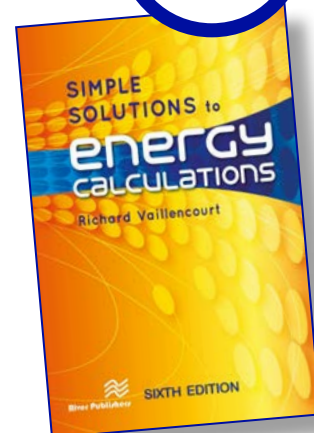
BOOKS



New Release

Simple Solutions to Energy Calculations, Sixth Edition

By Richard Vaillencourt
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Member Spotlight



Ziad Haddad has been an AEE member for more than seven years and currently serves as the President of the AEE Lebanon Chapter. Ziad is an exceptional leader who has a passion for developing the energy and sustainability industry.

Lebanon is undergoing an economic crisis, which makes life difficult for students to gain a foothold in the industry. To make up for the lack of opportunities,

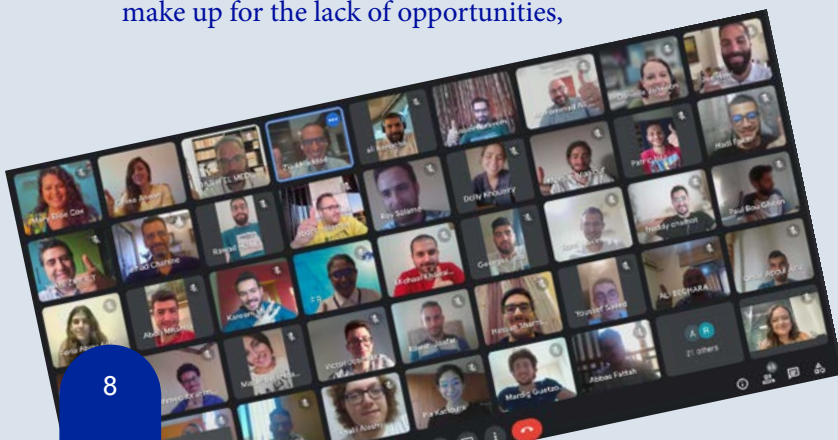
Ziad and a team of nine mentors put together a two-month free-of-charge internship program. They volunteered their time day and night to manage courses, communicate with students, and ensure a successful program.

The two-month internship featured 20 masterclasses that focused on personal, professional, and technical development. Sixty students joined from countries around the region, including Lebanon, Egypt, Australia, and Kuwait.

Thank you, Ziad, for your time and dedication to AEE and the industry. AEE members around the globe are similarly working hard to further advance the technology and resources in the energy and sustainability industry.

Ziad Haddad

Senior Director of Physical Plant
Lebanese American University



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Behind the Campaign

Laurie Beth Nix, AEE's Marketing Communications Specialist, describes how AEE's Social Media channels bring to light the best of our network.



The Power of Community

Social media is one of the most powerful tools we can use to communicate information and capture memories in real-time. After all, almost 48% of the entire world population uses social media! I'm sure you're asking, why would a social media article be in an energy magazine? Let's talk about the energy that surges through social media and how we can use that to our advantage to grow our businesses and networks.

"Social media is a conduit to stay close to each other"

A few months back, Mel, the Membership Director, and I met to create content that could show energy professionals how being a part of a professional organization can be impactful to your career. Of course, with us being marketing professionals, we had to come up with taglines that would speak to the energy industry and have a strong message. One of the taglines we came up with was "The Power of Community."

While I never had the opportunity to meet Al Thumann, our Founder, I do hear a lot of stories about him. People tell me he cared most about community and making people feel like AEE was a family, no matter where you are from. The best

part of my job is meeting with members from all over the world to hear their experiences and projects that they are working on to make their communities stronger and better, and I love when they bring up AI and share their memories with me. I am sure he would agree the power of community beams through with authentic and supportive members. Social media is a conduit to stay close to each other, especially when we are from all over the world.

What can you do to continue to power up AEE's community? The average person spends two and a half hours a day on social media, so make your media time count by following AEE and being active in our closed groups. We love seeing our members share meaningful information and talk about their projects. With new content almost every day, you can count on our social channels as a premium source for what's happening in the community.

We would also love to hear from you! Email lauriebeth@aeecenter.org to schedule an interview or meet me at AEE World to create a short testimonial video about your experiences with AEE or certification stories!

Connect with Laurie Beth



New to Social? Here's How to Tag.

Use @ if you want to directly link to a person or organization e.g. @associationofenergyengineers or @AEE. Use # if you want to reach a community interested in a subject e.g. #energyefficiency.





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AEE Employee Spotlight



**Connect
with
Priscila**

If you have renewed a certification recently, you may know Priscila Carbaugh. Priscila, our Certification Renewal Director, has been part of the AEE team for over ten years. She is also the Scholarship Program Director for the AEE Foundation.

Originally from Colombia, Priscila has been honored with two US journalism awards from the National Association of Hispanic Publications (NAHP). She holds a Bachelor's Degree in Communications from Mercer University, is PMP® certified by the Project Management Institute, and is currently pursuing a Master's in Business Administration (MBA) from Georgia State University.

Priscila loves to spend her weekends with her family and her three dogs. She can be reached (in Spanish, English, and Portuguese) by email at priscila@aeeecenter.org, or phone at (770) 447-5083, ext. 227.



Priscila, AEE's
Certification Renewal
Director and her three
daughters.

When Passion Decides A Pathway

A young professional's unusual journey to energy management.



By Elayne Blancas, Computer Engineering Student at NYU and AEE Foundation Scholarship Recipient.

I have been fascinated with energy engineering throughout my academic journey and have partaken in this field of science through unique experiences. Upon receiving my Associate Degree in Electrical Engineering at Hostos Community College, I interned with MIT in Neuroscience and Biology. This once-in-a-lifetime opportunity involved collecting autonomic responses on patients undergoing prostate removal in the Massachusetts General Hospital operating room. Our objective was to understand pain under anesthesia better. I was thrilled when we compared the human mind to a circuit board composed of electrical impulses of millions of firing neurons. However, it was a humbling experience to expand our research by closely examining the human heart to achieve the objective above. We collected ECG data from college student volunteers and analyzed their heart rate variability (HRV). I noticed that the HRV model our team was using revealed hidden nuances that were not detected by standard measures. This extraordinary discovery holds the potential to uncover hidden autonomic dynamics

in various states, including stress. From this internship, I realized how energy is all around us—even in our bodies, and the more we study it, the more we can learn from it!

The most impactful research opportunity I have had was during my matriculation at Hostos. It dealt with understanding the heat dissipation in elephant ears. Heat generation is proportional to mass, and elephants weigh several tons, so elephants generate a lot of heat—about 5 kW! With no sweat glands, they should theoretically be burning up, but they are not! Nature has given them a solution in which they use the flapping of their ears as a cooling system from which we can learn a lot. Their energy dissipation is entirely sustainable, and that has given me a lot of inspiration for how we can look to nature for energy solutions.

It is beautiful that the solutions to some of the most complex problems we face are right in front of us—in nature. I believe energy is so mysterious and pure; a lifetime would not be enough to understand its full potential and power! However, the more we make an effort to understand,

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the more we can learn and obtain answers— not just about our bodies but the world around us. Energy is the very thing that keeps us connected and in touch with one another.

Engaging adolescents in serious discussions about accountability towards their environment and educating them on the actions needed to maintain our planet is an essential step towards positive and powerful change. I firmly believe we should welcome challenging discussions of complex issues and encourage students of all ages to brainstorm and create potential solutions. They will be inheriting these lands from us, and it is up to us to make sure that it is safe and habitable for them and future generations.

With that said, as an individual who began to dream big at a young age — I am a curious and creative person constantly in

search of new opportunities to expand the boundaries of our scientific knowledge. In my free time, I contribute to developing a miniature satellite that will launch into space through NASA's CubeSat Launch Initiative. In addition, we are looking at ways to realize innovative ideas, such as using water as a non-traditional fuel propellant for our fuel system.

I am very grateful that I received a scholarship from the AEE Foundation. To represent something that I have been consciously and unconsciously working towards for a greener world, even though my path is not a traditional clean energy job as a computer engineer, I bring a unique perspective to this industry, given my broad range of research. It was beyond humbling to see that this organization recognized that in me, and I can't wait for what is next.



Contribute *To Your* Magazine

For Members, By Members



Write a Technical Article

Do you have a technical article, research paper, success story, or news that you think would be of interest to AEE Members?



Tell us about Your Chapter

Tell us your stories. Maybe your chapter or its members has been instrumental in an energy efficiency project or defining policy that impacts your local communities.



Share Your Stories and Photos

Do you have something unique to share? The easiest way is to post to your social accounts while adding a relevant tag, such as @AEE, #exploretheefficiency #AEEworld. Or you can email them to marketing@aeecenter.org with a short story.

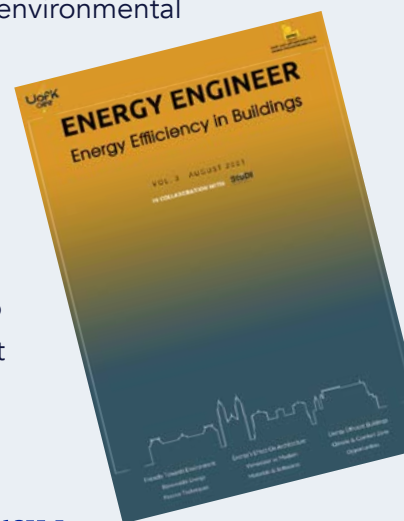


Advertise in Efficiency

As a non-profit organization, advertising helps offset production costs and enables us to do more for our members. Email inquiries to marketing@aeecenter.org. Only products and services relevant to our members will be considered for placement. Space is limited.

Resource For Sharing and Collaboration

The **University of Khartoum Student Chapter** was established in January 2021 in collaboration with the Faculty of Engineering and Faculty of Architecture. Chapter leadership decided a newsletter would be an excellent resource for collaborating and sharing locally researched content across the region and throughout the global AEE Network. The latest edition featured articles on environmental responsibility and how energy efficiency and understanding climate and comfort zones impacted architecture, vernacular architecture, and modern architecture to help create more energy-efficient buildings.



Supporting Energy Communities

The *Best Community Service Chapter Recognition Award* goes to the **New York Chapter** for their commitment to international and local professional energy communities. They recently took collaborative action to support students in continuing education in energy management, energy engineering, and sustainability. The chapter also made a donation to the Kapadia Education Foundation (KEF), an international organization that supports dedicated students in low-income countries with mentorship and financial resources. The donation covered a full year's tuition for two outstanding candidates from the University of Ghana. Congratulations to the AEE New York Chapter for their achievements!



Chapter News

Coffee & Conversation

To commend the **Greater Toronto Chapter** for their efforts in encouraging conversation, networking, and education, they have been awarded the 2021 Chapter Recognition Award for *Best International Chapter Meeting*. Every three to four weeks during the pandemic, they held one-hour online sessions with a guest speaker presenting a relevant energy and sustainability topic designed for members and local industry professionals to connect and stay engaged during the current pandemic. They call it "Coffee & Conversation." Each meeting has a lively 15-minute question and answers session at the end to discuss the presented topic. By adapting, they have seen session attendance more than double. So, they have moved these sessions to a hybrid meeting format to include online and in-person attendees.



Supporting Rural Communities

Member of the **AEE Tajikistan Chapter** recently completed two projects to support their local communities. The first, financed by UNDP, promoted Small-Scale Green Energy Technologies for rural populations of Tajikistan who are facing energy poverty. In conjunction with Private sector-led business, AEE members conducted comprehensive energy assessments for ten remote villages and established women-led energy committees. After initial training sessions, they installed, commissioned, and will maintain 19 PV systems, 26 solar collectors, 30 solar kitchens, and 160 Small solar portable systems throughout the ten communities.

The second saw AEE Members install ten solar systems for medical and educational facilities in on and off-grid areas.

Chapter members also carried out several capacity-building events for Tajik youth and journalists on air and water pollution. One awareness-raising event was a 30 minutes program, "Topic of today" aired on the second biggest national TV station, "Safina."

Members spoke about the benefits of RES technologies available in Tajikistan and how to promote them.



Propelling the Industry Forward





The Energy Managers Hall of Fame is the highest honor bestowed by AEE, recognizing individuals for their lifetime dedication in promoting the practices and principles of energy management. Since 1990,

individuals have been inducted at AEE's annual conference closing keynote and luncheon, formerly WEEC, now AEE World.

We would like to recognize two individuals in this edition of the AEE magazine and introduce you to the 2021 inductees. Maybe you know them or have worked with them during your career.

In Special Remembrance

Shirly Hansen Ph.D (1928 - 2019)

Many Members fondly remember Shirly for her involvement in AEE and its programs, but her achievements, too many to mention individually here, were widespread and still impact our industry today.

She was recognized around the world as a leading authority in the field of energy management, policy, financing and performance contracting. Shirley provided consultation and training to hundreds of potential performance contracting customers, ESCO's, Utilities, and Fortune 500 companies in over 36 countries. She was a notable author and an expert in energy savings measurement and verification procedures - serving on the Board of Directors of the International Performance Measurement and Verification Protocol, Inc. (now Efficiency Valuation Organization – EVO).

As the Director of the Schools and Hospitals Conservation Division of the U.S. Department of Energy (DOE), she administered a U.S. \$900 million grants program to help schools and hospitals modify their buildings to save energy. This program is credited with saving U.S. institutions (and taxpayers) more than \$10 billion - One of her most notable achievements.

Among the recognitions she received, she was most proud of her distinguished alumnae award from Michigan State University and her induction into the Association of Energy Engineers Hall of Fame.



Inductees over the Years

2020 - George Benda
2020 - Jon Feldman
2019 - Song Deng
2019 - Eric Oliver
2018 - Robert N. Amundsen, Ph.D.
2018 - Russell Koehler
2017 - Alexander Novoseltsev, Ph.D.
2017 - Douglas Tripp
2016 - LJ Grobler
2016 - Laurie Weigand-Jackson
2015 - Dennis Landsberg, Ph.D.
2015 - George Buster Barksdale
2014 - Arun Jhaveri, Ph.D.
2014 - Eric Woodroof, Ph.D.
2013 - James W. (Jim) Brown
2013 - W. Dan Turner, Ph.D.
2012 - Warren Heffington, Ph.D.
2012 - Graham Parker
2011 - Rusty Hodapp
2011 - Malcolm Verdict
2010 - Maryanne Lauderdale
2010 - F. William Payne
2009 - Randolph Haines
2009 - David Keith
2008 - Timothy Janos
2008 - Zohrab Melikyan, Ph.D.
2007 - Fredric Goldner
2007 - William (Bill) Younger
2006 - Richard Costello
2006 - Stephen Roosa, Ph.D.
2005 - Stephen Sain
2005 - James Waltz
2004 - Bruce Colburn, Ph.D.
2004 - Steven Parker
2004 - Albin Zsebik, Ph.D.
2003 - Paul Allen
2003 - Jack McGowan
2003 - Larry Rowland
2002 - Kenneth Kogut
2002 - Carl Salas
2002 - T. Kenneth Spain
2001 - Millard Carr
2001 - Douglas Decker
2001 - William Stewart
2000 - Patricia Rose
2000 - Walter Simpson
2000 - Jerry Taylor
1999 - Barney Capehart, Ph.D.
1999 - Larry Good
1999 - Kermit Harmon
1998 - John Feters
1998 - Shirley Hansen, Ph.D.
1998 - Wayne Turner, Ph.D.
1997 - Jon Haviland
1997 - George Owens
1997 - Al Thumann
1997 - Verle Williams
1996 - Lindsay Audin
1996 - Konstantin Lobodovsky
1995 - William Fleming
1995 - Martin Mozzo
1994 - Walter Johnston
1994 - William Mashburn, Ph.D.
1993 - Victor Ottaviano
1992 - John Siepp, Sr.
1991 - Harry Kociencki
1991 - Edward Stephan
1990 - Richard Aspenson

(continued on page 18)



Inductee Spotlight

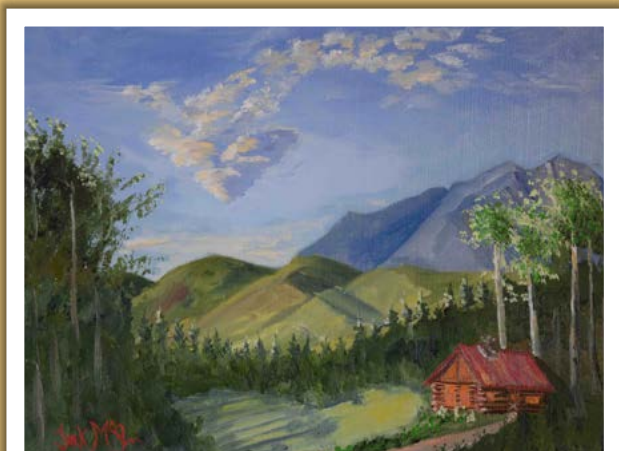


A Q&A with Jack McGowan (2003 Inductee)

Jack ran a successful business operating in the energy efficiency and renewable energy sector for nearly four decades. As an Energy Manager and entrepreneur, he published four books, conducted seminars throughout Southeast Asia and Europe, and chaired the U.S. DOE GridWise think-tank on smart electricity. Over his professional career, he was inducted into three halls of fame. As a 20-year member of AEE's Hall of Fame, we got to ask Jack a few questions...

How long have you been involved with AEE?

I am approaching four decades as an AEE Member and a CEM if you round up a bit. I have been an AEE conference speaker or session moderator more than 50 times, attended World Congress events and AEE regional conferences annually during this time. I have spoken at Chapters from Hawaii to the Caribbean, across the U.S. and Canada.



Will you always be involved in AEE?

I sold my company a decade ago and retired six years later, but I still pay my AEE dues and CEM fees. I do that based on a lifelong commitment to AEE and the principles that the organization represents. If you think about it, many people drop society memberships when they retire. For me, AEE would never be such an organization. I will always retain my membership because the organization has invested in building relationships with folks like me who want to stay engaged and are passionate about energy.

You're retired, but are you still working?

After four decades, I still love the work. So I find time to serve on two Corporate Boards of energy companies. But now I can spend more time on an old passion – Plein Air oil painting. My path to this moment is atypical for either a CEM or a Plein Air Painter. My profound appreciation for our planet gave me the conviction for professional success and now drives my passion for painting.

Has your lifelong career impacted your creativity in retirement?

The passion for preserving resources, and the environment, is not something you turn off. Beginning painting again helps me continue to put a spotlight on that passion. My goal is to create images that reflect the beauty of our environment, my love of mountain landscapes, and hopefully tug at the viewer's heartstrings just a little bit. I hope my paintings motivate viewers to value and question the environment and energy consumption behavior. If that is the case, I may continue to positively impact the planet in a small way, just as I did as an AEE member.

Do you still keep in touch with other AEE members?

You do not spend this long in the industry without making lifelong friends. AEE is such a significant organization to many people. Al Thummann, AEE's Founder and a close friend, left a legacy that I can see being made stronger by leadership at AEE and the members worldwide. I love to spend time with them whenever I can, especially members of my State Chapter in New Mexico. I am also fortunate to see and work with new energy engineers as a Board Member of Emera Technologies and New Mexico Gas Company.



See Jack's work at
jackmcgowan-artist.com

(continued on page 20)

31 OCT - 12 NOV 2021
GLASGOW

COP26

IN PARTNERSHIP WITH ITALY



The UK will host the 26th UN Climate Change Conference (COP26) in Glasgow on 31 October – 12 November 2021.

Bill Kent, AEE Executive Director, Mary Elise Cox, International Program Director, and key international AEE Leaders from Europe, Middle East, and Africa will attend. The COP26 summit will bring many parties together to accelerate action towards the goals of the Paris Agreement and the UN Framework Convention on Climate Change.

AEE is looking forward to representing "Earth's Energy Engineers" - energy managers and sustainability professionals working on the frontline of climate change and the race to Net Zero.

Learn More at ukcop26.org

Joining the Race to

Net Zero

2021 **Energy Managers** **Hall of Fame Inductees**

Lori Moen, CEM, CEP, CSBA

Lori has over 30 years of diverse and deep experience in the energy industry. Her innovative approaches to sustainable design, distributed generation, capital improvements, behavior change, and financing programs have resulted in millions of dollars in verified resource savings.

Straddling the utility and customer divide, Lori has worked for all four major utilities in the Puget Sound Region. She currently leads the Solutions Design and Management unit for Customer Energy Solutions at Seattle City Light. Her experience spans from goat barns to flight simulators and from integrated controls to simple behavior change initiatives.

Lori became an AEE member in the early 1990's, worked to help build a local chapter, and has served as the Chapter President and Regional VP. Her leadership experience helped develop and grow AEE during her tenure on the AEE board and in the role of Board President in 2019. Her passion for AEE, it's members, and the energy industry are inspirational. Please welcome Lori to the Hall of Fame.



Barry L. Benator, P.E., C.E.M. F.A.E.E.

Barry is the founder and president of BENATECH, INC., an energy management consulting firm serving clients throughout the U.S. and internationally. He is an instructor of AEE's Certified Energy Manager program, the developer and lead instructor for AEE's Life Cycle Costing Course, and a former instructor and board member of AEE's Certified Energy Auditor program, and a published author. With over 40 years of consulting and training experience for corporate, institutional, and governmental clients, he has conducted hundreds of energy audits and trained countless energy managers.

Barry's service to AEE began in the 1970s when he became a charter member of the Association. Before his career in energy management, Barry served as an officer aboard a U.S. Navy nuclear fast attack submarine. We want to thank Barry for his service to the industry and his country and welcome him to the Hall of Fame.



Who Qualifies?

Candidates may be employed, retired, or deceased. The first qualification is a minimum of twenty years of documented accomplishments in the commercial, institutional, or industrial sectors. Other qualifications include honors and awards, papers and publications, patents and inventions, education and professional licensing, community involvement, and service to AEE.

Who Decides?

The Energy Management Professionals Council (EMPC) oversees the election of new members to the AEE Energy Managers Hall of Fame. Nominations are accepted from members of the Energy Managers Hall of Fame, members of the current AEE Executive Committee, and Presidents of local AEE Chapters. The EMPC reviews the nominations that have been submitted and confirms that the qualifications of each candidate meet the high standards set by the Hall of Fame. A Ballot is then submitted to the Members of the Energy Managers Hall of Fame for voting.

Read More about the inductees at aeecenter.org.



education.aeecenter.org

Upcoming Training Programs

Get Certified, Upskill or Earn CEUs

Nov. 1-5	CEA® Certified Energy Auditor In-Person+Virtual Training Program, Seattle, WA/Pacific
Nov. 1-5	CEM® Government Focused Certified Energy Manager In-Person+Virtual Training Program, Los Angeles, CA/Pacific
Nov. 8-10	Transport Energy Auditing Certificate Virtual Training Program/Eastern
Nov. 8-10	CMVP® Certified Measurement & Verification Professional In-Person+Virtual Training Program, Washington, DC/Eastern
Nov. 8-12	CEM® Premier Certified Energy Manager Training Program Virtual Training Program/Mountain
Nov. 8-10	CEP® Certified Energy Procurement Professional In-Person+Virtual Training Program, Orlando, FL/Eastern
Nov. 15-19	CEM® Premier Certified Energy Manager Training Program In-Person+Virtual Training Program, Las Vegas, NV/Pacific
Nov. 15-17	Developing an Energy Management Master Plan Online Training Program (non-certification course).
Nov. 15-17	Electrical Power and Controls Online Training Program (non-certification course)
Nov. 15-18	Microgrid Fundamentals Online Training Program (non-certification course)
Nov. 15-19	CBCP® Certified Building Commissioning Professional In-Person+Virtual Training Program, Atlanta, GA/Eastern
Nov. 29 - Dec. 3	BEP® Certified Business Energy Professional Online Training Program
Dec. 6-9	REP™ Certified Renewable Energy Professional Online Training Program
Dec. 6-10	CEM® Premier Certified Energy Manager In-Person+Virtual Training Program, Atlanta, GA/Eastern
Dec. 7-9	Energy Auditing Fundamentals: Essential Strategies and Techniques for Optimal Results Online Training Program (non-certification course)
Dec. 7-9	Life Cycle Costing for Energy Professionals Online Training Program,
Dec. 7-10	EEP™ Energy Efficiency Practitioner Online Training Program
Dec. 8-10	Project Management for Energy Engineers and Energy Managers Online Training Program (non-certification course)
Dec 13-14	CWEP™ Certified Water Efficiency Professional Training Program Virtual Training Program/Central
Dec. 13-17	CEM® Accelerated Certified Energy Manager Online Training Program

These programs are available to US residents only. Please check with your local AEE Training Partner (see page 9) for available options in your country or region.

One of the benefits of restricted activities due to the pandemic was the additional time it allowed to get caught up on reading. The following three books provided different perspectives on environmental topics, differentiated by the past, present, and future.

Recommended Reads

By Ray Segars, C.E.M., F.A.E.E | AEE's Director of Business Development

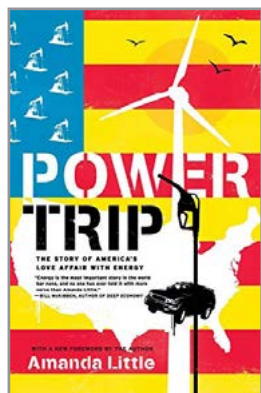
PAST



Silent Spring, by Dr. Rachel Carson

I discovered this book while decluttering the house during the pandemic. It was widely credited with inspiring the formation of the US Environmental Protection Agency. I read this book as a middle school student in the 1970s, required reading for a science class at the time, but still interesting today and a reminder of the beginnings of the environmental movement. Dr. Carson researched and wrote on the devastating effect of chemicals and pollution in the environment on plants, animals, and humans. Despite the work inspired by the book, we still wrestle with some of these environmental issues today.

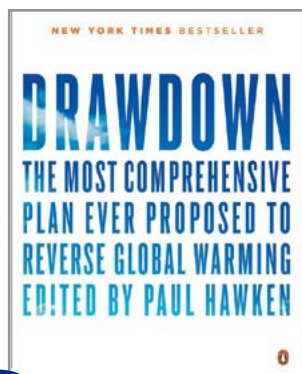
PRESENT



Power Drive, The Story of America's Love Affair with Energy by Amanda Little

From Drake's first oil well to Edison's electrification of cities to solar power and EVs, this book provides a narrative of the history of energy in the US and the world. Amanda Little, who has written for the New York Times, Washington Post, Vanity Fair, writes of her engaging journey of discovery of how our lives are so dependent on energy and the advances we have achieved because of it. Not only did she write of the benefits and consequences of harnessing energy, but she also highlights some notable projects like many of the projects that AEE members and professionals implement. Whether you are a technical or non-technical person, you will enjoy this read.

FUTURE



Drawdown, edited by Paul Hawken

If you attended AEE World 2019 in Washington, DC, you heard about this book. Many of the speakers referenced it in their presentations. In summary, this book is a collection of 80 concepts to respond to climate change. Over half of the solutions reviewed in the book are energy-related. Again, many AEE members and professionals will find the content in this book relatable. The book is part story, part reference, and most importantly, a cost-benefit analysis of the solutions to CO₂ reduction. The last part will appeal to AEE members that are interested in the business case for climate response.

Your Event Guide Pull-out and Take to the Event



Conference & Expo

Plan your time in New Orleans, LA.

October 20-22, 2021 | Ernest N. Morial Convention Center

aee-world.org

Follow our Tweets...

#AEEWorld

Highlight Activities



Welcome from AEE

Bill Kent, CEM

Executive Director

Association of Energy Engineers

Oct. 20 | 9:00-9:20 am



Opening Keynote

Deanna Rodriguez

President and CEO

Entergy New Orleans

Oct. 20 | 9:20-9:45 am



Opening Keynote

Bear Grylls, OBE

Survivalist and Outdoor

Adventurer

Oct. 20 | 9:45-10:20 am



Closing Keynote

Robert Swan, OBE

Record Breaking Polar

Explorer & Environmental

Campaigner

Oct. 22 | 12 pm (Noon)

Networking

Legends in Energy Reception

Oct. 19 | 6:30 - 10:00 pm

AEE Reception & International Awards Banquet

Oct. 20 | 6:15 - 10:00 pm

CWEEL Breakfast and Keynote

Oct. 21 | 7:30 - 9:00 am

CWEEL Reception

Oct. 21 | 5:00 - 6:30 pm

Awards & Recognition

AEE Regional Awards Ceremony

Oct. 19 | 3:00 - 5:30 pm

Fellows Induction Ceremony

Oct. 20 | 6:45 - 7:00 pm

Student Chapter Awards Luncheon

Oct. 21 | 12:00 - 1:30 pm

Energy Managers Hall of Fame Induction

Oct. 22 | 11:15 am - 1:00 pm

Event Sponsors

Platinum Sponsor



Gold Sponsors



Bronze Sponsors



Energy Leaders



Plus Technical Sessions, High Level Panels, and More. Fill in Your Agenda >>>

Plan Your Time

Wednesday October 20

Thursday October 21

Friday October 22

7:30 AM	Innovative Product Breakfast			
8:00 AM		CWEEL Breakfast		
8:30 AM				
9:00 AM				
9:30 AM	Conference Opening Session	Conference Tracks	EXPO	Conference Tracks
10:00 AM				
10:30 AM				
11:00 AM				
11:30 AM				
12:00 PM				Closing Keynote Lunch*
12:30 PM	Conference Attendee or Student Lunch	Conference Attendee Lunch		Including AEE Hall of Fame Presentations
1:00 PM				
1:30 PM				
2:00 PM				
2:30 PM		High Level Panel Discussions		
3:00 PM				
3:30 PM	Conference Tracks			
4:00 PM				
4:30 PM	Conference Attendee Networking Reception			
5:00 PM		CWEEL Reception		
5:30 PM				
6:00 PM	Banquet Reception and AEE Fellows			
6:30 PM				
7:00 PM	AEE International Awards Banquet (7-10 PM)			

Day - Time	- Conference Track	- Location
Wed. 2:30 PM		
Wed. 3:00 PM		
Wed. 3:30 PM		
Wed. 4:00 PM		
Th. 9:00 AM		
Th. 9:30 AM		
Th. 10:00 AM		
Th. 10:30 AM		
Fri. 9:00 AM		
Fri. 9:30 AM		
Fri. 10:00 AM		
Fri. 10:30 AM		

Panel Discussion - Location
Thur. 2:30 - 3:30 PM
Thur. 4:00 - 5:00 PM
EXPO Hall Forums

Visit the Expo for Free

Current Exhibitors (09/21/21)

Expo Hours

Wed. Oct. 20 | 10:00 am - 6:00 pm

Thurs. Oct 21 | 9:00 am - 2:30 pm

In the Expo Hall



Innovative Technology Breakfast

Oct. 20 | 7:30 - 8:30 am



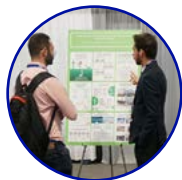
Meet the AEE Journal Editors

Oct. 20 | 4:30 - 5:30 pm



Exhibit Hall Forums

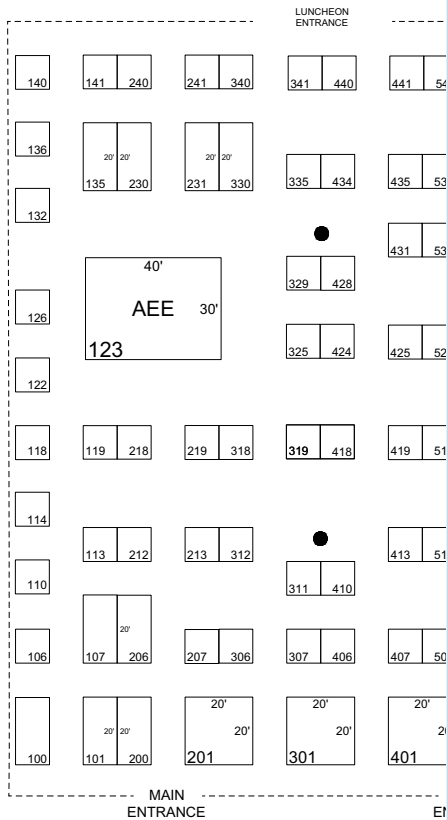
Daily



Expo Poster Sessions

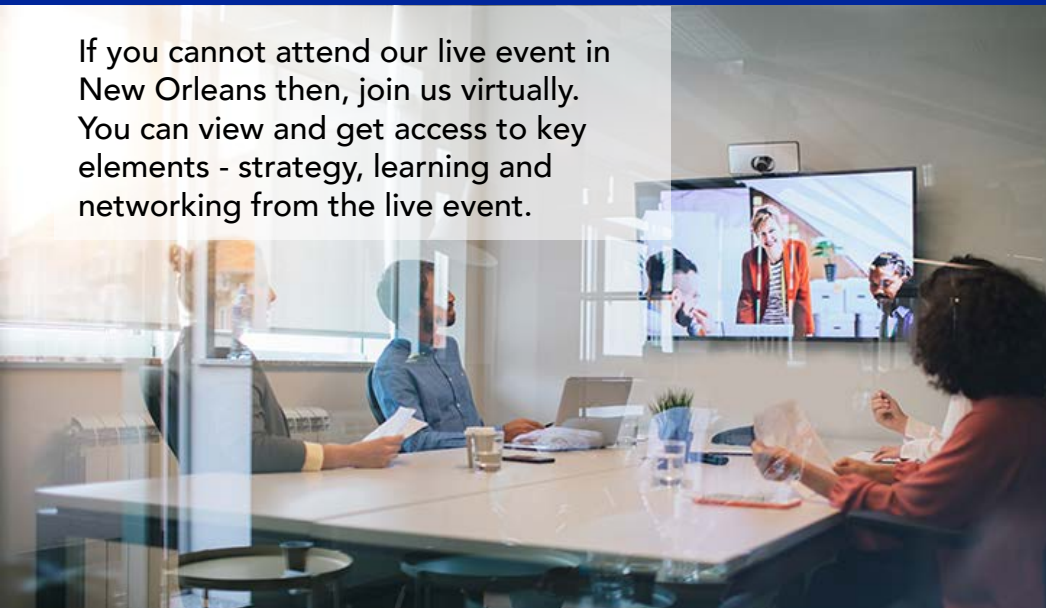
Daily

See the Latest Expo
Floor Plan Online at
aeeworld.org



Virtual. Access key elements of AEE's live events from your home or office.

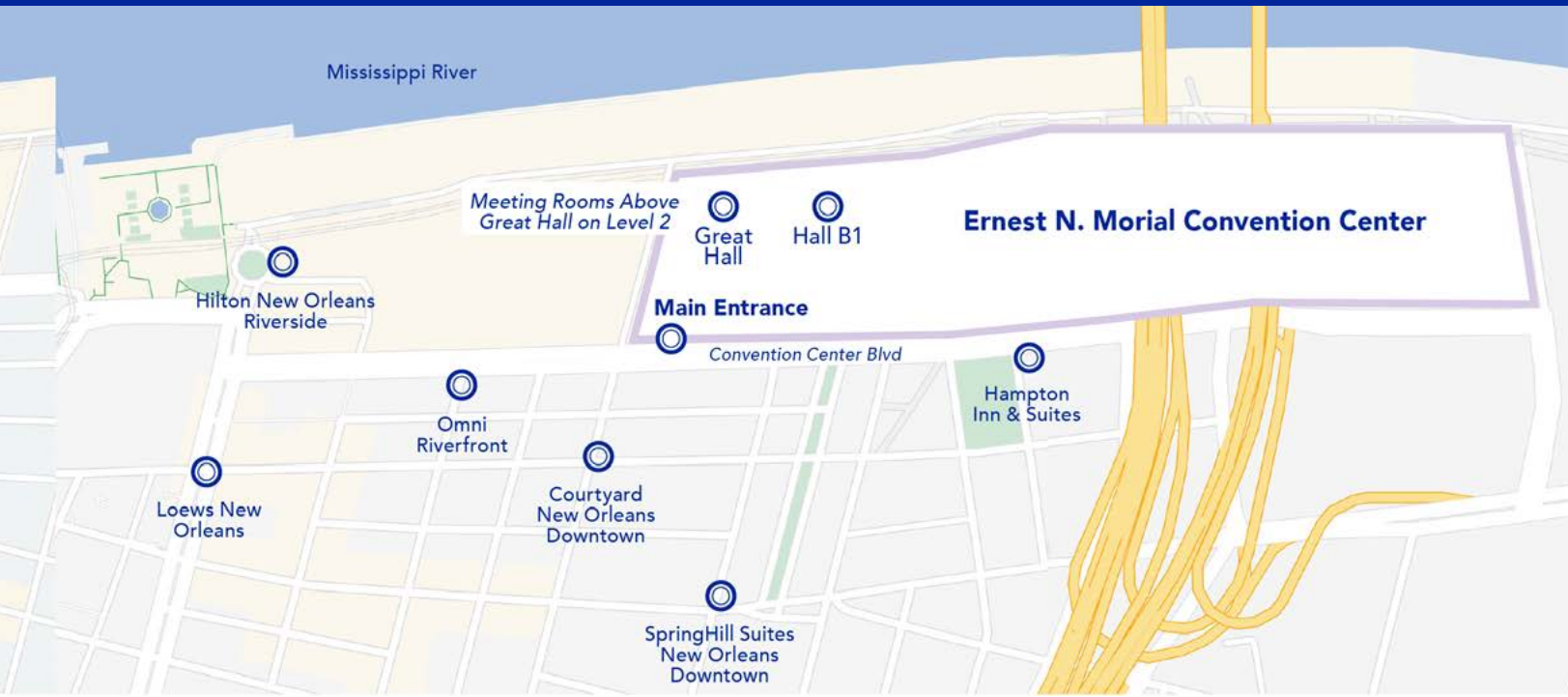
If you cannot attend our live event in New Orleans then, join us virtually. You can view and get access to key elements - strategy, learning and networking from the live event.



Accuenergy
2G Energy
AB Energy USA, LLC
Abraxas Energy Consult
Aeroseal, LLC
Alta Enterprises
AWEB Geo/Slim Jim
BrainBox AI
CARLO GAVAZZI, Inc.
Case Controls - iZ Systems
Clockworks Analytics
Continental Control Systems
CR Magnetics
Dude Solutions
Dynamic Air Quality Solutions
EFinity (Capstone)
eLuminaire
Emme Controls
Energy Star
Energy
eSight Energy Inc.
Everactive
EZ Meter Technologies
FS-Curtis
Granite Telecommunications
Honeywell - E-Mon
Hurst Boiler
I-Star Energy Solutions
Innovative Insulations
INSTAR North America, LLC
J&D Electronics
Kitchen Energy Solutions
Onset
Orion Energy Solutions
Regency Lighting
Resolute Building Intelligence
Retrolux
River Publishers
Rovanco Piping Systems
Shannon Global Energy Solutions
SkyFoundry
ThermaXX
TLV Corporation
Willdan
Worthington Engineer
Yardi

Getting Around and Things to Do in New Orleans >>>

Getting Around...



Things to Do in New Orleans...



**Haunted Ghost,
Voodoo, &
Vampire Tour**



Plantation Tour



City Tour



**Steamboat
Harbor Cruise**



**Food Tour of the
Historical French
Quarter**



**National WWII
Museum**



**Mardi Gras
Behind-the-
Scenes Tour**



Airboat Ride

Over The Years

Formally the World Energy
Engineering Congress

- ☐ 1978 Atlanta (Royal Coach Inn)
- ☐ 1979 Atlanta (Biltmore Hotel)
- ☐ 1980 Atlanta, GA
- ☐ 1981 Atlanta, GA
- ☐ 1982 Atlanta, GA
- ☐ 1983 Atlanta, GA
- ☐ 1984 Atlanta, GA
- ☐ 1985 Atlanta, GA
- ☐ 1986 Atlanta, GA
- ☐ 1987 Atlanta, GA - 10th
- ☐ 1988 Atlanta, GA
- ☐ 1989 Atlanta, GA
- ☐ 1990 Atlanta, GA
- ☐ 1991 Atlanta, GA
- ☐ 1992 Atlanta, GA - 15th
- ☐ 1993 Atlanta, GA
- ☐ 1994 Atlanta, GA
- ☐ 1995 Atlanta, GA
- ☐ 1996 Atlanta, GA
- ☐ 1997 Atlanta, GA - 20th
- ☐ 1998 Atlanta, GA
- ☐ 1999 Atlanta, GA
- ☐ 2000 Atlanta, GA
- ☐ 2001 Atlanta, GA
- ☐ 2002 Atlanta, GA - 25th
- ☐ 2003 Atlanta, GA
- ☐ 2004 Austin, TX
- ☐ 2005 Austin, TX
- ☐ 2006 Washington, DC
- ☐ 2007 Atlanta, GA - 30th
- ☐ 2008 Washington, DC
- ☐ 2009 Washington, DC
- ☐ 2010 Washington, DC
- ☐ 2011 Chicago, IL
- ☐ 2012 Atlanta, GA - 35th
- ☐ 2013 Washington, DC
- ☐ 2014 Washington, DC
- ☐ 2015 Orlando, FL
- ☐ 2016 Washington, DC
- ☐ 2017 Atlanta, GA - 40th
- ☐ 2018 Charlotte, NC
- ☐ 2019 Washington, DC
- ☐ 2020 Virtual Event (COVID 19)

HOW MANY HAVE
YOU ATTENDED?

Certification News

A Natural Fit IEnMP Energy Management Credentials

Starting August 1st, 2021 AEE manages three ANSI Accredited ISO 17024:2012 credentials supporting U.S. Department of Energy's (DOE) Superior Energy Performance 50001™ (SEP 50001™) program.

DOE's energy management programs rely on experienced and qualified experts who provide services to companies in implementing, auditing, and evaluating conformance to the ISO 50001 standard. To create a community of qualified energy management system professionals that could drive greater adoption of ISO 50001, DOE's Advanced Manufacturing Office (AMO) initially supported the Institute for Energy Management Professionals (IEnMP) to provide these credentialing services. IEnMP is now transferring the credentials to the Association of Energy Engineers (AEE).

AEE is excited to further support and align with DOE in support and promotion of the SEP program. AEE sees this acquisition as a natural fit with our existing programs. Collectively, AEE members and AEE certified professionals are already

- **ISO 50001 Lead Auditor**

- **SEP Performance Verifier (SEP PV)**

- **50001 Certified Practitioner in Energy Management Systems (50001 CP EnMS)**

positioned in the industry and can bring value to organizations implementing ISO 50001 energy management systems. AEE has a long history of providing ISO 17024 accredited certification programs for energy management professionals worldwide.

The transition's effects on stakeholders will be limited and will have no direct impact on SEP 50001 program certifications issued to end-user facilities participating in the SEP 50001 program. Individuals who hold IEnMP credentials can still access the IEnMP website (ienmp.org) that AEE will now maintain to ensure seamless support and continuity.

If you need to find certified individuals in these fields search the AEE Certified Individuals Database at aeecenter.org. For more information about these credentials visit ienmp.org.

Global, Recognized, Accredited.

cea[®]

Certified Energy
Auditor

CEM[®]

Certified Energy
Manager

CBCP[®]

Certified Building
Commissioning Professional

BEP[®]

Business Energy
Professional

C.A.P.[™]

Carbon Auditing
Professional

CDSM[™]

Certified Demand Side
Manager

CEP[®]

Certified Energy
Procurement Professional

CGB[®]

Certified GeoExchange
Designer

IEP[™]

Certified Industrial
Energy Professional

LEP[™]

Certified Lighting
Efficiency Professional

CMVP[®]

Certified Measurement &
Verification Professional

CSDIP[®]

Certified Sustainable
Development Professional

CWEP[™]

Certified Water
Efficiency Professional

DGCP[™]

Distributed Generation
Certified Professional

ECP[™]

Energy Efficiency
Practitioner

GBE[®]

Green
Building Engineer

PCF[™]

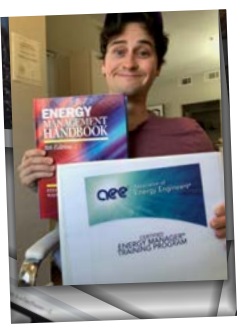
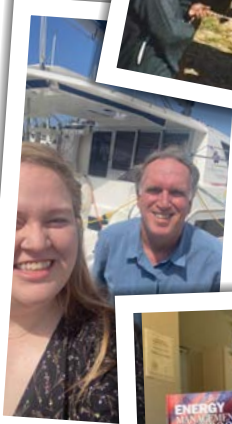
Performance Contracting
& Funding Professional

REP[™]

Renewable Energy
Professional



What Makes You
Stand Out?



CELEBRATING CEM[®] 40 Years

Certified Energy Manager

The Certified Energy Manager[®] (CEM[®]) Certification, is the flagship program of AEE. The first CEM exam took place in Atlanta on Monday, October 12, 1981. Since then, the program has changed in line with industry developments and is still held by many as the gold standard in energy management. CEMs realize the value and benefits this certification provides, and many individuals, groups, and boards of professionals have made contributions to the development of the CEM over the years. We'll share a few anecdotal moments in the history of the CEM, some milestones, and mention a few of those individuals that made it happen.

The Early Days

The 1970s were a turbulent decade that impacted America's relationship to fossil fuels. After the Oil Crisis, environmentalism grew as a movement. It started to influence federal policymaking, beginning with the Emergency Petroleum Allocation Act of 1973, the National Energy Policy & Conservation Act of 1978, which defined what an "energy manager" is, and the creation of the Department of Energy in 1977. These events, coupled with the onset of Reaganomics in the early 80's undoubtedly fueled Al's vision, entrepreneurial spirit, and hence the development of the two-day CEM program, called the "Fundamentals of Energy Management."



Albert Thumann. Al's energy and spirit inspired people to follow the energy engineering career path. He helped change the lives of individuals, the success of corporations, and even the fate of emerging nations striving for energy efficiency and sustainable solutions.

Barney L. Capehart. Barney and his wife Lynne loved to travel. He visited all 50 U.S. states and over 50 countries around the world. He was a lifelong student and teacher; traveling taught him great respect for other cultures and allowed him to share his knowledge with students worldwide.

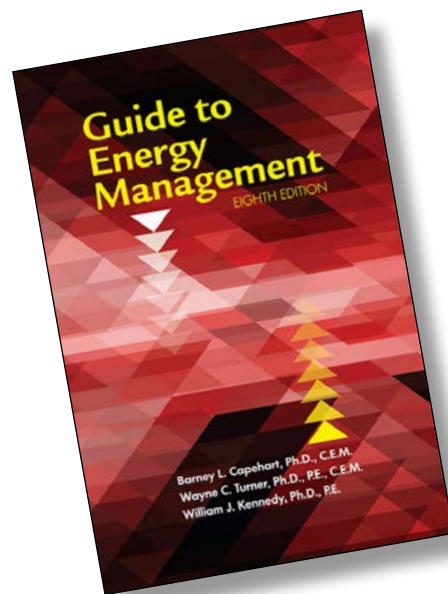


Al found friends and like-minded individuals in Victor Ottaviano and Walter Johnston to help teach the first CEM two-day program. The adoption of the program grew slowly but steadily for the next few years. Technology began to mature across the industry, leading to a growth in the subject matter and a need for specialized instructors. Wayne was one of the first additional instructors to the program in 1985.

By February **1982**, over **900**
Energy Managers had applied to become certified,
and the Association was starting to spread its wings
with over **4,400** members

The Guide to Energy Management

Wayne co-authored a book called Energy Management, released in 1984. Wayne and Barney, who had worked together professionally for over ten years, discussed updating the text in the late 80s. Wayne was unable to take on the additional work, and so Barney took to the task. The revisions were significant enough that AEE wanted to publish it as a new title. Wayne remembers, "In October 1993, Barney got a phone call from Al. He [Barney] thought Al probably wanted him to help teach the two-day CEM training seminar. But was surprised when Al told him he had just read over the galley proof of the new book, and he was so impressed with it that he asked Barney if he would like to develop a new, five-day training seminar based on it and also call it the "Guide to Energy Management."



The Guide To Energy Management (8th Edition) and The Energy Management Handbook (9th Edition)



Wayne C. Turner. Wayne is a great outdoorsman who has keen insight into his life, the earth, and her creatures. He is devoted to energy management and fly fishing. He is a pioneer for AEE and the CEM program, teaching for more than three decades and influencing young students to carry the banner for AEE and the CEM program.

Victor Ottaviano. Dedicated his life to the energy profession and taught hundreds of young energy professionals. He specialized in and authored on the subject of Mechanical Estimating.

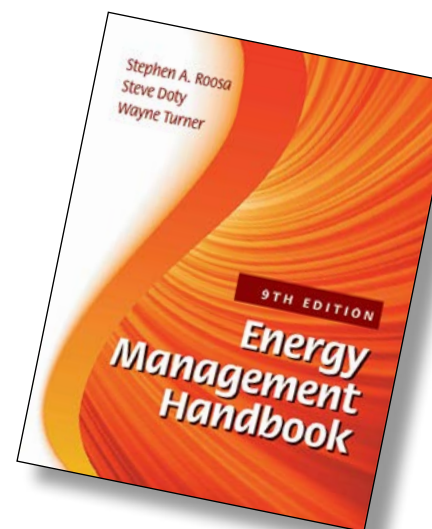


1981 – 1st CEM Board Meeting

Victor Ottaviano, Al Thumann, P. Gilson, J. Cautedella, Romay Rupnow, R. Lanz, C. Feledy

The Energy Management Handbook

Wayne fondly remembers the discussions he had in Dallas, TX, in 1980 with a wide range of energy professionals, many of them affiliated with AEE. Those discussions and the contributions AEE members made culminated in the publication of the Energy Management Handbook in 1982. It has always been one of the "hottest sellers" in the AEE library and remains a critical desk reference for every CEM.



Making the CEM more Accessible

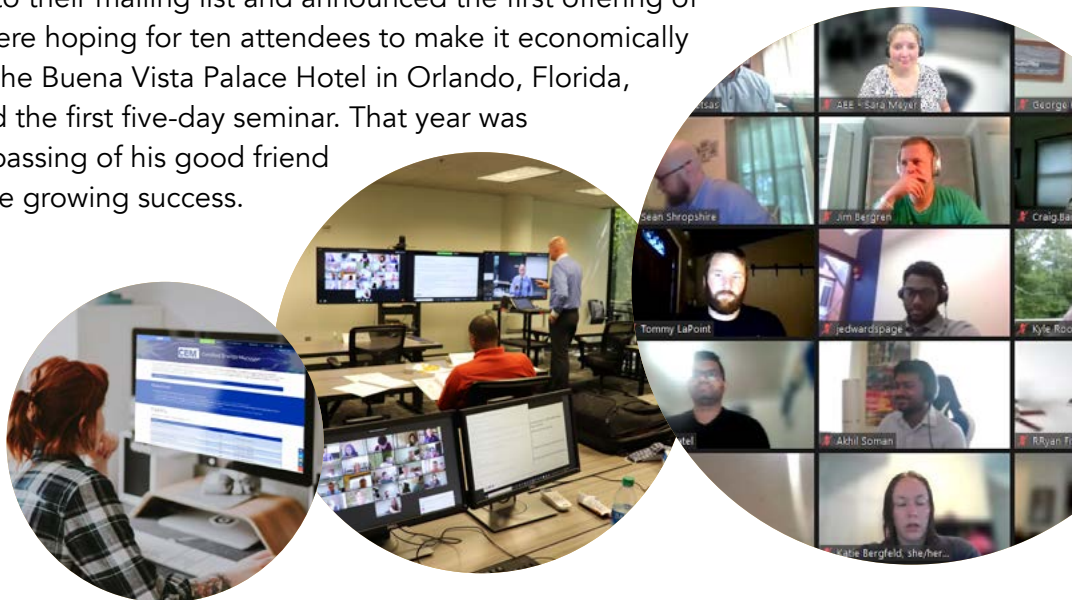
Al realized that many people could not handle the speed and intensity of the two-day seminar, and he thought there would be some value in AEE offering a more extended, slower, and less intense five-day seminar. Barney initially took the lead to develop the outline of the five-day program, but it was clear to him that he would need help, especially teaching over five days. He enlisted Wayne to help create the course workbook and teach the first class. To this day, CEM Training Program attendees benefit from multiple instructors' different perspectives and real-world experiences. Every CEM probably looks back on the training experience and can remember their instructors, the class, and the exam build-up.



Integrating the CEM Exam

It was clear the work Barney and Wayne had put into the workbook and their combined instruction would prepare attendees for the CEM examination. So Al asked them to build time for the test into the program. That factor significantly impacted the interest and attendance of the first "Comprehensive Five-day Energy Management Training Seminar." AEE mailed out 1000 brochures to their mailing list and announced the first offering of this brand-new program. They were hoping for ten attendees to make it economically viable. On June 20-24, 1994, at the Buena Vista Palace Hotel in Orlando, Florida, 65 energy professionals attended the first five-day seminar. That year was bittersweet for Al as he saw the passing of his good friend Victor, who would not share in the growing success.

Remote proctoring of the CEM Exam has enabled many to gain certification during the pandemic.



Each attendee brings unique perspectives and contributions to the CEM Program.

Public, Government, and In-house

Immediately after the first Public Five Day CEM course, word spread, and demand grew. AEE began to get requests for the CEM from Private Companies, Utilities, and Government Agencies. AEE realized a need to contextualize these private seminars' content while maintaining a standardized program for public classes. They hastily scheduled public seminars for the fall of 1994 in Las Vegas and early spring of 1995 in Washington, DC. The first Five Day CEM In-house course for the US Postal Service H.Q. was held in Potomac, MD, while the U.S. State Department Foreign Service group hosted the first Government program in Washington, DC. All were very well attended.





2002 - CEM Board Meeting

Steven Parker, Jack Andres, Kenny Spain, Eric Woodroof, Timothy Janos, Wayne Turner, Barney Capehart, Mel Heis, Clint Christenson

10

Today the CEM is delivered in 10 languages globally, and to meet the needs of all learning styles, it is taught in person, virtually, and hybrid formats with choices for fast tracks or slower-paced classes.



GBE™

Individuals who hold a CEM certification and a current U.S. or Canadian P.E. license are a select group that may apply for the Green Building Engineer Certification.



CEM Spotlight From CFO to CEM



Maryanne McGowan has been in the energy industry for almost 25 years, but her career started in finance. As a CPA by trade, she loved working with energy engineers and decided to make a career switch. She finds humor that she went from the 15th floor of a skyscraper in the city to a coal plant many miles outside of town to follow her passion. After working as a CFO for Duke Energy, she transitioned to strategy, directly handling customers' feedback and how Duke Energy could accommodate their needs.

During this role, she was encouraged to pursue her CEM Certification. Maryanne was honored to take on this certification, knowing that her company valued the credentials, and she had been working with AEE since Duke Energy was a corporate member. She said, "I was a little hesitant because I wasn't sure I would be able to perform on the technical side and pass the exam, but through the good fortune of grit and hard work, I was able to conquer the technical side!" Her key to success: having a study group. She worked with engineers, teaching them the finance side while they taught her the technical side.

When asked how the CEM has helped her in her career, she stated, "The CEM adds credibility to my work. It offers an external source that acknowledges my knowledge and experience level of the work I am providing to clients. We are very fortunate that AEE has aggressively pursued additional areas that recognize and honor the CEM Certification. When the Department of Energy came on board, I felt like that was a giant leap forward to what the CEM can offer. Also, the CEM is international crosses all boundaries and barriers." She has been a CEM for over ten years now and continues to see value in her certification.

Maryanne is the first woman to serve on the CEM Board and is delighted to represent women in energy. She said, "My experience with AEE is that they have always been on the forefront of supporting women in this male-dominated industry. In my younger years, I was very frustrated by the barriers to opportunities. So I think that it's great that they take on that role of having women in leadership." Maryanne also serves on her local chapter and CWEEL board.

Maryanne is Celebrating Her 10-Year CEM Anniversary

Growing Internationally

By 1996, two years after the first Five Day CEM Seminar, and in line with AEE's growth internationally, the CEM was conducted through a USAID funded project in Ukraine, quickly followed by courses in Jamaica, Egypt, Canada, Puerto Rico, Hong Kong, Ireland, and Jordan. The program continued to grow worldwide as it became the gold standard for confirming competence in energy managers. Many of the CEM programs initiated energy efficiency projects that have improved the lives of those involved and the local communities they serve.



Mary Elise Cox. Mary Elise is passionate about serving others. She is inspired by nature, travel, and kindness. Her dedication to the AEE vision has fostered the continued growth of AEE as a global organization and built truly impactful partnerships that transform lives and communities.

Gaining Accreditation

Around 2011, AI noticed a trend in US federal government agencies for the requirement of accreditation, specifically through the American National Standards Institute (ANSI). Always looking toward the future, keeping the CEM not just relevant, but at the forefront of the industry, AI tasked Bill Kent, AEE's new Business Development Director, to set about the laborious task of pursuing ANSI accreditation based on the International Standard ANSI/ISO/IEC 17024. In 2013, the CEM was the first energy management personal certification program awarded ANSI accreditation.

Internationally, a similar effort was facilitated by Mary Elise in 2016. Ian was instrumental in identifying the need for a recognized accreditation in Europe, while it fell on Andreas to work locally in Spain to gain accreditation through Entidad Nacional de Acreditacion (ENAC) based on the international standard of UNE-IN/ISO/IEC 17024. Notice of accreditation was awarded in November 2018. The support of a network of global industry professionals and chapter organizations was instrumental in this success.



Bill Kent. Bill is following his mentor and friend AI Thumann in executing the mission of AEE. An avid tennis player, hiker and traveler, he is passionate about making a difference for future generations.



Ian Boylan. Ian brings a solid presence to the AEE family in Europe. He enjoys sailing. But his engineering heart and continual improvement mindset mean he's constantly questioning how to make his boat go faster with the same input energy?



Andrés Ortuño. A former president of the Spanish Chapter, and member of the International CEM Certification board, Andrés, has volunteered his deep experience and time to help expand the reach of the CEM program globally.

With over **16,750** active Certified Energy Managers and **1,200** more Energy Managers in Training, the evolution of their roles and responsibilities will never be complete.

The CEM program, presented in over 60 countries, and continues to be a global certification standard for energy professionals.

Societal Trends and Responsibilities

In 2012, Barney thanked Eric for his contribution to the 7th Edition of Guide to Energy Management. Eric discussed the importance of greenhouse gas emissions impact on global climate change and an energy manager's need to manage emissions from buildings and facilities, including how to measure and report GHG emissions, reduce them, and mitigate or offset them. The connection between electric generation and use, and CO₂ was clear. It became part of the CEM program and body of knowledge. The discussion for energy managers to understand societal trends and how they impact energy projects is now discussed during the training program and included in the training workbook.



Dr Eric Woodroof. Eric Woodroof was fortunate to be mentored by Wayne Turner and Barney Capehart during his graduate studies and professional career. Woodroof enjoys traveling, water sports, and helping young people with opportunities to further expand the energy management field.



Samer Zawaydeh. Samer is committed to the development of the energy sector across the middle east, especially for young professionals. He continuously works on global energy awareness, capacity building and clean energy projects that are secure and affordable.

Globalization

In 2019, AEE made another significant investment to ensure the continual improvement of the CEM Program. It was an effort of herculean proportions undertaken by two teams led by Eric and Samer. They brought together 20 industry experts, each one a CEM program instructor, with more than a century of combined experience between them. Together, they reformed and re-wrote 38 years of development in just a few short months. CEM instructors worldwide now teach to these new materials, which are aligned to the Body of Knowledge and meet the needs of energy managers globally.

Thanks to all that made it possible.

AEE would like to thank everyone for their contributions to this article. Much like the CEM program and the work AEE accomplishes daily, this article would not have been possible without many individuals' input, time, and effort.

Breaking Barriers

I was recently asked to write an article about the value of renewing certifications—a somewhat simple task. After all, I'd only need to regurgitate the typical talking points put out by the organizations that offer industry certifications. But as I put pen to paper, it becomes more complicated. Those talking points are valid, but I think the personal journey of gaining and maintaining certification is more interesting to cover. From here on, it is purely my opinion. I will not talk about any specific certification or recommend any particular certifying body or organization. I'll first review how I progressed in my career. I will cover what certifying bodies claim is of value and then offer the value I believe is tangible. Lastly, and more importantly, I will talk about what certification offers in the sense of self-worth, no matter what market or technical field you work in, your experience level, or your age.

My journey, and please bear with me, is the journey many professionals take. Going back 15 years, as I started as a young professional in sales and marketing, I realized that to validate my experience and demonstrate my skill set, obtaining a certification might be a good idea. I was lucky to work at a forward-thinking technology company that valued accreditation, especially in technical roles. I was working in fields where the tools and technology changed at a fast pace. I decided to take training in two specific areas, a leading

The Value of Maintaining Certification

By Michael Hewson



creative software platform, and an online advertising platform. At the end of each short training program, I took an exam and gained my certification—a pretty standard process. These were both focused areas in the field of marketing.

A few years later, my responsibilities grew, and I moved into a middle management position. At that point, if my career was to develop further, I realized I would need additional credentials that demonstrated my broader experience and depth of knowledge across the field of marketing and business as a whole. As many people do at this point in their career, I undertook a more extended educational program, a master's degree.

More recently, I looked at making changes to how I manage projects and balance time. Unfortunately, I do not have the time in my daily work schedule to put aside and train myself on the latest philosophies in time management—that age-old vicious cycle. So, I undertook a short online training program outside business hours. I joined a small cohort of my peers on a program that also offered an accredited certification. This training undoubtedly kick started my adaptation of these new time management methods.

So, back to my original point. I believe many professionals, no matter what field they operate in, undertake this three-step cycle as they build their careers.



Step 1. Individuals leave a university with a broad understanding of the fields in which they want to work. During their first years of employment, they are mentored and focus on a specific area. They may then undertake training in technology, tools, or platforms to undertake specific tasks.



Step 2. As their career progresses, they gain more experience and depth of knowledge—responsibilities increase, and the focus becomes less on tasks and more on management and business. The training, and hence certification, undertaken at this point spans technical and business functions. It is broader and deeper and generally validates expertise in the industry sector showing your ability to make connections across different disciplines and boundaries.



Step 3. As new technologies, processes, or fields begin to emerge in a sector or cross from other disciplines, there may be a need to adapt and utilize. Training and certification once again become focused on specific technologies, tools, processes, or strategies. To adopt these quickly, you look to 3rd party, trusted sources or organizations for help.

(continued on page 38)

Developing Your Individual Shape

Early in your career, excel in a specific position and gain a foothold on the professional ladder. As you grow, a broader outlook is needed. As you mature, you delve deeply into focused areas. This outlook fits with what Human Resources call T-shaped, M-shaped, and, more recently, E-shaped individuals.

Without getting too detailed, an I-shaped individual has a depth of knowledge in a particular area of study. A T-shaped individual, in contrast, has a depth of knowledge in a particular area of study but also has the breadth of knowledge that allows them to work effectively with other disciplines. An M-shaped individual has a depth of knowledge in multiple yet incongruent areas of study. An E-shaped individual is one that combines experience, expertise, exploration, and execution.

Nebulous Reasoning

Certifying bodies or organizations market their certifications in very similar ways. Even though they are often presented as nebulous ideas, the reasons for you to obtain their certificates are very valid. They use high-level terms, such as providing value, reinforcing reputation, accreditation, ensuring quality, meeting industry needs, transferable, or demonstrating competence, without explaining the tangible value or benefit in terms that an employee or organization directly relates to.

I believe the primary reason anyone should pursue certification is to overcome barriers.

In the world of business, four primary reasons support this: developing capability, creating customer affinity, maintaining a competitive edge, and leading in the industry. Again, nebulous reasons without further explanation, so let me expand on each of these ideas and the barriers they overcome.



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Develop Capability

Entering into a certification program helps expand fundamental knowledge and develop subject matter expertise. Plainly speaking... you learn new things. As an employer, it is proven that investing in your employees to help them "learn new things" helps maintain staff, reduce turnover, and build future capabilities. Both individuals and companies develop additional capabilities that allow them to do things they may not have done before, or done as efficiently.

Create Customer Affinity

Maintaining a credible certification recognized and trusted by your customers will increase customer loyalty. This is indirectly true. It's a great service experience that directly increases loyalty and allows firms to reduce price sensitivity. But the behavior of a certified individual can add a great deal to the service experience, such as offering an unbiased approach, demonstrating a high level of competence and a commitment to quality standards, and following industry best practices.

Maintain a Competitive Edge

Being recognized as a subject matter expert in a competitive marketplace opens doors of opportunity. Many companies require specific certifications for employment, and they are often a project requirement or included as an integral part of a request for proposal (RFP). Maintaining a certification ensures you and your organization have the opportunity to compete.

Leading Industry

Holding a certification increases your chances of being involved and part of the community that leads to industry changes. Strategies, practices, and technologies change at such a fast pace; these changes are sometimes local and driven from an industry segment, sometimes they are external to the market in which you operate. The current pandemic is a prime example of an external catalyst for change that is driving everyone to adapt to a new 'norm.' It's the individuals that lead a community that define new regulations, adopt practices, or prove technologies that become the standards for the future. A certification grants you access to a focused group of individuals that, in turn, generally steer these conversations.



Ebook Subscription Service Launching Soon

I am excited to announce we will soon be offering access to the complete AEE Book library to our members for less than \$3 per month. We have worked with our partner, River Publishers, to bring the ebook platform to you - A single annual subscription provides access to over 200 titles covering topics from Energy Management and Engineering to Security and Manufacturing Lubrication. With over 10,000 pages of searchable content, subscribers will be able to read, search, highlight, and take notes from professional, peer-reviewed book content.

The Ultimate Desk Reference

All the titles referenced in our certification study guides will be available, including the Guide to Energy Management 8e (CEM), the Handbook of Energy Audits 9e (CEA), the Green Facilities Handbook (BEP), and many more. For those

undertaking an AEE certification program, access to these titles will help prepare them for the exam. For active energy professionals, a subscription will be an invaluable, ongoing resource.

Increasing the Value of Membership

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Mel Claus, AEE
Membership Director



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Increasing Your Value and Self-worth

Many individuals are technical, creative, and motivated. They perform exceptionally for the companies that employ them, often generating substantial savings for their company or performing work that will support their company for years into the future. But they may not realize their intrinsic value because they do not necessarily know their self-worth. Understanding the value you bring to

any situation and the difference you can make is crucial to realizing your self-worth. I am not saying you need a certification to understand your self-worth. But undertaking a certification program certainly demonstrates a level of self-awareness and self-worth. I think this is the most significant benefit of undertaking and maintaining certification. It can be demonstrated in the following ways:

It Adds to Your Self-esteem

They are confident in the work they produce and act professionally. Traits that help individuals develop positive relationships.

You Recognize the Contribution and Difference You Make

You believe in your skills, knowledge, and experience you can apply to your work. You can see the value of what you are achieving vs. the level of effort involved to obtain results.

You Stand Alongside Your Peers

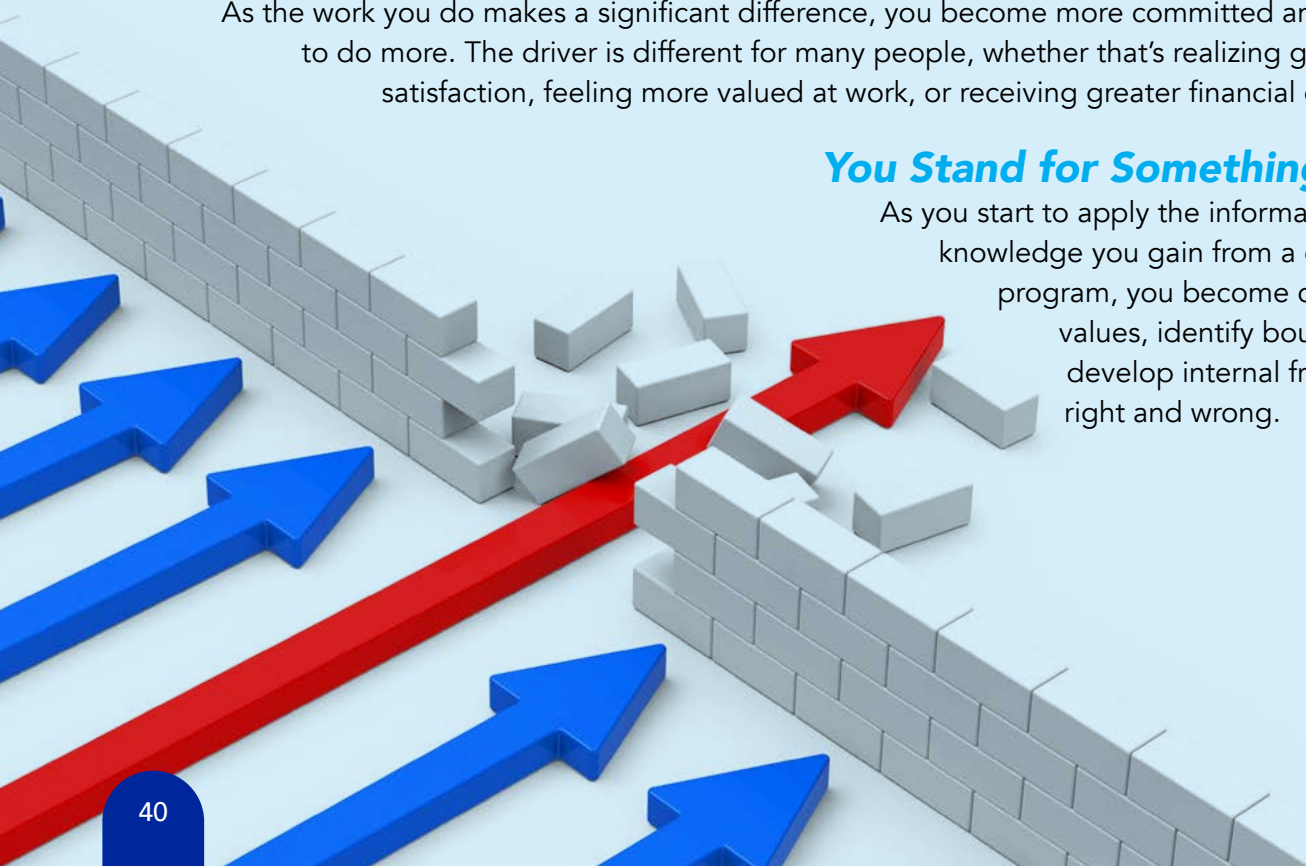
Knowing you have achieved the same certification level helps create a sense of equality, which carries through to your interactions with clients, managers, colleagues, and even friends. You gain a seat at the table and are part of the conversation.

You Become Increasingly Engaged

As the work you do makes a significant difference, you become more committed and are willing to do more. The driver is different for many people, whether that's realizing greater job satisfaction, feeling more valued at work, or receiving greater financial compensation.

You Stand for Something

As you start to apply the information and knowledge you gain from a certification program, you become clear about your values, identify boundaries, and develop internal frameworks of right and wrong.



In Conclusion

If you are considering undertaking a certification or are already certified, I hope some of the points I make resonate with you. In conclusion, I will leave with one last question. **Why maintain your certification?** The answer to this is the culmination of everything I have discussed.

Gaining any certification demonstrates personal development and a willingness to improve and adapt. These are vital skills for leaders and valued by an employer or a client and will stand you in good stead as you progress through your career. By an equal measure, maintaining your certification status shows longevity and commitment.

If you feel the certificate is not relevant in your current situation, I will argue that you should still maintain it. You will never know the next hurdle you need to cross or the tools you'll need at the time to overcome the obstacle. If the cost of renewals is an issue, please consider this. The measures that organizations put in place to maintain your certification demonstrate a certificate's depth and add to the certificate's value. Obtaining educational credits, attending events, or proving practical experience are designed to ensure you are involved and engaged with the wider community.

Lastly, certification programs that are relevant and endure are continually updated to fit the needs of the industry. For an organization to maintain the certification, a large portion of the renewal revenue obtained is re-invested to keep its relevancy in industry. In the words of Frank Sinatra himself, "Regrets, I've had a few. But then again, too few to mention." Every measure of self-worth plays a role in why you should maintain a certification. Don't underestimate the personal value of maintaining something you have worked hard (and possibly fought) for.

AUTHOR BIOGRAPHY

Michael Hewson joined the AEE in 2019 to lead brand management and provide creative direction for all marketing activities. Michael is an avid (Certified) SCUBA Diver, underwater photographer, has over 18 years of experience in marketing communications and holds a master's degree in marketing from Robinson College of Business, Georgia State University. He may be contacted at michael@aeecenter.org.



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Call for Papers Opens Oct. 4th 2021

Visit AEE event websites for details or see page 5.



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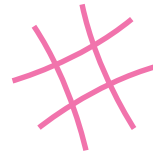
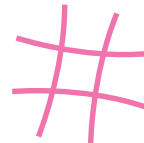
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PROGRAM**

TIC
TAC
TOE



Hey

Teachers and parents tell you it's important to save energy and water. Can you think of ways to save on both? We've listed a few ways here...

Use less electricity by turning off your bedroom light! You would have to peddle your bike for over three days to generate the same energy as a 60w bulb uses in one hour, and your light might have more than one bulb! Ask your Mom and Dad if you have LED Bulbs in your house.... they are much more energy-efficient!

Don't overcharge your devices and unplug them when they are not in use. A tiny amount of energy trickles into the devices when they are fully charged but still plugged in. How many a million kids live in your country? That little trickle from all those electronics soon add up. Unplugging when not in use will also improve your device's battery life.

Close the doors when you leave your house, even if you're running in and out? It takes energy to heat and cool your home. Every time you leave the door open, even for a minute, allows the energy to escape. You then have to use more energy to keep indoors the temperature you like.

Use less water by taking shorter showers. Try running your shower for 1 minute and capture the water to see how much you would save. You also save energy by not having to heat the water!

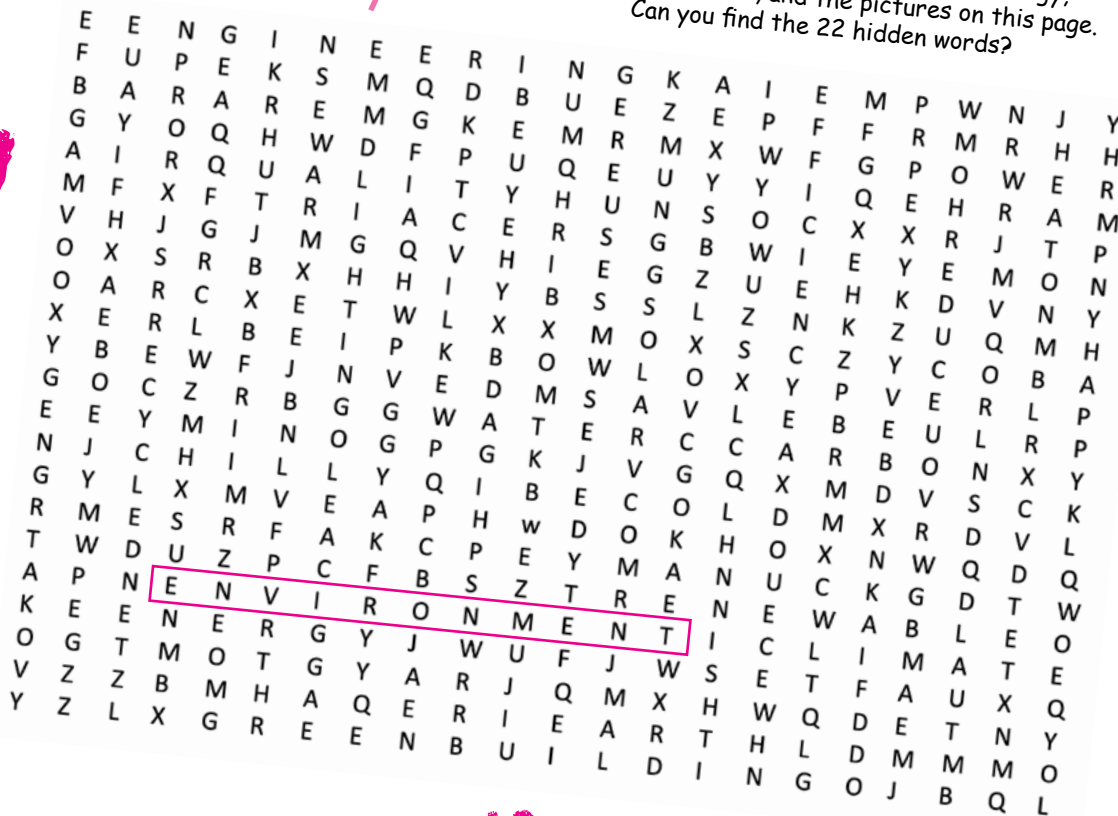
Make your flushes more efficient! Each time you flush the toilet, you use about 6 gallons of water. It may be too expensive to fit a new efficient toilet. But you can still save water by putting a brick or a water bottle in the back of the toilet. Take a plastic water bottle, fill it, and put a couple of rocks in it to help it sink. You're using displacement to use less water and re-using the plastic bottle, which then helps the environment.

This is an easy one. Turn off the tap when you brush your teeth. We think you can save up to three gallons of water per day. Don't believe us. Then do this. Brush your teeth with the tap on but collect the water in a milk carton or bottle. Measure the water. Multiply it by two - because you brush two times a day, right? Then multiply it by 365 to see how much water you'd save each year. We think it's about 1,000 gallons per year.

TIC-TAC-TOE

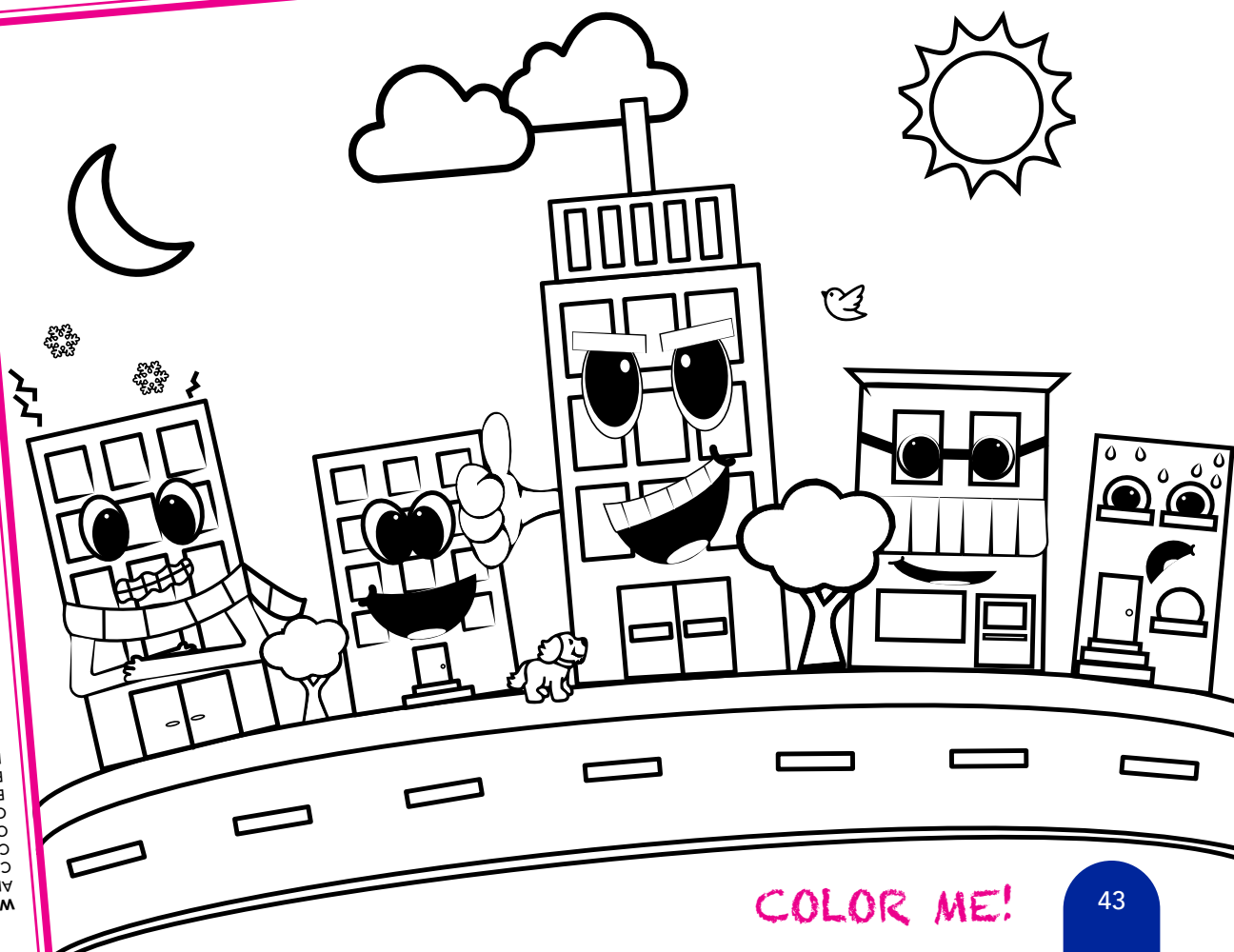
Kids!

WORD SEARCH FUN
Find words in this puzzle related to energy, efficiency, climate, and the pictures on this page.
Can you find the 22 hidden words?



Which Buildings are Energy Efficient?

WORD SEARCH ANSWERS
AIR QUALITY
CARBON
CHILLY
CLIMATE
COLD
EARTH
EFFICIENCY
ENERGY
ENGINEERING
ENVIRONMENT
GREEN BUILDING
HAPPY
HEAT
RECYCLE
SOLAR
LIGHTING
REDUCE
WARM
OXYGEN
REUSE
WATER
POWER
RENEWABLE



COLOR ME!

In July 2021, AEE announced the offering of a Transport Energy Auditing course. This is an in-depth certificate program aimed at experienced and qualified energy auditors seeking to include transport analysis in their energy audits and management services. As energy managers and auditors, why should we be concerned with transport energy? Traditionally, we have focused on the energy consumed by buildings and fixed assets that we can control and make more efficient. Except for electrified mass transit and EVs starting in Y2K, transit assets and the energy they consume have been considered disconnected from the energy used by buildings and delivered by the grid. However, transport energy has become increasingly associated with buildings and the grid. Important reasons for this association include transport's large share of global energy use and GHG emissions, accountability for transport in ESG benchmarking, and innovative transportation solutions emerging that will help reduce emissions.

"that is where the money is."

Clyde Barrow of Bonnie and Clyde fame was once asked why he robbed banks. He answered, "that is where the money is." Energy managers have concentrated on buildings because they use the most energy and cause the most GHG emissions. The EIA and USEPA respectively estimate that globally buildings use 40% of the energy and account for 40% of GHG emissions. However, transportation holds a strong second place to buildings accounting for 25% of energy consumption and 29% of GHG according to the EIA and

USEPA. Due to greater light vehicle use, transportation in the US accounts for a higher energy consumption of 28%. Like buildings, transportation represents a large opportunity to improve energy efficiency and reduce GHG.

Sustainability and environmental benchmarking programs ask participants to measure and report data to account for GHG emissions. These emissions are measured in three scopes. Scope 1 accounts for emissions for energy from fuels consumed on site like natural gas and diesel, Scope 2 represents GHG from energy generated offsite such as electricity from a coal fired plant, and Scope 3 GHG come from other activities caused by operations. These may include GHG from deliveries, employee travel for business, and even GHG associated with employee commutes. Transport Energy Auditing can play an important role in Scope 3 assessment and identifying solutions to associated GHG emissions.

While zero emission vehicle (ZEV) concepts such as battery powered EVs and hydrogen fuel cells have been around for decades, recent innovation has made these applications practical and production scalable. Demand for the Toyota Prius, Nissan Leaf, and Tesla line of cars have proved the market has adopted low and zero emission vehicles. 2022 promises to be exciting with the scaled delivery of several light-duty truck and SUV models. In addition, several firms continue to develop heavy duty trucks and busses.

However, these exciting developments come with some questions such as: Can we meet the demand for batteries and hydrogen? Can the grid handle this new load? **As AEE members and certified professionals, we will have to answer these questions.**

Range Anxiety

Currently, one can refuel petroleum powered vehicles quickly and conveniently.

Conversely, a question asked by those that consider vehicles powered by nontraditional sources is, "how far can I go on a charge or fill up?" As the capacity of batteries increases, charging infrastructure expands, and driver experience grows, range anxiety will diminish.



Prius Effect

Behavioralist discovered operators of hybrids and EVs drive differently than people that drive internal combustion engine (ICE) cars. They found these drivers paid attention to dashboard data to improve efficiency and range. As a result, they were less likely to accelerate with jackrabbit starts and brake slam stops.

Drawdown Potential

The book Drawdown identified eleven transportation solutions that could help with the reduction of GHG emissions (CO₂e) and climate change. These concepts included solutions to transport on land, sea, air, and virtually. Experts estimated from a plausible scenario that global transport solutions could reduce GHG by 45.8 gigatons by 2050 at a net cost of \$15.7 trillion (US) with a net savings \$22.7 trillion (US).

Currently, petroleum fueling stations are ubiquitous and convenient. As the use of EVs and alternate fuel vehicles grow, do we have the infrastructure to support charging and fueling? As chargers get added to buildings and the grid, AEE professionals will play an important role in determining how to deliver this energy efficiently, economically, and safely. Also, we will be called upon when considering concepts fueled by emerging sources such as hydrogen.

Charging & Fueling

(continued on page 46)

An Open Road

SMART Vehicles

EVs come loaded with phenomenal amounts of technology, such as AI and IoT. This tech allows them to operate safer, more efficiently, and in response to the environment around them. The most amazing feature of these vehicles is the ability to operate autonomously without human drivers. The Curiosity Lab in metro Atlanta now tests the Olli autonomous bus and other smart vehicles on public streets. Knowledge gained from these experiments will control transportation and smart cities of the future.

Hydrogen Powered Vehicles

What if we could power transportation with the most abundant element in the universe and with no GHG emissions? Hydrogen fueled vehicles represent this potential. Toyota is taking orders for their Mirai model, several heavy truck manufacturers are developing new models, and Germany has a new train that are all fueled by hydrogen. Airbus is also considering hydrogen fueled jets. The future of this fuel will depend on finding more green ways to produce it and building a supply infrastructure to make it widely available.



Regenerative Braking

One feature that drivers of hybrids and EVs take advantage of to improve efficiency is the regenerative brake. This feature returns braking energy used to stop a car to recharge the battery. Optimizing this feature is one of the behaviors observed in the Prius Effect.

Battery Life Cycle

As we all know from the use of our mobile phones and other rechargeable devices, batteries have a limited number of recharge cycles. What do we do with all these worn-out batteries and the dangerous chemicals in them? Several startups have started recycling these devices to safely reclaim valuable components and avoid harm to the environment.



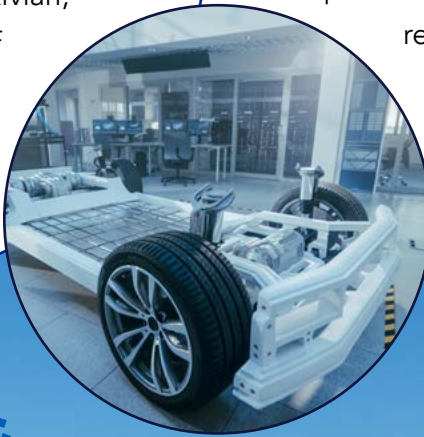
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Ray Segars, CEM, joined AEE in 2021 to lead development strategies and identify growth opportunities for AEE throughout the United States. With 30+ years in the industry, he has gained extensive energy efficiency and business development experience. He is an AEE Fellow, has served as AEE Chapter President, and currently serves as AEE Region II Vice President. He may be contacted at ray@aeecenter.org



SUVs and Light Duty Trucks

Because of their usefulness, SUVs and pickup trucks sales continue to grow for manufacturers. 2022 promises to deliver many new models such as the Ford F-150 Lightning, a Hummer EV, and models from newer manufactures like Tesla, Rivian, and Lordstown. The growth of these products will depend on the acceptance for use for fleets and services.



New and Traditional Vehicle Manufacturers

Tesla has proven that nontraditional manufacturers can design and produce vehicles in scale as well as those that have built cars for decades. The new entrants have pushed the big three from the US, Toyota, Honda, Kia, BMW, and Daimler to produce EVs. China boasts over 100 startups focused on producing EVs. One of these, Xpeng, recently announced they had produced their 50,000th car in 496 days.

Mass Transit V2G

This segment represents a potential to deliver huge GHG reductions in urban areas is the switching of mass transit to sustainable sources. Bus manufacturers including Blue Bird, Thomas, and BYD now produce electric busses for the education and transit market. Los Angeles now uses electric buses, and Canton, Ohio has a fleet of hydrogen powered buses. Greater deployment of these concepts will reduce GHG and other pollutants that cause clean air nonattainment in many cities.



What if your car could power your house or store energy from your solar panels? While range anxiety concerns those driving longer distances, most daily commuters will often need less energy than the batteries will store. The development of Vehicle-to-Grid (V2G) technology could reverse electricity from an EV to supply a house or even the grid during times of critical need. On a larger scale, grid designers are considering how vehicles that have down time such as school buses in the middle of the day could support the grid.



COVER STORY

ENERGY EFFICIENCY ON THE WAVES SUNWATER MARINE | SAN DIEGO, CA

While most individuals started baking or exercising as a pandemic past time, James Richmond (CEM®) bought a boat and created a new company called Sunwater Marine. There are only about a thousand electric boats in the entire world, most in Europe and on the US East Coast, but James wanted to bring this technology to the West Coast. As the first solar-electric full-time charter in San Diego, the Ramblin' Rose is making waves in the world of energy-efficient sailing.

The electric conversion started with replacing the lead-acid batteries with lithium-ion, and installing electric motors. Future projects are replacing energy-intensive items such as the watermaker, autopilot, and cooktop with energy-efficient replacements. For solar panels on boats, the most common drawbacks are shading from the sails and available footprint. James found CIGS panels made of gallium-selenide instead of silicon, making them more flexible, and you can walk on them. Each cell contains a bypass diode, so the panels generate power even when partially shaded.

The Ramblin' Rose generates enough solar energy for instruments, auxiliary systems, cooking, and low-speed propulsion needed to get wind to sail. Tour the boat and learn more about the technology by watching James' interview.

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Take a Tour



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