Anne Arquit Niederberger, Enervee

Poster Title: Advances In Quantifying Savings From Choice Engine Platforms

Abstract: Beginning this year, online utility choice engine platforms originally deployed as pilots & demonstrations are transitioning to full-scale resource acquisition programs, with utilities claiming the market-based savings captured by making markets work better for consumers, without monetary incentives. Key to this transition and to scaling investment in marketing to drive increased engagement is the ability to quantify and claim the resulting energy savings. We will report recent results from utility online choice engine platforms and methods developed to quantify the influence of choice engines on actual purchases. This includes new research on survey-based methods of determining net-to-gross ratios. In particular, we studied two self-reported measures and studied to what extent the responses were correlated with product choices and their efficiency (based on the zero to 100 Enervee Score of each product model): >A single question about how influential the platform was in affecting the buying decision >A modified multi-item usefulness scale, documented to be reliable in the scientific literature. This research found the following: > "Influence" is significantly different across the Score/no Score conditions, but only just significant (p=.04). Influence is a very abstract term, and relying on a single question does not represent a best practice, so we anticipated this result. > The "influence" measure has no significant correlation with efficiency of product chosen (further supporting the conclusion that it is a weak proxy for platform influence on buying decisions). > The "usefulness" scale is significant at the 2% level, suggesting that this established multi-item measure is better suited to act as a self-report proxy for actual purchasing behavior than asking about influence. > The "usefulness" measure has a highly significant correlation with efficiency of product chosen (p< .001). These correlational analyses support the argument that a usefulness measure would be more appropriate as a self-report proxy for actual influence, especially if a sliding net-to-gross measure is considered. These results were to be expected, given shortcomings of the perceived influence question: > Social (un)desirability bias. Consumers play down self-reported influence on decision-making, as we have a tendency to protect what we feel is our mental sovereignty ("I can make up my own mind, and nothing influences me."). > We could not find any validated self-report measures for "influence" in the scientific literature; where influence was an independent variable in studies, it was determined by behavioral data, rather than self-reports. > Using a single question survey measure heightens its shortcomings.

David Barclay, NMR Group, Inc.

Poster Title: The Last Great LED Hunt: Observations from the End of Residential Lighting

Abstract: The reign of residential lighting programs has been long and fruitful, but the throne is quaking. In recent years, the implementation of the Energy Independence and Security Act of 2007 (EISA) and the introduction of LEDs into the marketplace have pointed to the end of program-induced savings from residential lighting programs. Hence program administrators have had to carefully reexamine their programs. The data presented in this paper will help inform program administrators as they make crucial decisions on how to allocate limited program funds given the dwindling savings from residential lighting. This paper will look at market data gathered over 17 years, drawing from both historic and recent market assessments in multiple areas, including non-program areas. Using these data, we will paint a picture of the long-term lighting market and forecast the market's future based on market adoption curves developed from saturation data and from insights provided by market actors. The various market assessments will allow the authors to track and present key market indicators and examine them for emerging trends and issues brought about by technological change and increased efficiency standards. The paper will place special emphasis on the impacts of EISA (including Phase 1 and 2), and on the adoption of LEDs in program and non-program areas. The authors will use the information on historic trends and current market conditions to provide actionable insights to help program administrators carefully consider when and how to exit the lighting market. This paper will be of interest to a wide variety of program planners, implementers, administrators, regulators, and evaluators. All research will be completed prior to March of 2018. Data sources include: thousands of on-site lighting inventories (including repeat visits to panels of homes), point-of-sale data for 44 program and non-program states, and scores of in-depth interviews with manufacturers, suppliers, and retailers representing programs across the nation. All data collection will be completed by December 2018. Study Limitations: To help mitigate both the potential for Hawthorne effects among panelists and non-response bias from the consumer survey used to recruit for the on-site visits, evaluators set strict quotas based on home type that help ensure good representation from often overlooked respondents including: low income, multifamily, renters, and households with lower levels of educational attainment.

David Barclay, NMR Group, Inc.

Poster Title: So, What Would You Say You Do Here? Asking The Hard Questions About The Role Of Direct Install Programs

Abstract: With saturation levels climbing and lighting standards looming, the writing seems to be on the wall for traditional upstream residential lighting programs, but does this mean residential direct install programs share the same fate? LEDs are a staple of home energy audit and assessment programs. Low costs, ease of installation, and high electric savings help to boost the cost effectiveness of direct install programs. Unlike LEDs sold through traditional upstream programs, which are generally used to replace lamps after they fail, LEDs installed through direct install efforts are often considered early replacements. However, with the market rapidly transforming, program administrators are struggling to understand what role LEDs will play in direct install programs in the coming years. Questions regarding effective useful life (EUL) and net-to-gross ratios (NTGR), and interaction with existing upstream and midstream programs, must be answered before program plans are set. One program administrator has already answered these questions using a consensus process that included program administrators, regulators, and evaluators. The consensus process leveraged an innovative tool designed to help the group make decisions in bite-sized chunks, with each decision building upon the last. The tool was designed to facilitate conversation by providing updated NTGR and EUL estimates in real-time based on decisions made by the group. In the end, a seemingly onerous task came down to agreeing on values for three key inputs, namely: market movement, market movement escalation, and market movement attributable to the upstream program. The tool also carefully accounts for interactions between upstream or midstream program interventions and direct install programs, an area that may be of interest in the future as programs increasingly move towards midstream. Readers will be able to take lessons learned from the paper to help develop their own key inputs to define their own markets (regardless of end use) and develop region-specific EULs and NTGRs (subject to data availability). Readers will also be provided with access to the publicly available tool to help facilitate their own consensus processes. This paper will be of extreme interest to a wide variety of program planners, implementers, administrators, regulators, and evaluators. All research for the paper is complete.

Terra Bell, CLEAResult

Poster Title: Project Footprint: Join the Movement to Accelerate Hawaii's Sustainable Future

Abstract: "Together, we can power Hawaii with 100% clean energy". Project Footprint provides a new avenue for empowering Hawaii residents to act and be part of the community movement toward reducing Hawaii's carbon footprint as the state continues to move forward on its 100% clean energy goals. By rewarding small steps, promoting community partnerships, and adding personal touches in utility-customer messaging, Hawaiian Electric Company (HECO), in partnership with CLEAResult, is using Project Footprint to deepen relationships with their customers and remind us all that individual actions can collectively make a difference in the global mission to reduce our carbon footprint. Using emotional messaging and advertising with local imagery, themes that resonate with the people of Hawaii, and brand loyalty program strategies, Project Footprint will promote culture change, social movements, and build a social network to scale up community participation in Hawaii's clean energy transition. Launched in late-January 2019, early campaign results as of mid-March are positive: 210,000 emails sent with a 30% open rate and 4% click-through rate to the site (above industry average), 3,400 customers have joined the movement with 5,000+ projected to join by end of March, over 2,400 customers have claimed rewards, over 3,800,000 media impressions, 80,000 YouTube video views and growing, and 28,000 unique visitors to the sight since launch. Additional campaigns and social media are planned throughout 2019. https://footprint.hawaiianelectric.com/#/ At CLEAResult, we envision the structure of Project Footprint to be highly replicable to improve customer satisfaction and increase engagement with utilities in other parts of the country with customization of the emotional touches, messaging, imagery, and rewards that resonate best within your region.

Tracey Benson, University of Canberra

Poster Title: Ignite*Energy : Supporting Behaviour Change Through The Use of UX and VR

Abstract: When considering energy consumption, it is a mistake to assume that people make economically rational decisions driven by costs. There is strong evidence that suggest that factors such as comfort, social norms and people's values all contribute to how energy is consumed at home. It is important to understand the choices that people make and what triggers them to make positive changes to their energy use. Clearly the best interventions are upgrades to appliances, building better housing and retrofitting existing dwellings but this is often not possible for renters and low income householders. This paper focuses on the potential of using virtual reality (VR) as a means to intervene into people's habits around daily energy use. The Ignite*Energy research project seeks to understand key barriers and incentives related to changing energy use amongst renters in the ACT. Research methods include a survey instrument and a workshop focused on triggering change in social behaviours around energy use through storytelling, personas and VR. The paper explores the concepts driving the design of the Ignite*Energy VR experience. Our focus is on creating an empathetic space for both visualising impact and reinforcing rewards which correspond to the energy saving choices offered through the VR interface. Literature review Energy efficiency behaviour change interventions are largely designed applying methods drawn from the broad fields of economics and psychology (Ã–lander 2014, Thaler 2008, Darton 2008). Participatory Action Research is seen as an appropriate method to engaging the workshop participants, which aligns with Shove's research into energy savings and comfort (2012). Proposed framework/concepts One of the key findings in the Powershift report (Russell-Bennett et al 2017) was the need for creating programs that were fit for purpose and tailored to the needs of the consumer. The larger aim of the workshop model is test some of these design and communications tools in the context of energy efficiency with the ambition to apply the model to other environmental and social contexts where changes of habit have a positive impact on environment, health and wellbeing. Some early studies regarding the benefits of VR experiences suggest that this technology can support an increased sense of wellbeing in a range of health settings - in particular with terminally ill patients, dementia, mobility impairment and mental health (Freeman 2017, Radford 2016).

Alex Bradley, ENERGY STAR, EPA

Poster Title: Leveraging the Value of the ENERGY STAR Brand Through Deeper Customer Segmentation

Abstract: Authors: Jill Vohr and Alex Bradley In 2018, ENERGY STAR set out to better define and understand key customer segments for energy-efficient products and to quantify the value of the ENERGY STAR brand on their purchase decision. Using Claritas Consumer Profiles and PRIZM Premier Lifestyle Segments, ENERGY STAR developed a customer segmentation model that characterized customers according to their propensity to purchase energy saving products. This existing data was analyzed in new ways to first create demographically cohesive consumer groups and then to rank these consumer groups based on energy-saving behaviors and attributes. The results identified two custom segments of consumers: "Energy Savers", customers that have already purchased energy saving appliances, and "Energy Intenders", customers who intend to purchase energy saving appliances. "Energy Savers" are made up of two subsegments: Sustaining Seniors and Established Environmentalists, while "Energy Intenders" are made up of three subsegments: Striving Conservationists, Aspiring Energy Savers and Conscious Conservers. For each sub-segment, ENERGY STAR analyzed the data to identify geographic penetration, cost effective customer acquisition strategies, market insights, recommended messaging, and media approaches. With these profiles in hand, ENERGY STAR has planned a second phase of the research, using paid media to measure relative impact of energy-saving messaging and ENERGY STAR branding with our two core audience segments. The goal of this test is to confirm which messages and tactics best resonate with each segment and subsegment and develop strategic media recommendations that facilitate energy-saving behavior change. Data from this second phase of research has not yet been publicly shared, and the BECC presentation will provide the first glimpse at these national-level results. The findings will help utilities to better target their customers with program messages to increase the effectiveness of their efficiency marketing programs.

Eric Cahill, Plug In America

Poster Title: Motivating Auto Dealers to Drive Electric Vehicle (EV) Sales

Abstract: The commitment of auto dealers to stocking, marketing and selling electric cars has come under increasing scrutiny since the first electric models were introduced early this decade. Several well-publicized reports, including those from the Sierra Club, Consumer Reports and research firm Ipsos RDA noted widespread lack of preparedness and even resistance by dealers, with some actively pushing conventional gas-powered models on EV shoppers. What are the key retail-level barriers to EV sales and what should we reasonably expect of auto dealers? What role(s) are best left to automakers, electric utilities or other stakeholders? What steps can the EV community take to encourage more auto dealers to sell EVs and to provide the support EV customers need? We report promising results from a groundbreaking dealer engagement program developed and piloted by nonprofit Plug In America in cities as diverse as Boston and San Diego. Developed based on insights from dozens of interviews with auto dealer, manufacturer and utility representatives, Plug In America's "PlugStar" program provides EV-focused training, tools and incentives to spur EV sales. Attendees representing electric utility, industry and government interests will hear what was tried in these pilots, which elements best resonated with dealers, and whether interventions resulted in increased EV sales and customer satisfaction with the EV purchase experience. We will then discuss the potential to scale up these efforts and promising models to sustain and eventually transition responsibility to industry actors as market conditions evolve.

Jeff Cappellucci, NREL

Poster Title: Multi-Unit Dwelling Parking Availability and Electric Vehicle Charging Infrastructure Analysis

Abstract: Plug-in electric vehicles (PEVs) enable the reduction of energy consumption and emissions from automobile transportation, ultimately promising a less energy intensive transportation solution by way of vehicle electrification. One of the many factors that determines the utilization of PEVs is availability of charging infrastructure at home. The U.S. is home to a rich set of housing situations, with varying parking availability, which can impact the ability to install PEV chargers. Indeed, a lack of electric vehicle supply equipment (EVSE) at multi-unit dwellings (MUDs), combined with less robust direct current charging infrastructure, leave prospective PEV consumers isolated without reliable access to necessary equipment to own a PEV. This is especially the case with MUDs, where ownership and parking availability barriers often prevent the installation of EVSEs, potentially reducing the adoption of PEVs by these households. Despite comprising a substantial percentage of U.S. population in areas with generally PEV-favorable demographics, studies often treat MUDs in an ad-hoc manner given the unique ownership challenges they present. This analysis addresses this issue by conducting an inventory of U.S. housing stock and making estimations for the availability of home charging based on residence type and parking access. We identify representative households and Public Use Microdata Areas (PUMA) that exemplify strong EVSE installation potential and subsequent PEV adoption. Our study offers insights into the demographic and geographic profile of households with strong potential to install EVSE. This information subsequently uncovers a new perspective on one of the primary barriers for PEV adoption and how stakeholders can be better informed to facilitate better PEV adoption in the future.

Susan Corbelli, SMUD

Poster Title: The Seduction of Induction (working title)

Abstract: In December 2018, we invited members of our online residential insight community, SMUD Plugged In, to participate in a research study where they could order a portable induction cooktop from our online marketplace and use it to try various cooking tasks over a period of 3 to 4 weeks. We invited almost 400 members and 287 members completed the research resulting in a response rate of 82% and margin of error of 2.44%. Members provided their feedback on the ordering experience on our online marketplace. After having the induction cooktops delivered to their homes and using them for 3-4 weeks, respondents completed an online survey to provide their feedback on the experience in using induction cooking. We found significant increases in positive ratings after the trial as well as increase in likelihood to consider induction if they need to replace their current stoves. Additionally, we compared attitudes and perceptions of current gas stove and electric stove users regarding induction. Subsequent to the online surveys, we conducted online interviews with current gas and electric stove users to understand what they liked and disliked about their current stove type. We also presented a short advertisement about induction cooking to better understand potential interest and/or barriers to consideration.

Jonathan Coulter, Advanced Energy Corporation

Poster Title: Field Performance of Mini-Split Heat Pumps in Low-Load Homes: Southeastern U.S.

Abstract: Recent energy efficiency practices have led to greater airtightness and insulation levels in houses, prompting concerns about interior moisture levels and comfort. At the same time there is growing industry interest in peak load management of large energy consuming home components. Constructing low-energy/ low-low homes and conditioning them with mini-split heat pumps (MSHP) have been common options in these overlapping conversations. But very little data exists comparing the desired outcomes of these paired technologies with the real-world results in the mixed-humid climate of the Southeast. Advanced Energy has been studying these systems in nine low-load houses in mixed-humid climates by sub-metering MSPHs and monitoring temperature and relative humidity measurements. Advanced Energy's research indicate both desirable and undesirable outcomes from this field research. Some desirable benefits from these paired technologies include increased operational energy savings, coincident peak savings and low installation costs. Some undesirable outcomes include high indoor dew points, MSHP fans running when the coil is not below dew point, and design- and occupant-related issues. If ignored, these concerns could reduce durability, indoor air quality and comfort. This presentation offers insights into the interconnections low-energy/ low-load homes and mini-split heat pumps have on homeowner comfort, coincident peak load and building durability. These initial results can benefit home builders, home buyers, realtors, utilities, manufacturers and program managers. Additional recommendations include optimizing system performance and developing standards or best practices to inform how these systems are used. It is clear, though, that additional research is needed to learn more about MSHPs, as well as to examine standard systems in mixed-humid climates.

Jeffrey Domanski, Erase40

Poster Title: THE MEETING MAP: A POINT OF SALE BEHAVIORAL INTERVENTION AIMED AT HOME BUYERS

Abstract: As many as 42,000 home buyers are presented with the option of building a passive or zero energy home each year during a meeting with a zero energy qualified architect or builder. Such homes come with a number of benefits for the occupants: improved sleep conditions, improved air quality and reduced exposure to common triggers of asthmaâ€”as well as dramatically lower energy and repair costs. The impact on CO2 emissions is also significant: opting for a passive or zero energy home over a conventionally built one can reduce emissions by over 1179 metric tons over the life of the building. Multiply that number by 42,000 home buyers presented with this option and the potential yearly emissions impact of these home buyers opting for a zero energy home is more than 49 million metric tons. Unfortunately, only a very small percentage of this population of home buyers opts for a zero energy home. The purpose of the Meeting Map is to significantly increase the percentage of this population that opts for a passive or zero energy home. Home buyers unconsciously dismiss certain variables in the decision making process and underweight others. Hyperbolic discounting reduces the perceived value of certain attributes of the passive home, such as energy and repair savings. The end result is that the decision is not based on outcomes. The Meeting Map gives the home buyer a number of objective measures to use to evaluate a house with each criteria tying the decision to long term outcomes (as opposed to merely aesthetics or misconceptions about what makes them happy). It reduces the influence of biases in the decision and increases the home buyer's ability to properly weight certain variables by disaggregating the criteria to be used in the evaluation. By looking at each criteria independently (as opposed to considering them all simultaneously and then producing a general intuition about the house) the home buyer will be less likely to discount the benefit of higher air quality or lower repair costs.

Anthony Duer, Applied Energy Group

Poster Title: Remote Sensing: Not Just for Psychics

Abstract: Our world is a vast, complex, and ever-changing place. Traditionally, we have tried to understand our world by sampling it: conducting surveys, doing site visits, or taking physical samples. However, these methods all share the same drawback: in a world that may look vastly different tomorrow, we can only take a snapshot of today. The era of 'big data' is beginning to change this dynamic. With the advent of modern computer vision algorithms, the reduction in data acquisition costs, and commoditization of computational power, users are suddenly able to tap into vast quantities of data to try and solve problems. One area of interest has been the availability of high-quality satellite imagery. In prior years, accessing satellite data required either a scientific grant, government sponsorship, or launching your own satellite into space â€“ none of them particularly affordable options for smaller customers. Companies, however, have begun to provide access to updated satellite imagery â€“ often only lagging a few days or weeks. This access has allowed individuals to explore the world in both unprecedented detail and scope. This has drastically expanded our ability to survey buildings â€“ rather than visiting a few hundred sites to survey them, what happens if we visit every building? Our recent work has been following recent developments in this space. Specifically, using satellite data to track the installation of solar panels across the United States. This presents a significant step forward in our ability to understand how the grid is changing across vast space and time. Using current satellite imagery, we can estimate total installed capacity at a specific site and across a region. Likewise, by using historical imagery, we can also estimate how that capacity has changed across time. Our presentation provides an overview of the ins-and-outs of understanding how to access, understand, and build models with satellite imagery to better understanding our ever-changing world.

Meghan Duff, Association for Energy Affordability

Poster Title: All-Electric Affordable Multifamily: How to Do It

Abstract: To realize a decarbonized building stock, we must make all-electric new construction the standard, while working to wean existing buildings off of fossil fuels via electrification and renewables. In this session we aim to provide attendees with a simple framework for going all-electric for affordable multifamily buildings, both new and existing. The session will be structured around the following topics and focus on answering a number of questions for each: 1. How to Do It â€“ Technical and design challenges to electrification What changes in a building design when you eliminate fossil fuels and add renewables? What are the obstacles to electrification and associated solutions? What is needed to scale these approaches? 2. Getting to Yes â€“ Making the value proposition of electrification to owners Why should building owners and occupants want to electrify? What are some useful communication tools to address the uncertainty and discomfort with unfamiliar approaches? 3. Installation Considerations â€“ Working with contractors and subs What is needed to ensure contractor engagement and successful installation? 4. Show Me the Data â€“ Measured project performance Can electrification + PV reduce energy costs? What are the impacts of electric rates? Do heat pump water heating systems really operate as efficiently as the manufacturers say they do? We must scale up all-electric new construction and retrofits in affordable multifamily to provide healthier, more resilient homes and slow climate change. Attendees to this session will leave with solid knowledge of what challenges they are likely to face when going all-electric, and the tools to be confident they can successfully eliminate fossil fuels from their next project.

Jamie Dunckley, Electric Power Research Institute (EPRI)

Poster Title: Plug-in Electric Vehicle Customer Preferences

Abstract: While electric vehicle sales are continuing to increase in the United States, they are doing so in a clustered fashion. What motivates a buyer in one region to purchase an electric vehicle but not in another region? The research outlined here aims to determine what are the most effective factors that influence a customer to purchase an electric vehicle on a regional basis. To answer this question, discrete choice estimation (DCE) will be used through surveys to elicit customer preferences for electric vehicles. A total of 3200 surveys were sent out in 8 utility service territories to be able to understand nationwide what motivates a potential EV buyer as well as the regional differences in buyer preferences. Influencing factors on a vehicle purchase such as model type, price point, federal/state/local incentives, carpool lane access, electric vehicle charging density and cost as well as customer demographics such as income level, education and number of people in the household were taken into account. The results of the survey work will be combined with a vehicle modeling tool developed by ORNL - MA3T to be able to simulate how incentives change EV adoption over time. The results of this work will provide utilities valuable insight as to how actions or changes will influence EV adoption over the next 10 years.

Nic Dunfee, TRC

Poster Title: From Zero Net Energy Buildings to Zero Emission Buildings: The Evolution of Efficiency Metrics in California

Abstract: As California is reaching both its statewide carbon reduction, and 2020 residential new construction zero net energy goal, we are realizing that our work has only begun. Recent updates to the state's carbon emissions goals call for a carbon-free grid and carbon neutrality as a state by 2045. Within the building sector, this has led to more focus on zero-emissions buildings and less on zero net energy (ZNE) buildings. This session will explore why ZNE goals do not necessarily equate to zero emissions buildings, and how this has caused California to start rethinking the way we value building efficiency. The discussion will include what resulted from California's final push towards 2020 goals, and how the state is shifting to the new 2045 carbon emission goals. Attendees will learn why carbon emissions may be displacing energy use as the new metric of choice for efficiency. Drawing from experience designing and implementing a first of its kind residential new construction electrification program for the Sacramento Municipal Utility district, the speaker will address how programs can mitigate specific obstacles and objections facing all-electric new construction. Additional insights include how the sponsor utility is valuing these all-electric homes, and the conversion of avoided therms into kWh savings using a source carbon equivalency.

Anna Evans, MIT

Poster Title: Design of a coordination mechanism to facilitate efficient distribution network investment

Abstract: Significant developments are occurring in the electricity sector. Households and end-consumers are increasingly able to respond to price signals, either by investing in distributed energy resources (DER) or by reducing demand during high price periods. System operators and regulators, are starting to realize the efficiency gains that can be achieved by engaging end users, and providing incentives to contribute to the optimization of power system operation and planning across the short, medium and long-term. The sector is facing significant challenges, resulting from a combination of rapid developments in the sector, and a technical and regulatory framework that is designed for a system that in reality no longer exists. Despite exacerbating some challenges, many of these developments present new solutions, but require a policy framework that supports and leverages these opportunities appropriately. The potential for operators to leverage their consumers to respond to system needs is considerable, and has been driven in part by the wide-scale implementation of advanced meters and appliances ('domotics'), the move towards more cost-reflective pricing (such as time-of-use or critical peak pricing tariffs), roll-out of demand response and efficiency programs, and the development and implementation of DERs. However, further changes are needed. There is particular interest in increasing the efficacy of investment decisions, by better coordinating the large range of technologies and participants that are both impacting, and also providing new solutions to, system operation. Planning and regulatory processes in many jurisdictions are not keeping up with the rapid rate of change in the sector. The traditional centralized approach to system planning is no longer fit for purpose. It is necessary to update the regulatory settings that govern investment decisions, as these have a significant impact on efficient decision making. While traditionally the only way to meet increasing demand was to expand or reinforce network capacity through grid investments, it is now possible to utilize DERs, such as demand response or storage solutions, to achieve the same outcome at lower costs (referred to as Non-Wires Alternatives, NWAs). However there are several key challenges, including information asymmetry, choosing the appropriate level of granularity (both spatial and temporal), and signal stability, that need to be overcome for this response to be unlocked in the most efficient way. This paper discusses the key considerations needed to efficiently coordinate investments in the distribution system, and proposes a methodology to guide efficient investments in both traditional investments and NWAs.

Abby Finis, Great Plains Institute

Poster Title: Meeting the Climate Deadline in Minnesota

Abstract: To help Minnesota cities achieve greenhouse gas emissions reductions at scale, it is useful to know the emissions profiles of many cities and their willingness to act in order to effectively organize those communities into cohorts where they can have the greatest impact. Emissions profiles can be looked at in two ways: one is by sector, which includes residential, commercial/industrial, and transportation. The other is to look at energy type, including electricity, natural gas, and transportation fuels. We can use this information to create profiles of cities and categorize them based on their unique characteristics. Categorization of energy profiles allows us to gain deeper insight into how various cities use energy so that technical assistance can be tailored to achieve greater reductions. Cities with commercial-dominant emissions profiles, for example, would achieve the greatest emissions reductions by focusing on the commercial sector. These cities would make good candidates for a commercial building benchmarking cohort. When looking at emissions profiles by energy type, cities would be organized by electric utility provider. In Minnesota there are different challenges and opportunities for cities in investor-owned utility service territories as opposed to municipal or cooperative. Xcel Energy is the largest electric utility in the state and has announced goals to be 85% carbon free by 2030 and 100% carbon free by 2050. This greatly reduces the burden on cities in Xcel Energy territory to achieve reductions from electricity emissions so they can focus instead on transportation and gas. Alternatively, communities not in Xcel Energy territory can work together to identify solutions to reduce barriers to clean electricity. In addition to understanding cities' emissions profiles, it is also important to understand where a city is at in terms of its willingness to act. Minnesota is fortunate to have a critical mass of communities that are deeply engaged in sustainability actions and increasingly willing to act on climate mitigation, though not all cities are in the same place. City performance and desire to act will play an important role in determining how to best assist cities by meeting them where they are. Using emissions data and our knowledge of city participation in various energy/climate programs and projects, we can begin to conceptualize where cities are to target assistance to help move them to where they need to be to meet climate goals.

June Flora, Stanford University

Poster Title: Know Your Energy Numbers (KYEN): A Program for Tween aged Boy and Girl Scouts

Abstract: The Know Your Energy Numbers (KYEN) program is derived from earlier published work with young Girl Scouts, used design thinking and behavioral science principles their to engage tween aged Boy and Girl Scouts in understanding their own energy consumption and draw insights for saving energy form their smart meter data. Youth learned key energy numbers pertinent to understanding their household smart meter data. This program was underpinned by results from previous work demonstrating that children have agency within their families, both learning from family members and in turn contributing to family behavioral norms. The first pilot program taught by Stanford interns and local Eagle scouts was composed of three sessions for middle school Boy Scouts, the second pilot was five sessions and delivered to middle school Girl Scouts. Session 1 served as an introduction energy basic concepts such as power, watts and kWh, time of use pricing and a review of reasons to save energy. Session 2 introduced Scouts to the load curve of daily electricity consumption and had them thinking critically about the electricity using device/appliances in their homes. Session 3 involved Scouts brainstorming about "how to save energy" and prototyping an energy saving plan for their own families. During Session 4, Scouts focused on learning what energy use activities created consumption peaks and how to reduce that peak energy consumption via curtailment, shifting practices and reduction of baseload. Finally, in Session 5, Scouts analyzed and shared the results of their home energy saving plans and role-played being energy advocates. Each session incorporated interactive activities including sticky note brainstorms, Kahoot quizzes, utility data analysis, roleplaying and video creation, and prototyping. At the end of each session teams of scouts created brief scenarios demonstrating energy saving actions, these scenarios were video taped and played back to tweens to reinforce their new learnings and view their behavioral rehearsal of energy saving actions and advocacy. Scouts also downloaded smart meter data and visualizations of that data were analyzed during the sessions. After the program, all Scouts indicated that they viewed the energy curricula as effective (very â€“ extremely effective) and all viewed the visualization component of home energy data as extremely effective. These two prototype programs are aspects of a larger NSF funded project to create accessible technologies for youth to learn about practices that use energy and to modify those activities in response to real-time electricity consumption.

Teresa Neumann, Loyola University Center for Urban Reseach and Learning

Poster Title: Examining an Effective Model to Impact Grassroots Knowledge and Behavior Regarding Energy Usage.

Abstract: This presentation examines the effectiveness of a consumer education strategy based on community organizing methods. The Illinois Science and Energy Innovation Foundation (ISEIF), through its consumer education initiatives, has been seeking "to help consumers understand and harness the benefits of a more modern, efficient electrical grid." The presenters are the principal investigator of the research project examining the impact of the education and a lead outreach staff in this consumer education effort. Loyola University Center for Urban Research and Learning and Heartland Social IMPACT Research Center, conducted preliminary descriptive research to help ISEIF understand the impact of their grantees' public education on consumer knowledge, behavior, and sharing information with others. Researchers collaborated with ISEIF's grantees to recruit attendees at nine public education outreach events. The grantees, the Citizens Utility Board (CUB), Elevate Energy and Faith in Place, conduct three types of events: utility bill clinics, presentations to community groups, and house parties. Researchers collected data from 48 participants at two points in time. At time one, focus groups were conducted, and at time two, phone interviews. The focus groups and interviews were conducted in either English or Spanish. This preliminary research found that individuals retained information about reducing energy consumption over time, acted upon some of that information, and to a large extent, shared that information within their family and community networks. Also, the findings seem to suggest people are more likely to retain information and/or take action when they can see how it directly benefits them. Hence more intimate settings with one-one-one interactions (utility bill clinics) and smaller groups (house parties/presentations) see better results in information retention and program participation. Strategies for saving energy and money are often related and linked to smart grid technology in ways that aren't apparent to the average utility customer. Understanding an individual's relationship to their energy at home allows for more tailored solutions for energy/money saving tips. Investment in grassroots outreach and education allows organizations like the ISEIF grantees to become trusted voices in communities on energy related topics. This model relies on ongoing strategic engagement with local and statewide elected officials, community leaders and other grassroots organizations in metropolitan and rural communities. Continuing to explore the need to support community-based outreach strategies is critical to ensuring that the benefits of smart grid technology, energy efficiency, and renewable energy are accessible to everyone no matter where they happen live

Wendy Gibson, CLEAResult

Poster Title: Scaling Up Strategic Energy Management

Abstract: In 2009, a new type of incentive-based program emerged that was designed to help utilities connect with industrial customers on a broader level. Strategic Energy Management (SEM), encourages deeper connections with participants by engaging them in a comprehensive program that teaches them the minimum elements of energy management:

- Organizational commitment
- Identifying and implementing savings opportunities
- Measurement and verification

SEM transforms the way facilities integrate energy efficiency into their organization by identifying areas of energy waste and reducing that waste through behavioral, operations and maintenance, and/or process changes. According to the US DOE, "Strategic energy management allows for continuous energy performance improvement by providing the processes and systems needed to incorporate energy considerations and energy management into daily operations." As industrial SEM programs flourished, utilities began implementing commercial SEM programs and, as of 2018, 27 utilities now offer SEM programs across North America . Through SEM, utilities capture no-cost/low-cost savings and increase customer participation in other utility programs. SEM encourages peer-to-peer interaction, where participants learn from each other in a cohort setting, sharing real-world experiences. SEM programs both transform the way organizations think about energy and deliver cost-effective savings for the utility. This success has resulted in rapid growth across North America and necessitates implementers and utilities to develop strategies to manage this growth and scale with the demand. SEM can serve customers at all levels, and CLEAResult has developed approaches for scaling up within all sectors, thereby supporting market transformation for utilities adding SEM to their portfolios.

CLEAResult's proposed presentation will explore ways SEM can scale to produce greater impact and reach more customers.

1. Regional Scaling: CLEAResult delivers SEM to diverse sectors and markets rather than targeting specific sectors or markets. This approach increases cost effectiveness, provides broader peer learning among participants, and increases the reach of program benefits across utility territories.

2. Utility Scaling: To increase cost-effectiveness in offering SEM to smaller customers, CLEAResult has customized program design, M&V strategies, and recruiting tactics to benefit customers of all sizes. This allows utilities to provide SEM programs that develop long-lasting relationships and increase energy savings with more customers.

3. Customer Scaling: For multi-site customers learning how to manage energy should start with a small number of facilities. CLEAResult then helps them scale SEM by expanding to additional buildings as energy management succeeds. Over time, these participants achieve savings on par with larger single-site customers.

Patrick Hancock, University of Virginia

Poster Title: (ir)rationally Natural And (de)polarized: The Impact Of Natural Descriptive Analogies On Support For Climate Engineering Approaches

Abstract: This paper presents the preliminary results of an experimental survey which looks to investigate the effect of descriptive framing analogies, on a scale of "naturalness", in moderating support for climate engineering approaches. The research outlined here is on-going and subject to change with new developments. The most up to data information will be presented at the conference. In part, our research, hopes to investigate the risks, if any, to public perception by how the delineation between sub-categories, of climate engineering, impacts the perception of particular approaches and possibly the entire domain of climate engineering. How the public perceives climate engineering is likely to have great influence on how widely and quickly climate engineering could realistically be adopted. By studying and understanding what moderates the public's perception, a clearer understanding can be developed about decision making, by the public, in periods of uncertainty, time scarcity, and complexity of novel approaches for problem solving. In the study, participants were randomly assigned into one of two sub-categories of climate engineering (carbon dioxide removal or solar radiation management) with either a "natural" or "anthropogenic" descriptive framing analogy or an independent control group without an analogy, in addition to a basic shared description of their assigned approach. Our preliminary results indicate two main findings. First, a statically significant difference was found in the support for use, of climate engineering approaches, between sub-categories. Second, a trend, which will be explored further in powered up experiments, of a possible irrational increased support of "naturally" framed climate engineering approaches, moderated by political ideology, within both sub-categories. The data suggests self-identified liberal's might be more prone to an increased support of SRM due to a "natural" framing, whereas self-identified conservatives might be more prone to an increased support of CDR due to a "natural" framing. The impacts of political polarization on both mitigation and adaptation have been resounding in terms of slowing the collective response to climate change. The implication of these possible findings could provide a context of where friction points may develop in the ongoing deliberations of what role, if any, that climate engineering approaches have in effective climate action policy.

Mike Harrigan, ProspectSV

Poster Title: How the Development of Electric Public Fleets Has Catalyzed Robust Transportation

Abstract: The Santa Clara Valley Transportation Authority (VTA) plans to meet state environmental objectives by shifting its 500+ bus fleet to ZEVs. Electrification is a major part of that strategy and includes the advancement of energy and fueling strategies, operations, and other business factors. The VTA Advanced Transit Bus VGI Project is a $3 million project that is developing and demonstrating advanced charging controls, reducing costs, and establishing electric bus revenue generating energy services. Additionally, the project will establish VTA's long-term infrastructure strategy for comprehensive bus electrification. The technical scope of the project includes deploying 10-35 electric buses, installing Chargepoint unidirectional fast-charging infrastructure, and managing energy usage. The energy management platform integrates key metrics with demand response, time-of-use pricing, peak load reduction and demand charge mitigation. At the end of the project a detailed analysis and project review will be shared publicly with other transit authorities as a proving ground for fleet electrification. This presentation will provide a case study for the mass adoption of fleet electrification. Some of the topics will include: the development of this project as a real-world business case, the creation of a roadmap for complete agency electrification, and how this project has served as a platform for the commercialization of these innovative technologies. Additionally, the presentation will include the current status of the fleet and how further deployment is being scaled throughout the transit agency.

Scott Hoppe, Sabreez, PBC

Poster Title: Weekly Clean Energy Forecast

Abstract: Sabreez has developed a Clean Energy Factor (CEF) that reports when electric power is cleaner each day in consumer-friendly terms, the "Wind Number" and "Solar Boost." The CEF is inversely proportional to wholesale real-time energy prices as well as carbon emissions (url https://www.sabreez.com/lmp_graph), so it illustrates that clean energy costs less as a compelling value proposition to promote load shifting. In California, our Application Programming Interface (API) processes real-time data from the California Independent System Operator (CAISO) and energy forecast data from TESLA, Inc. to produce a 7-day advance forecast. Our Weekly Clean Energy Forecast (WCEF) API can be integrated into consumer-facing applications to extend the offer of automation (url https://www.sabreez.com/forecast_plot). The CEF peaks each day and each week when energy is cleanest, and the real-time CEF and weekly forecast APIs are engaging ways to promote time-of-use rate adoption. Some consumers may choose to manually run their appliances when energy is cleaner, use the delay button, or charge their vehicle based on the stimulus. Program managers can use our APIs to increase consumer engagement. The inverse correlation between the CEF and wholesale pricing has been well-documented since the Wind Number was presented at the 2017 BECC Conference. Program managers can offer the stimulus, then combine a user's smart-meter data with our database to provide a normative report. The consumer's CEF can be offered as a game to reinforce load-shifting behavior. Utilities and other demand response providers that participate in wholesale markets can encourage load shifting with real-time messaging to reduce costs as well as emissions. Specific use cases can be applied for thermostats, appliance load shifting, pool pumps, and vehicle charging. Although the CEF is designed to integrate renewables by offering a compelling value proposition to consumers when energy is cleanest each day, the CEF is also lower during peak-demand periods when rates are higher. Over time, the message that clean energy costs less should create a sustainable value proposition and lasting behavior change. Sabreez will be engaging utility and smart home stakeholders in California's energy system to offer the WCEF to educate consumers about the new default time-of-use rates. The results of our Spring-Summer marketing campaign will be presented at the 2019 BECC Conference.

Dana Jackman, Environmental Protection Agency

Poster Title: Breaking Out of the Niche: Matching What Consumers Want to What Electric Vehicles Deliver

Abstract: Passenger vehicles are one of the largest sources of greenhouse gas emissions. With the greening of the electricity grid in the United States (US), replacing conventional passenger vehicles with electric vehicles (EV) could dramatically reduce greenhouse gas emissions. Generally, EV adoption is expected to follow a standard diffusion model. However, transportation systems are complex and subject to significant physical, institutional, and social inertia. Thus, despite the global appetite for vehicle electrification, a diffusion path to large scale electric vehicle adoption in the US is not assured. Among the acknowledged but understudied challenges to EV adoption are the gaps between an individual's intent and actual purchase, at the individual level, and between early and mainstream adopters, at the market level. In addition, existing research into EV adoption often differentiates buyers based on observable demographics, but rarely on latent characteristics, and the stages of the purchase process are often conflated. To bridge those gaps, this research leverages the self-reported experience, behavior, and preferences of hundreds of thousands of new vehicle buyers. In addition, I delineate the five stages of the consumer decision process and examine the internal and external factors that influence vehicle purchase (Taylor & Fujita 2018). Specifically, I frame EV adoption in terms of what new car buyers want and what EV technology can provide. Current EV owners are early adopters, and all vehicle buyers are prospective EV owners. This alternate framing leverages the responses of every new vehicle buyer in the Strategic Vision (SV) New Vehicle Experience Survey (NVES) â€“ an annual survey of more than 200,000 new vehicle buyers. The SV NVES includes 1) the entire purchasing process from problem recognition to early ownership; 2) vehicles considered, replaced, and owned; 3) perceptions of vehicle attributes; 4) the purchasing experience; and 5) buyer demographics and psychographics as well as self-perception, hobbies, life style, politics, and emotions. Leveraging the remarkable depth and breadth of the SV NVES for 2014, 2015, and 2016, I will estimate a latent class model â€“ classifying new vehicle buyers, assessing the likelihood of EV adoption for each class, and identifying stages in the purchase decision process where individuals are more amenable including EVs in their decision process. Latent classes will be contrasted with more conventional approaches to market segmentation such as vehicle class (e.g., car, mini-van, SUV), demographics (e.g., age, sex, income), and technology adoption life cycle (e.g., early adopter, majority, laggard).

Auriane Koster, Pierce Energy Planning

Poster Title: Scaling Up Behavior Change in K-12 Schools Through Technology and Data Management

Abstract: Many strategies successfully encourage energy-saving behavior change in K-12 schools: programs encouraging awareness and education, incentive programs based on observed behaviors, and competition-based programs. However, it's difficult to show a direct correlation with energy savings and behavior change; this is where technology and data management "Scale Up" energy savings! This presentation will discuss three of the more successful technologies: the K-12 ENERGY STAR score, the Eyedro current transformer sensor, and the data management software, FuseboxÂ®. The ENERGY STAR score for K-12 schools compares the energy performance of the school to its peers, accounting for regional and operational factors. A higher ENERGY STAR score indicates a more energy-efficient school. ENERGY STAR allows for intra- and inter-school quantitative comparisons. It allows a district to know which of its schools are energy efficient and which schools to place a bit more "energy" into making it more efficient. It allows districts and schools to fairly compare themselves and come up with strategies for increased energy savings. School buildings typical have one energy meter. When new buildings or additions are built, a new meter may not be installed. Multiple buildings on one meter does not allow for accurate energy monitoring when a district is trying to reduce resource use and increase sustainability. Thus, districts have begun installing current transformers (CTs) to separate out energy use when multiple buildings are on the same meter. Eyedro is installed in the breaker and uses a small sensor to provide real-time data analyzing and storing electricity usage. FuseboxÂ® provides a variety of energy management tools for school districts to use in developing and implementing an energy management program. A dashboard for each school is customized to meet their unique needs and data analytics can be managed for electricity, gas, and water. Attractive and engaging graphics show the district's energy data and costs, green team activities, energy reductions, and 15-minute interval data for use in managing electrical load. This presentation will provide examples of Arizona school districts who have successfully used ENERGY STAR, Eyedro, and/or FuseboxÂ® to save energy and implement a sustainability program. The presentation will include short clips from school district stakeholders, before-and-after energy savings, and examples of using the three technologies to successfully implement district-wide "green teams."

Kathy Kuntz, Cool Choices

Poster Title: Nudging EVs into the Mainstream: Guerilla Tactics from Middle America

Abstract: Everybody agrees that we need to accelerate adoptions of electric vehicles (EVs) as part of the effort to reduce transportation-related emissions. And there's lots of talk in the media about how fast EV markets are growingâ€”even James Bond is on track to drive an EV. The overall story, though, covers up a real challenge in middle America. While California and other coastal states have adopted a Zero Emission Vehicle (ZEV) standard, most of the country has not. This matters because auto manufacturers are sending most of the EVs they produce for the US to the ZEV states to fulfill mandates, which means some EV models aren't even available in most of the country. More, many dealerships are skeptical about the profitability of offering EVsâ€”the dealerships have to pay fees for training and to upgrade their facilities and EVs have lower maintenance costs, so there's less opportunity to recoup those investments. All of that means that in most of America it's hard to buy an EV. Early adopters talk about going to multiple dealerships or driving across state lines to purchase a vehicle. This isn't the way to achieve climate action at scale! The good news is that EV advocates are starting to leverage insights from energy efficiency market transformation programs and behavioral science to accelerate EV adoption. In this presentation we'll talk about current efforts in Wisconsin where we are leveraging vehicle sales data to motivate more dealerships to stock and promote EVs while also facilitating contagious word-of-mouth marketing campaigns. Essentially we are transforming the market on a shoestring budget, demonstrating what's possible with public information, early-adopter enthusiasm and sound behavioral theory. In addition to sharing a strategy that's easily applied in other states, we'll provide sales data and market insights. The lessons learned from our work in Wisconsin can help other states accelerate EV sales, ideally setting the state for policy shifts across middle America in the coming years.

Chelsea Lamar, Navigant

Poster Title: It takes two (or three or four) to tango: how stakeholder engagement and the leveraging of additional funding effect low income programs and evaluations

Abstract: This comparative analysis of income eligible programs reveals key insights for maximizing savings per household and enhancing the range of program benefits delivered through multi-agency coordination. Income eligible programs are often some of the most complex programs to administer and evaluate because of the multitude of stakeholders responsible for implementation of the program. In many jurisdictions, community action agencies, non-profit organizations, state and federal weatherization programs, and environmental justice advocates, in addition to the program implementation contractor and the utility, play a role in shaping how these programs are designed and implemented. The purpose of this paper is to 1) evaluate the current status of stakeholder engagement and behavior associated with income eligible programs, 2) assess the current status of utility savings from income eligible programs that involve funding from multiple agencies 3) identify best practices for both stakeholder engagement and multi-source funding and 4) present key challenges and guidelines for evaluation. The presentation will contain two case studies on income eligible program stakeholder engagement processes in Illinois and Michigan. The presentation will compare the role of these statewide stakeholder groups including their mission, objectives, and metrics for success. In addition, the presentation will include results from interviews with internal and external subject-matter experts, who will provide background on the legislative framework and stakeholder interactions for the state. The paper will include an analysis of how these policies have benefited income eligible programs and increased energy efficiency savings. Findings will provide utilities, regulators, and other key stakeholders with practical program and policy solutions that have been shown to improve income eligible programs and ensure energy, health and safety needs are being met for those most in need.

Amy Lastuka, Center for Sustainable Energy

Poster Title: Barriers to scaling up electric vehicle adoption in public fleets

Abstract: As part of the Department of Energy's Clean Cities initiative, The Center for Sustainable Energy conducted a focus group with managers from four local fleets. The fleets were all members of the San Diego Regional Clean Cities Coalition and were all interested in adding plug-in electric vehicles (PEVs) to their fleets. To better understand the barriers to scaling up PEVs the fleet managers were asked about challenges that had arisen as they added PEVs to their fleet and potential concerns about adopting medium- or heavy-duty PEVs. The focus group participants reported positive experiences with the PEVs they currently operate in their fleets, including high driver satisfaction and lower maintenance costs. However, they also highlighted several key barriers to adopting more PEVs in their fleets. Their largest concerns were the costs associated with the vehicles and the infrastructure. The higher upfront cost of a PEV compared to a similar non-electric car is problematic for public agencies that rely on a council or legislature to approve expenditures. A related concern was a lack of reliable data on the total cost of ownership for PEVs. Key technical concerns raise by the participants were the inability to track fueling costs for individual vehicles, a need for faster refueling, a need for redundancy in the event of an extended power outage, and high battery replacement costs causing vehicles to have low value on the used market. The main concerns related to medium- or heavy-duty PEVs were the comparability in power output and the potential difficulty in charging logistics for vehicles that are needed for shift work.

Rodrigo Leal, Navigant

Poster Title: Building A More Resilient Future: How Organizations Are Adapting to a Changing Climate

Abstract: "The Fourth National Climate Assessment, released late last year, highlights the increasing impacts and risks of climate change in the United States. With our infrastructure, ecosystems, and economy at risk, leaders across various sectors are taking action to build resilience to these climate impacts. This poster will explore the approaches being undertaken by cities, utilities, and corporations in adapting to a future of climate extremes, featuring both national and international examples of organizational action to address some of the most pressing resilience issues, including:

- Climate Equity: Low-income and marginalized communities will suffer the greatest impacts from climate change. Navigant worked with the City of San Antonio, TX to identify vulnerabilities, prioritize risks, and develop adaptation measures to ensure the needs of vulnerable populations are integrated into the City's Climate Action and Adaptation Plan.
- Urban Resilience: Cities around the world are taking action to address climate impacts. Navigant partners with international city networks, including C40 and the Covenant of Mayors, to assist cities in the development of climate adaptation strategies.
- Financial Risk: Banks, insurance companies, pension funds, and other financial institutions want to understand the potential impacts of climate change on their assets and balance sheets. Navigant worked with Dutch National Bank (DNB) to identify the key risks posed to the organization by climate change, including the expected losses from assets of Dutch financial institutions.
- Critical Infrastructure: Extreme weather and climate change threaten to disrupt critical infrastructure, including the energy, water, and transportation sectors. Navigant is working both in the U.S. and around the world to identify opportunities to harden critical infrastructure against increasing weather and climate extremes.
- Supply Chain Disruptions: Corporations are struggling to understand how climate change will impact their supply chains. Through an assessment of the latest climate projections for various key locations in Mars Inc's supply chain, Navigant helped corporate leadership understand how climate impacts will render their supply chain vulnerable, allowing Mars Inc. to adjust their approach to sourcing and supplier engagement.

Araceli Martinez, Elevate Energy

Poster Title: Energizing Your Savings: Hourly Pricing and the Solar Net Metering Customer

Abstract: Since 2007, Hourly Pricing, a dynamic electricity pricing option enabled by smart meters, has empowered Illinois ComEd residential customers to take control of their energy usage. Hourly Pricing participants have saved over $20 million compared to the utility fixed-price rate by shifting their usage to lower demand, lower-priced hours. Overall, program participants have saved an average of 15% on their energy supply costs and averaged a reduction of over 700 kilowatt hours from conservation efforts in 2018. While Hourly Pricing benefits most customers, there is a segment that is rapidly increasing, both in numbers and in added benefits: Hourly Pricing participants with solar panels on net metering. For those customers embracing the cutting edge of a smart energy future, how does this innovative dynamic pricing rate integrate with solar net metering participants? How does the average solar net metering participant characteristic differ from the average program participant? What benefits can this segment of participants generate? How can net metering participants ripen their savings compared to the average program participant? Solar net metering can help empower savings potential of Hourly Pricing customers by using the sun as an additional energy and cost savings source. In this presentation we will review the advantages of Hourly Pricing and uncover the characteristics, savings and ways to engage solar net metering customers benefiting from this dynamic rate option.

Allison Miller, ASE

Poster Title: EmPowered Schools: Scaling Student Leadership in Energy Efficiency

Abstract: Mitigating climate change requires community education and wide-spread behavior change in energy use. The Alliance knows that some of the most influential voices of change are those of our young people. For over 25 years, students across the country have engaged in the Alliance's PowerSave Schools program, learning about energy efficiency and leading outreach campaigns with their peers, teachers and families. Participating schools have saved an average of five to 15 percent on their energy bills. While these results reflect students' ability to drive meaningful change, the program's costs and administrative burdens have limited the number of schools it can support. In order to scale the program while preserving its intensive engagementincluding STEAM curriculum, student-led activities and support for schoolwide outreach campaigns the Alliance is developing a new online platform that will launch in fall 2019: the emPowered Schools program. Through concurrent pilots with the Los Angeles Unified School District (LAUSD), the Los Angeles Department of Power and Water (LADWP), and Energy Upgrade California (EUC), students will learn the fundamentals of energy and efficiency, and how they can be leaders of change. Through the LAUSD & LADWP program, students will conduct energy audits of their schools and homes and communicate data-based energy recommendations to their classmates, school administrators, and families. In the EUC pilot, students will help their families to shift energy use to times of the day when renewable resources are more abundant, helping the state achieve its 100% clean energy goal. The emPowered online platform streamlines program implementation, giving both students and staff access to an interactive web platform that guides activities, provides immediate feedback, and serves as a medium for communication. All lessons, follow-up activities, materials, and data tracking will be accessible in real time. The program also allows schools to benefit from one another's experiences and engage in friendly competitions as they lead their schools' efforts. Moving to the emPowered platform will significantly reduce program costs and make it possible to reach more schools in more regions throughout the country. We hope the emPowered platform will create a blueprint for delivering student-led behavior-change programs at scale. Our goal is to make energy literacy available to all students, and to prepare them to be creative, bold, and innovative leaders with a global impact.

Alice Napoleon, Synapse Energy Economics

Poster Title: Strengthening the Connection Between Energy and Health Equity and Well-Being

Abstract: Today's power sector is a source of health disparities and inequities: Disenfranchised populations—particularly communities of color and low-income communities in rural areas and in small to mid-sized towns and cities—have insufficient access to clean and affordable energy, experience excessive exposure to pollution from fossil fuels, and face disproportionately large impacts from climate change. They struggle with managing energy use, because either they do not own their dwelling and thus cannot make efficiency improvements or they must make unaffordable repairs before installing such measures. Power sector transformation has the potential to alleviate inequities by providing wider access to clean, distributed energy resources such as solar energy and energy efficiency. It can also create new job opportunities, helping to address equity issues related to under-employment. Early action can ensure that health equity and human well-being are key factors in energy decision-making processes and ensure that frequently marginalized communities won't be left behind. Synapse, RAP, and Community Action Partnerships are undertaking a far-reaching study of the health disparities and inequities arising from today's power sector. We will also look at the promising policies and changes to decision making processes that could mitigate these inequities, now and as the sector transforms. Following an initial literature review and analysis to prioritize roughly 10 pathway/policy groups, we will engage key stakeholders through a series of web forums, interviews, and convenings to gather input and leverage the power of the collective to generate ideas and address crucial problems. These stakeholders include representatives of consumer groups and advocates, environmental non-governmental organizations, public utility commissions, energy offices, air regulators, public health agencies, investor-owned utilities, electric cooperatives, and municipal utilities. The project will culminate at the end of 2019 in a concept paper with case studies that highlight the four or five actionable measures most likely to achieve tangible progress on these issues. The aim is to motivate action on energy sector decision-making practices and encourage the implementation of policies to improve the equity of energy system outcomes. We propose discussing the approach, case studies, and preliminary findings for this project at BECC, given the interest in equity and serving disadvantaged communities. In November, we will be near the end of the project and can review our findings to elicit feedback from the conference participants.

Natalia Gardocki, MEEA

Poster Title: Best Practices for Engaging the Real Estate Sector on Energy Efficiency

Abstract: What are best practices for engaging the real estate sector through energy efficiency programs? MEEA has been doing work to education real estate agents and appraisers on energy efficiency since 2013. MEEA, through the Illinois Home Performance with ENERGY STAR program, targets local realtor associations to offer the National Association of Realtors' (NAR) Green Designation course. This two-day course educates real estate agents on energy efficiency and how EE features can be leveraged at the time of sale. Agents who successfully complete this course are listed on NAR's website as having this designation so that they can be sought out by potential clients who feel they have an energy efficient home and want that properly represented or clients who are seeking to purchase an energy efficient home. MEEA also educates real estate agents on local energy efficiency programs as well as real-time pricing programs that are available that they and their clients can take advantage of. When surveyed, 85% of agents pledged to educate future clients about these programs. Similarly, MEEA targets local appraisal chapters throughout Illinois to educate their members on the Appraisal Institute's Residential Green Addendum, which is a tool appraisal professionals can use to properly assign value to energy efficiency features in a home. MEEA has brought nationally recognized instructor Sandy Adomatis to the state of Illinois to deliver this information through in-person trainings. MEEA is also currently working to create fact sheets focused on energy cost disclosure ordinances and MLS green fields with the goal to engage municipalities on the benefits of implementing these types of programs and offering technical assistance to those interested in taking next steps. MEEA proposes to deliver a 5 â€“ 10 minute presentation focused on best practices to engage the real estate sector on energy efficiency.

Neil Veilleux, Cadmus

Poster Title: Strategic Electrification in the New Energy Economy

Abstract: Strategic or beneficial electrification can provide a decarbonization pathway to transform the building (heating) and transportation sectors away from direct combustion of fossil fuels (e.g., natural gas, gasoline, diesel, etc.) to high efficiency, electric-powered technologies (e.g., heat pumps, electric vehicles [EVs]). As recently noted by regulators in California, strategic electrification represents "the most viable and predictable path" to achieve a zero-emission future. However, beneficial electrification is rife with controversy as utilities, HVAC companies, transit agencies, and car-makersâ€”in addition to local and state agencies that govern themâ€”wrestle with the challenges of deploying new business models and their associated impacts on public health, the environment, and consumers. This presentation will describe the assumptions, successes, failures, and promise of strategic electrification efforts to date. It will explore the notion that Americans can sufficiently decarbonize the economy—and avert the worst impacts of climate change—by transitioning building and transportation end-uses from fossil fuels to electricity, while simultaneously deploying clean and renewable generation on the grid. The presentation will include a discussion of the challenges associated with disrupting market incumbents, the prevailing market transformation theories, and key policies and programs that drive sustainable market growth. The latter encompasses, for example, recent efforts by states, cities, and utilities to support market development by creating new incentive and financing programs, innovative rate designs, marketing and communication initiatives, supply chain development efforts, and technology and innovation pilots. The presentation will touch on a variety of recent case studies, drawing on examples across the U.S. and Europe. As time permits, this may include, for example, case studies describing how (1) utilities are piloting new business models to adapt to changing customer and regulator expectations (e.g. National Grid, Alliant Energy, Southern California Edison, Con Edison, etc.); (2) state agencies are seeking to drive down soft costs and promote sustainable market growth (e.g. NYSERDA, MassCEC, Mass DOER); and (3) cities are exercising leadership to catalyze regional market transformation (e.g. drawing specifically on the efforts of the Building Electrification Initiative).

Brent Nelson, NORTHERN ARIZONA University

Poster Title: On residential energy benchmarks: the importance of occupancy over floorspace

Abstract: Buildings accounted for 39% of total U.S. energy consumption in 2017, and numerous efforts have been dedicated to gathering data and modeling building energy consumption for benchmarking purposes. However, many areas for improvement remain. Most predominant benchmarks can only be used to compare buildings with similar uses, climate, floorspace, and occupancy to determine relative performance. One commonly used energy benchmark is the energy use intensity (EUI), which measures building energy consumption per floorspace. In the commercial building sector, floorspace is a useful normalization because floorspace provides a reasonable measure of the business operations that can take place within a building, with variation in energy usage stemming largely from building type. EUI is thus a logical energy benchmark for similar commercial buildings types, since floorspace is the driver for meeting the business needs. While EUI may be logical for the commercial building sector, application of EUI in residential buildings becomes problematic. In the residential sector, the buildings provide places in which people reside, fulfilling needs for shelter, rest, a long list of basic human functions, and ever evolving modern requirements. Individuals vary greatly in their usage of and demands for floorspace, making occupancy a better normalization for the residential sector and leading to energy usage per person (EUP) as a logical energy benchmark. Moreover, EUI-based benchmarks, standards, and incentives in the residential sector encourage maximizing floor area to minimize EUI, resulting in an overall increase in energy consumption because thermal loads increase with building size. Despite the logic of EUP for the residential sector, it is not well understood or analyzed. This presentation will describe an exploration of EIA residential energy consumption survey (RECS) data to understand how EUP varies between climates, occupancy levels, and residential building types. This data will then be compared to residential building energy models to determine whether the models exhibit similar sensitivity to the RECS data.

Stephenie Ritchey, Go Sustainable Energy, LLC

Poster Title: The Ohio Department of Rehabilitation and Correction: A Whole Story of Institutional Strategic Energy Management

Abstract: Strategic Energy Management (SEM) is a long-term, data-driven effort for sustained management focused on a chosen outcome, often reduction in energy use, reduced utility costs, reduced green-house gas emissions, or sustained incorporation of renewable energy resources across an entire institution. A Strategic Energy Management Plan (SEP) is the organizational foundation for implementing and maintaining SEM. Starting in 2010, the Ohio Department of Rehabilitation and Correction (DRC) began its SEM journey when the American Correctional Association adopted sustainability standards as part of its accreditation program. Three years later in 2012, the Ohio DRC had developed and adopted an Energy Conservation & Waste Reduction Policy and was embarking on a Three-Year Strategic Sustainability Plan. Pivotal to these efforts were energy use tracking and energy efficiency projects, which the institution purposely pursued. However, it wasn't until 2017 and in the context of a Sustainability Proposal and a new Five-Year Plan, that SEM became a crucial component to achieving the Ohio DRC's newly stated concurrent goals of pursuing net-zero energy use and reducing recidivism. In early 2018, we worked closely with the Ohio DRC to develop an SEM Plan Framework to embody and guide the energy component of its continuing sustainability journey. Since then, the institution is pursuing what is likely to be the State of Ohio's largest solar PV installation as well as a more highly refined SEM Plan. This paper chronicles journey of the Ohio DRC, the state government's largest energy user, towards internalizing SEM through the development and adoption of an SEP. It details the history, foundation, and drivers that led to this development. This paper then leads into presenting the basic approach to and the subsequent development of the SEP framework crafted for the Ohio DRC, the resultant pathways it has since pursued and intends to pursue in the future, and the milestones achieved and challenges faced so far. This paper will also celebrate the successes as well as attempt to understand and characterize the challenges and short-comings of the SEP framework in terms both specific to the Ohio DRC as well as general to the concepts of SEM and SEP. It will also attempt to understand and characterize what have been the primary drivers motivating the Ohio DRC to pursue SEM and SEP. In conclusion, it will pose questions and contemplations for encouraging additional institutional progress and for creating a more meaningful SEM and SEP product in general.

Lindsey Roark, Rising Sun Center for Opportunity

Poster Title: Scaling Up Community-Based Energy Efficiency Programs With Pay-For-Performance

Abstract: To meet California's climate change iniative goals within AB32, the California Public Utilities Commission recently mandated that utilities transition from deemed energy efficiency (EE) measures, to that of pay-for-performance (p4p). While the shift is intended to boost innovation and efficacy, many smaller companies and organizations running deemed measures programs run the risk of not being able to compete with larger for-profit companies within the upcoming p4p market. Rising Sun Center for Opportunity, an Oakland-based non profit has been running a deemed measure EE program throughout the Bay Area for the past 18 years that focuses on delivering EE measures to hard-to-reach populations. Rising Sun defines hard-to-reach as those that are low-to-moderate income, seniors, renters, and non native English speakers. In an effort to scale up their efforts, Rising Sun has partnered with Home Energy Analytics (HEA), a web-based customer engagement software company that uses smart metering analysis to help residential consumers take control of their utility bills. Continuing to focus on their target population of hard-to-reach, Rising Sun is currently piloting an outreach and marketing campaign that is inclusive and relatable to encourage potential clients to signup and engage with the HEA platform. Through my poster presentation, I will be showcasing the results of our first year promoting and working with clients through the HEA, p4p framework as well as how effective it is at helping our hard-to-reach populations. Further, I will be assessing the success of different behavior change strategies such as prompts, energy consumption feedback, social norming and diffusion on different demographics. The overarching goal I intend to answer though my poster presentation is: is p4p the best way to scale up small community-based energy efficiency programs?

Sonya Sachdeva, US Forest Service

Poster Title: Evaluating the Impacts of a Plastic Bag Ban

Abstract: Bans on single-use plastics in consumer goods such as straws and shopping bags have been increasing in recent years. How effective are these types of policy interventions in changing behavior and reducing the use of plastic goods? Our research team set out to answer this question after the state government of Maharashtra, the second most populous state in India, banned the use of plastic bags in 2017, as part of a national effort to eliminate all single-use plastics by 2022. We surveyed over 1100 shop owners and managers in a major metropolitan center and examined (among other factors) participants' knowledge of the ban, how effective they perceive the ban to be, and self-reported behavioral change as a result of the ban. We also collected information about business practices such as the types of goods or services provided by the shop and the alternatives offered to plastic bags. Finally, we used these variables, in conjunction with neighborhood-level socio-demographic characteristics to build a predictive model assessing the strongest factors in leading shop owners to curtail the dispersal of plastic bags. We find that while most small and large business owners in this metropolitan center are aware of the ban, compliance with the ban is fairly variable, and is moderated by business type as well as location. The strongest predictors of whether business owners are likely to decrease the supply of plastic bags are: a) customer demand (inversely correlated); b) business owners' perceived effectiveness of the ban; c) real estate prices in the neighborhood; and d) the overall waste generated in the neighborhood. Additional qualitative data suggests where the ban has been most effective in curing the use of plastic bags as well as loopholes and black markets that have emerged to flout it. This study is an essential step in measuring the efficacy of citywide programs to limit consumption of single-use plastics, particularly in the context of developing nations.

Karen Salvini, Lawerence Berkeley National Laboratory

Poster Title: Making Sustainability Stick through Leveraging an International Framework

Abstract: But how do you integrate sustainability into operations across an organization, and ensure persistence over time? How do you sustain behavior and results, even when a key individual leaves? Berkeley Lab is leveraging the rigor of the international standard and "Plan-Do-Check-Act" framework, ISO 50001. The purpose of the framework is to establish a lasting system for managing environmental performance that is integrated into operations, rather than a discrete exercise reliant on one or two individuals. The framework guides an organization to critically evaluate, improve, record, and maintain both process and results. Some key elements include: 1) Obtaining top management support, 2) establishing an interdisciplinary team and an organization-wide policy, 3) identifying significant uses, objectives, and key performance indicators, and 4) developing a manual to document and guide activities. Any organization can implement some or all of the elements of the framework to improve and sustain their environmental performance. At Berkeley Lab, developing a central, online manual has been the keystone element of this effort. Processes no longer live in one person's head or hard drive. The manual serves as a resource hub that guides the way the organization manages its resources and reduces its carbon and water footprint, helps to promote and scale up best practices, and ensures that energy and water savings continue to improve and persist.

Michael Santulli, SERA- Skumatz Economic Research Associates, Inc

Poster Title: Circadian Lighting Effects? Specialized Survey Results to Quantify Advanced Lighting Features: How Do We "Value" Lighting Technologies and their Effects on Behavior and their Market Value?

Abstract: Studies in controlled lab environments show strong correlations between lighting and worker productivity. Most people are aware of how glare or flickering lights can been distracting or worse. There are other, more subtle effects that lighting can have on alertness and other behavioral aspects. Recent field studies of advanced LED lighting show impacts on our sleep cycles through influence on our "circadian" rhythms and daylighting simulation. The human hormone Melatonin is affected by lighting conditions and directly affects our mood, alertness, and productivity. New terms are being applied in this field such as "Circadian" and "Bios" lighting. There is an abundance of new studies on lighting and behavior in various settings, including effects on appetite with lighted furniture. This is all well and good, but how do we determine the degree to which people, businesses, and ultimately, the market, will value these advanced lighting features? The authors, working with a National Laboratory, used several approaches to triangulate estimates of these hard-to-measure behavioral and market effects. We used specialized, but well-tested, survey methods, and developed dollar value estimates of the value of specialized lighting technologies in commercial, residential, and street-lighting applications. We present these results, identify gaps and caveats associated with the results, and the "next steps" in the research project.

Rebecca Schaaf, Stewards of Affordable Housing for the Future

Title: Next-Level Sustainability: Affordable Housing's Role in an Equitable Clean Energy Future

Abstract: The transition to a clean energy economy is well underway. Numerous states and cities are embracing policies that drive toward greater efficiency and renewable energy. Furthermore, market forces alone make renewable energy the cheapest way to add generation in many markets. At the same time, recent studies validate concerns that the benefits of the clean energy economy will not be equitably shared without concerted efforts. For example, Stanford University's DeepSolar project confirmed that low- and medium-income households are less likely to have installed rooftop solar even in favorable geographies. The move away from natural gas and toward building electrification raises similar concerns around who will bear the cost of stranded assets for natural gas infrastructure. The thirteen non-profit affordable housing providers who are members of Stewards of Affordable Housing for the Future (SAHF) are longstanding leaders in embracing energy efficiency, water conservation, and renewable energy, having set a 20% reduction goal by 2020. As long-term owners of large portfolios of affordable housing, they understand the risks climate change poses for the communities we serve and the importance of ensuring that the benefits of our clean energy future are equitably shared among people from all walks of life. As we near our 2020 energy efficiency goal, the SAHF members are poised to take climate action to the next level, pivoting from a focus on simple efficiency to a carbon reduction focus. This presentation will outline the implications of this new approach to sustainability on multiple fronts, including the range of carbon emissions affiliated with multifamily housing, the implications of electrification and moving away from fossil fuel use, data management tools and needs, and implications for future-focused building design. In addition to these organizational dynamics we also will address the institutional relationships that support and enable our shift from a focus on energy efficiency to a focus on carbon reduction and delivering the benefits of the clean energy transition to disadvantaged communities and vulnerable populations.

Paul Steinberg, GoCarma

Poster Title: It's Time To Start Counting People—Not Cars

Abstract: The ability to move from one area of the nation to the next, free of harassment, is part of the fabric of this country. Freedom of mobility is a cornerstone of liberty, so much so that the authors of the constitution empowered the Federal government with the responsibility to manage the movement of commerce. Over our history, its been the expansion of mobility that has fueled our economy and our growth. Railroads helped us secure manifest destiny, a single nation from coast to coast. Construction of massive ports and canals helped leverage millions of acres of farmable land to feed not only a nation, but a world. The car allowed individuals and freight to leave the city and create 'suburbs'. Yet now, as our economy evolves and our people become the commerce, its transportation that threatens to strangle commerce, not expand it. Congestion has become one of the single greatest hurdles to growth, costing the US economy nearly 305$ billion in 2017. Despite an onslaught of new technology and business models, too many transportation officials are counting cars as a measure of success. DOTs still have no idea how many people are traveling in each of those vehicles on the road. In the past, vehicle occupancy was not an important piece of data. For more than a hundred years, we have measured the success for any road project was the total capacity of vehicle throughputâ€¦ moving forward, it must be passenger throughput With the U.S. average vehicle occupancy at peak travel times is 1.1, there is strong evidence that will drop with the introduction of Autonomous Vehicles unless policies are in place to address the potential for empty electric vehicles circling city streets to avoid parking while owners are inside buildings. DOTs must better leverage the existing capacity we have by pushing more people through instead of adding capacity to push more vehicles through. I am not advocating for everyone to start riding the bus, nor are we suggesting that we should stop building roads. But we need to recognize the state of play and face the facts that a vehicle with one or even zero (autonomous) people inside puts more burden on our transportation system than a vehicle with 2-3- or 4 persons. It's time to stop asking how many cars, and start asking 'How many people are we moving down our roads?'

Bingrong Sun, National Renewable Energy Laboratory

Poster Title: Estimating Mode Choice Decisions for New Transportation Services: A Mode Choice Model Based Upon Fundamental Influencing Factors

Abstract: The introduction of new transportation technologies such as emerging mobility as a service (MaaS) and connected/automated vehicle (CAV) concepts is expected to greatly affect daily travel behaviors and consequently influence the mobility and energy performance of the transportation system. How travelers will evaluate the new transportation services against conventional modes is a question of interest to both researchers and practitioners. One major difficulty in answering this question is the lack of observed mode choice data from new transportation services (e.g., MaaS and CAVs). Stated preference (SP) surveys are usually designed to understand travelers' mode choice decision changes in hypothetical scenarios where CAVs and shared mobility services become available, but SP data has been criticized for not reflecting travelers' preferences in real life. This research proposes a mode choice model based upon a set of fundamental factors that influence mode choice decisions. These factors can be represented as a set of variables that travelers consider for mode choice decisions and can also be used to compare any existing or new/hypothetical travel mode. The model therefore can be estimated with observed data from existing transportation modes and later be applied to investigate travelers' mode choice behavior and associated energy implications for new transportation modes. The fundamental factors include variables such as mode access time at origins, access time at destinations, cost, degree to which the mode requires physical exertion by the traveler, and degree to which a traveler must actively perform a task or that a traveler can productively engage in other tasks. Both conventional modes and new transportation technologies can be described with such set of variables. The California state add-on dataset from the 2017 National Household Travel Survey was used to demonstrate the performance of the proposed model. Comparison was made to a multinomial logit model that included an alternative specific parameter of travel time weighting for different travel modes in the dataset (an approach that should provide good model predictive power, but with limited applicability to novel travel modes). The comparison showed similar predictive performance between the two models (both in terms of overall fitness and parameter signs), proving that the proposed model can reasonably represent travelers' mode choice preferences and has the potential to estimate the likely uptake rate and associated energy implications for new/novel travel modes.

Karina van Schaardenburg, Oracle

Poster Title: How Opower Uses Data And Research To Design The Ideal DER Customer Experience

Abstract: As utility customers adopt DERs (distributed energy resources), their relationship with their utility changes. Their bill could be much higher (in the case of electric vehicles) or much lower (in the case of solar panels). They need help making smart energy decisions and are thinking about their use much more than they were prior to getting a DER. Since 2014, Opower has interviewed ~ 50 DER customers (and surveyed many more!) to understand their information needs and to develop products to smooth the DER transition. This session will cover the research methods used (including interviews, surveys, and utility site visits), they key insights (including customer concerns, barriers, and motivations), and ultimately how we've incorporated those insights into our suite of DER products. We will discuss what customers expect before, during, and after the DER transition, and how this experience could be improved. While the number of people with DERs is relatively small today, we expect that number to grow over the coming years. Creating a great experience for the next generation of DER customers will be crucial to drive widespread DER adoption (and the associated environmental benefits), since we know many customers make the switch to an electric vehicle or solar panels due to a word of mouth recommendation.

Steven Wiese, Frontier Energy

Poster Title: High Impacts in Low Income Multifamily Housing

Abstract: CenterPoint Energy's Agencies in Action program has provided comprehensive and cost-effective weatherization and energy efficiency services to income eligible residential customers since 2007. Frontier Energy implements the program for CenterPoint Energy. Starting in 2015, Frontier Energy developed and incorporated a program component aimed at replacing aging HVAC systems in all-electric multifamily housing with new, high efficiency heat pumps. Each year, owners of qualifying multifamily properties are invited to competitively bid for incentives covering a share of the cost of heat pump replacement projects on multiple units at a complex. Bids are scored based on the cost effectiveness of each proposal, so bids requesting lower incentives or greater savings are preferred. Incentives are offered to fund the highest ranked projects that meet all due diligence requirements, subject to annual spending limits applicable to sponsors, property owners and ownership groups, and contractors. The program design makes use of unique scoring, ranking, inspection and legal due diligence procedures developed by Frontier Energy in order to ensure that projects are selected and completed on time, within budget, and with minimal surprises along the way. The approach ensures that low income residents in multifamily homes can benefit from the program, and leverages program funds by requiring a share of the cost to be provided by the owners of multifamily properties. An accompanying white paper reviews the impacts, cost effectiveness, and trends of the program over the past 4 years. By compiling information obtained from all bids received, as well as actual installation data from awarded and completed projects, we obtain granular insight into program outcomes and trends. These data reveal that the program has consistently yielded increasing savings and cost effectiveness on a year over year basis, due primarily to the competitiveness of the bidding process and gradually increasing equipment efficiencies.

Madeline Williams, U.S. Department of Energy

Poster Title: The Road Not Taken: Lessons in Energy Efficiency Leadership Pathways

Abstract: The Weatherization and Intergovernmental Programs Office (WIP) in the Office of Energy Efficiency and Renewable Energy at the U.S. Department of Energy (DOE) works primarily to enable strategic investments in energy efficiency and renewable energy technologies through the use of innovative practices across the U.S. and a wide range of stakeholders, in partnership with state and local organizations and community-based nonprofits. In order to more strategically and effectively maximize energy and cost savings from energy efficiency and renewable energy technologies for states, local governments, and K-12 school districts, WIP has recently undertaken a project to better understand and categorize the barriers public-sector stakeholders are facing during decision making and program implementation processes. The goal of this project, the Energy Efficiency Leadership Pathway to Achieve Results Framework (EELP Framework), is to identify some of the most pervasive barriers preventing significant energy and cost savings, so WIP can: (1) make solutions more accessible, (2) enable strategic planning of technical assistance that is responsive to stakeholder needs, and (3) identify gaps where additional resources are needed. The EELP Framework leverages the typical policy process cycle of continuous improvement that all public-sector stakeholders follow to achieve success from any program, but highlights four "Building Blocks" foundational to energy efficiency and renewable energy activities specifically: (1) Design Programs and Initiatives, (2) Implement Data Management, (3) Establish Financing, and (4) Empower Organization. Each Building Block refers to an explicit category of tasks and challenges encountered during the policy process that if accomplished, successfully achieve energy and cost savings through efficiency and/or renewables. The process of determining the concrete and specific barriers these public-sector stakeholders face in each Building Block, through widespread stakeholder engagement and mining of WIP institutional knowledge, has illuminated where many stakeholders face the most trouble. Once the lists of barriers were compiled and vetted through public-sector stakeholder review, the process of pairing existing DOE technical assistance resources to barriers began. These pairings indicate where gaps in the current arsenal of resources exist and provide a framework for future targeted technical assistance planning. The sum total of this project will culminate in an easily accessible and navigable online framework stakeholders can access to sort resources by barrier and other relevant information (e.g., resource type, applicable sector(s), population information for case studies). While this achievement is important, what is more influential for the niche this conference occupies is the breadth of knowledge WIP has collected regarding human behavior and decision making as part of the policy process. In addition to compiling an exhaustive list of barriers public-sector stakeholders face to achieving their energy savings goals, this framework also provides a methodology for conceptualizing and targeting these barriers that is potentially useful across the energy market.

Adriane Wolfe, Performance Systems Development

Poster Title: Public Buildings Portfolio Reporting: From Interval Data To Action

Abstract: Public agencies have a responsibility to lead climate change efforts at the local level. To achieve this, they must have meaningful information to strategically plan their energy future and drive action. Interval consumption data offers the potential to provide enhanced information that can help target energy efficiency and distributed energy resource (DER) adoption. While a myriad of tools can help customers interpret their energy consumption trends, the public sector market segment presents a unique and untapped challenge: scale. Public agency sector customers manage portfolios of hundreds to thousands of meters. When staff are faced with unpacking an entire agency's portfolio to identify energy opportunities, it is not clear where to start or what to prioritize. Interval, and even monthly data at this scale is not actionable without visualization, trend analysis, and interpretation. It is not efficient for each public agency to address these challenges independently. To assist in these challenges, the Southern California Regional Energy Network (SoCalREN) was created with ratepayer funds to assist public agencies in meeting the State's ambitious GHG reduction goals. SoCalREN and Performance Systems Development (PSD) collaborated to provide agencies with reports from Compassâ„¢ to offer actionable data insights. Unique to this approach is the ability to understand not only the building stock, but also infrastructure such as water pumping, street lights, and other public assets. For SoCalREN, Compassâ„¢ automates the collection, analysis, and reporting of utility consumption and billing data. Three automation mechanisms are available to import agency scale consumption and billing data into Compass: Green Button Connect (GBC), ENERGY STAR Portfolio Manager (ESPM), and spreadsheet upload. Reports have been developed collaboratively with the goal to iteratively improve the information agencies are provided. Portfolio reporting include annual summaries by load type, annual summaries of time-of-use during demand windows, and load profile metrics. From these portfolio reports, buildings and assets with high consumption and anomalous performance are identified and targeted for further analysis. Individual building and asset reports include a building scorecard using ESPM benchmark data, and interval consumption visualization and analysis using GBC data. To date, SoCalREN has provided portfolio reports to nearly 50 public agencies in Southern California. SoCalREN plans to build upon these results with the introduction of enhanced portfolio-level interval data analysis to provide greater insights into each building's performance, and potential to identify opportunities for energy savings and DER adoption.

Tawechote Wongbuphanimitr, Stewards of Affordable Housing for the Future

Poster Title: Rethinking Upgrade Decisions: Co-delivering Resident Benefits and Environmental Benefits in Affordable Housing

Abstract: The IPCC's recent Global Warming of 1.5Â°C report emphasizes the need to scale up our response to climate change through a mix of pathways. Most of the solutions needed already exist but are not being implemented quickly enough. One of those pathways is to deploy end-use energy efficiency and renewable energy measures in buildings. The thirteen non-profit multifamily affordable housing (MFAH) providers who are members of Stewards of Affordable Housing for the Future (SAHF) understand their role in reducing the impacts of climate change for the low- and moderate-income (LMI) households we serve, including a collective 20% reduction goal by 2020. As long-term owners of affordable housing nationally, they have been pushing the envelope when embracing and promoting the latest innovations in energy efficiency, water conservation, and renewable energy. This poster will explore how the MFAH sector is changing the script on how decisions are made around energy efficiency, water conservation, and renewable energy and pursuing building upgrades that provide greater benefits to LMI households nationally and reduce the environmental impact of their buildings. We will explore a framework and tool developed by SAHF for MFAH owners to show the direct and indirect benefits associated with seven different categories of building upgrades: building shell, HVAC, hot water, water, lighting, appliances, and renewables. The benefits of these building upgrades also fall under five overarching categories of resident benefits: financial, health and safety, comfort, education and learning, and social and resiliency benefits. The poster will showcase the use of the resident benefits framework in two different retrofit scenarios. The first scenario is a light retrofit, most commonly funded by utility incentives, and typically covering low-hanging fruit measures. The second scope of work will showcase a member property that went beyond standard building code to provide healthier, efficient homes that reduce the energy burden for LMI residents and the overall carbon emissions of the building by using a robust green building certification program (e.g., Passive House, Net-Zero Ready). Within member organizations, making these solutions happen requires creativity and internal collaboration to deliver efficiency projects that have greater resident benefits. We will address how members have used this resident benefits framework to make the case for deeper efficiency upgrades internally and resident engagement strategies employed by members to give residents more agency in the upgrade process to produce a greater stock of healthy, sustainable, affordable housing for LMI households.

Yanran Yang, Carnegie Mellon University

Poster Title: How Stable Are Preferences among Emerging Electricity Generation Technologies

Abstract: Coal-fired power plants with carbon capture and sequestration (CCS), natural-gas-fired power plants with CCS, and Small Modular Reactors (SMR) are potentially important emerging energy technologies that could help mitigate climate change and contribute to a low-carbon future. They are not widely available today. Public opinion and preferences towards these technologies will affect their adoption when they are technologically ready to be implemented. This study examines the nature and stability of public preferences among these options. We look at preferences among these technologies as the replacement for a soon-to-be-retired conventional coal-fired power plant, presented as one of the incremental decisions that can shape an evolving energy portfolio. We find that participants have internally consistent preferences, when tested in several ways. Overall, they prefer SMRs to natural gas with CCS to coal with CCS. On a group level, these preferences depend on the choice alternatives, but not on how fully the technologies are described nor how far away a hypothetical power plant would be sited. On the individual level, preferences are related to participants' perceptions of the technology and their political ideology. Our findings suggest that presenting the three technologies together will produce the most balanced, informed judgment, with the least influence of political ideology.

James Yienger, Climate Action Associates LLC

Poster Title: The Utility Energy Registry - A National Census-Based Geospatial Energy Data Registry To Support State And Local Sustainability Planning

Abstract: The Utility Energy Registry (UER) is a national on-line registry to help utility companies publish community-wide energy consumption and renewables generation metrics aligned to US Census geography. The UER provides policymakers and researchers an unprecedented ability to evaluate energy patterns and trends against demographic drivers. It will help state and local governments set sustainability goals, track GHG emissions and evaluate energy programs and policy. The UER is driven by states. The State of New York (NYSERDA) started the UER project, and it is now partnering with the Maryland, Minnesota, and District of Columbia under a United States Department of Energy (USDOE) grant to turn the UER into a national model. UER partners invite other states to collaborate on the UER rather than pursuing individual and possibly inconsistent standards, as this harms the value of the data and will make reporting harder on utilities. The National UER Protocol allows participating states to create customized state chapters that permit adding unique data and geospatial resolutions not included in the national protocol data field library. For example, New York include metrics specifically to help communities evaluate Community Choice Aggregation. Maryland, Minnesota, and DC facilitated working groups of utilities, policy makers, and community representatives to choose what data to include in their protocol chapters. While UER protocol is an open source product of states, it is also a data registry for utility companies or state data repositories acting on their behalf. Utilities develop data to the UER protocol for their service territories and publish it at routine intervals to the UER after they screen it for privacy. The UER holds no private customer data and all data published is free and public. The New York Public Service Commission adopted the UER on Earth Day 2018, and since then seven utilities have been publishing millions of data points for over 1400 cities, towns, and villages in the state with data starting in January 2016. All data is freely available and currently hosted at: https://www.nyserda.ny.gov/All-Programs/Programs/Clean-Energy-Communities/Community-Energy-Use-Data

Margo Zlotnick, Opinion Dynamics

Poster Title: Synergize to Decarbonize: Understanding how Homeowner Behavior and Energy Savings Tools Work Together to Boost ZE Home Performance

Abstract: California's Title 24 adopted strict energy-efficiency and self-generation code to meet the state's goal for all new residential construction to be Zero Energy (ZE) beginning in 2020. The passage of Assembly Bill 3232 and Senate Bill 1477 in 2018 narrowed the focus of such efforts to emphasize the construction of zero-emission electric buildings. To ensure that residential new construction helps reduce energy consumption and contribute to ongoing building decarbonization efforts, the home's ZE features and the homeowner's interaction with such features need to effectively synergize. To explore this relationship, the California Energy Commission has ordered a study of homeowners living in a ZE community in Fresno, California. To our knowledge, this study is the first to collect detailed information on individuals living in a fully-equipped ZE home and will therefore offer unique insight into behaviors underlying ZE technology adoption. This study will also offer BECC attendees the opportunity to understand which ZE features homeowners utilize to save energy, and identify the practices and technologies best leveraged for large-scale residential ZE construction in California. For this effort, we are surveying up to twenty-five homeowners who moved into ZE homes in the Fresno community in 2019. The homes feature cutting-edge technologies including, but not limited to, a unique advanced thermostat, the CURB home energy monitoring system, and heat pump water heater thermal storage. We are surveying homeowners to (a) gauge homeowner satisfaction with ZE features, (b) measure how often residents use the features, (c) uncover how homeowners adapt their behaviors to live more efficiently, if at all, and (d) explore whether a correlation exists between behavior and ZE performance. Residential energy use accounts for over a third of both electricity and natural gas consumption in California, making large-scale adoption of zero-emission electric buildings crucial for the state's ability to mitigate climate change. While ZE homes are designed and equipped with the most advanced energy-saving technology currently on the market, the passive and independent operation of such systems is unlikely to lead to a zero-carbon energy-use future. Instead, an active synergy between homeowner behavior and ZE features is the key to boosting ZE home performance. The findings from this study will offer valuable insights into the patterns of behaviors and key ZE features driving this effective synergy. It will also help to inform best practices for ZE technology adoption at a state-wide scale.