

Jessica Grandson, Lawrence Berkeley National Laboratory

Briefly describe your company or organization's work and your role

Berkeley Lab is a multi-program science lab in the national laboratory system, supported by the U.S. Department of Energy and managed by the University of California. Berkeley Lab is charged with conducting unclassified research across a wide range of scientific disciplines; we develop science and technology solutions for the world by bringing together multidisciplinary teams of researchers, and creating world-class tools for scientific discovery.

I am a Staff Scientist, and a Deputy Director of the Building Technology and Urban Systems Division. I lead our portfolio of R&D in commercial building analytics and advanced control technologies.

What do you enjoy most about your work in energy efficiency?

It's a really hard problem! Realizing efficiency at scale, throughout our building stock is not only a technology challenge, but also one that requires innovation in process, professional practice, and policy.

How has technology in energy efficiency changed during your career? How do you predict it will continue to change?

During my career, the change that stands out most to me is the increase in connectivity in our buildings, and the associated increase in the volume and availability of data. This in turn, has opened the door to improved understanding of the many different aspects of performance that we are interested in, opportunities for more pervasive integration, and a foundation for new applications and services.

Are there new "cutting edge" energy efficiency technologies that you are excited about?

I'm excited about the convergence of analytics and controls, as well as new types of data analytics. For example, we are working with a set of fault detection and diagnostics technology providers to develop methods that automate not just the identification of problems, but also their resolution. In an earlier-stage R&D effort, we are using computer vision and machine learning techniques in combination with drone and satellite/aerial imagery for improved asset and efficiency measure identification.

What new technologies are you hoping we will see in the energy efficiency field soon?

I am hoping that we will soon see solutions for more streamlined and cost-effective interoperability between systems and applications. Additionally, as distributed energy generation and grid interactivity become more central to how we operate our buildings, predictive controls that can integrate end uses and optimize for load flexibility, utility cost, and comfort will become increasingly important.

I would also note, that in addition to new technologies there is still great value to be gained from scaling the adoption of existing although still emerging technologies - a challenge that in many ways has proved equally as difficult as new technology development.

How can we best support technological innovation in the energy efficiency field?

One path to continued innovation is to ensure a thriving and sustained pipeline of diverse, inspired talent in our field. To that end, we can all endeavor to shine a bright light on the difficult problems that our field presents and the rewarding careers that can be built upon solving them.

How can we get more people to work on developing new technologies within the efficiency field?

See above

Greg Marsicek, Slipstream

Briefly describe your company or organization's work and your role

Slipstream is a nonprofit company which creates, tests, delivers and scales next generation energy efficiency and renewable energy solutions which move us toward a clean energy economy. I am an energy engineer who manages emerging technology projects, including conducting field monitoring and analysis.

What do you enjoy most about your work in energy efficiency?

I enjoy learning about cutting edge technologies and how they work to save energy over traditional technologies and practices. I find it challenging and rewarding to work to overcome market barriers and educating the public on new technologies.

How has technology in energy efficiency changed during your career? How do you predict it will continue to change?

I have been in the energy sector for around 7 years - which is a very short time. However, even in this short time, building energy codes have adopted many technologies that were once considered "emerging technologies" such as demand controlled ventilation and mandating lighting controls for most spaces. In some cases, the market has adopted more efficient technologies as they have become more affordable (for example LED lighting). In addition, the energy efficiency market has continued to grow in order to meet the demand for cutting edge buildings which are both beneficial for the environment but also for the occupants. Moving forward, I expect the demand for high performance buildings to continue to grow as well as for commercial energy codes to become more stringent.

Are there new "cutting edge" energy efficiency technologies that you are excited about?

Coming from a northern climate, I am most excited about alternatives and technologies that move us away from fossil fuel heating – which is a significant challenge. Currently, there is significant interest in 'cold climate' variable refrigerant flow (VRF) systems. While VRF systems have been on the market for many years, recent advancements have been made to improve their cold weather performance – making them a viable option in cold climate locations. We have seen an increase in popularity of these systems, however limited research and data is available on their real-world performance. Another HVAC technology that we are currently investigating is adsorbent air cleaning – a technology which is used to reduce the amount of outdoor air required by cleaning the indoor air. Significant energy savings can be found by reducing the amount of outdoor air used.

What new technologies are you hoping we will see in the energy efficiency field soon?

A technology that is gaining traction is automated demand response (ADR) and Grid-interactive Efficient Building (GEB). This technology reduces demand when the grid becomes overloaded by implementing building control logic to reduce or shift demand during peak load hours based on utility and grid operator's ADR signals.

How can we best support technological innovation in the energy efficiency field?

In our experience, one of the largest barriers to adoption of new technologies is lack of knowledge and data. Providing quantitative energy savings as a third party unbiased source informs all stakeholders including local, state, and federal government, utilities, building owners

and designers, and the public on how the technology works, its energy and cost savings in the field, and the cost-benefits of implementing it. As part of any technology study, we consider the barriers to adoption and how to best overcome them. We work to support contractors and the public on these technologies through training and education.

How can we get more people to work on developing new technologies within the efficiency field?

Increasing awareness and educational/training events will grow the impact of the emerging technology and energy efficiency markets. Partnering with private companies as well as university and national lab researchers in R&D and in commercializing their new technology and products will expedite new technology market adoption.

Jamie Peters, Google

Briefly describe your company or organization's work and your role

Google creates products and services that help customers save energy and be more comfortable and safe at home - we create the helpful home. My role is to help energy partners such as Enbridge and ComEd, and their implementer partners such as CLEARResult and Summerhill, design and run customer programs that include Google products. I help connect the dots between helpful hardware and utilities that want to help their customers save energy.

What do you enjoy most about your work in energy efficiency?

I love the people aspect of my work. Throughout my career I've seen all sides of the utility energy efficiency industry and it truly does make an impact on people's lives. There are so many jobs that these programs support - and create - which is, to me, just as powerful as the energy savings themselves.

Here at Google we have a program called the Power Project which is our contribution to helping people in need save energy. Our goal is, through our partners, to get 1 million smart thermostats into the homes of people that have limited means, and thus the highest energy burden since energy use doesn't scale with income. And since heating and cooling costs account for more than half of a home's energy use and Google Nest Thermostats save 10-12% on heating and 15% on cooling, the impact of improving tech equity is substantial. I'm proud to be working with a number of Canadian and American utilities to help them incorporate this important technology into their customer programs.

How has technology in energy efficiency changed during your career? How do you predict it will continue to change?

At risk of dating myself, when I began my career in sustainability, a programmable thermostat and insulation and air-sealing were considered innovative. Look how far we have come! Now, we're looking at the house as a system that can be optimized to benefit both residents and the energy grid as a whole.

Are there new "cutting edge" energy efficiency technologies that you are excited about?

Yes! I think that the work our partners such as Uplight are doing in synchronizing and optimizing energy use for grid goals is incredible. In order to meet climate goals, we'll need to think bigger than a single house or single set of products and instead zoom out to how a whole neighborhood or town can save or shift energy at specific times to reduce the need for the most carbon-intensive fuels. Google plays a role in this through our long-standing and industry-leading residential demand response program called Rush Hour Rewards, which can be the foundation for larger and more complex energy usage optimization.

What new technologies are you hoping we will see in the energy efficiency field soon?

Not a new technology, per se, but a go-to-market opportunity for existing smart home products: I'd like to see more HVAC and other in-home service providers start offering smart home advisory and installation services that guide the customer to setting up the home as an ecosystem. More and more people are looking for DIFM (do it for me) solutions and the set of hardware and software options is proliferating rapidly: it's clear that the market opportunity will only be growing. This is an opportunity for energy programs as well, since customers don't always optimize for energy efficiency as their first choice - entertainment or convenience or safety can be bigger drivers to start building out a smart home - but most customers certainly would like to reduce their energy usage as well. This is where the in-home services routinely provided through utility's DSM programs such as direct install programs, energy audits, etc. would be an excellent fit.

How can we best support technological innovation in the energy efficiency field? How can we get more people to work on developing new technologies within the efficiency field?

I see these two questions as interconnected since innovation requires diverse and fresh perspectives and the energy industry has historically been rather homogeneous. I think it's important to purposefully invest in expanding access to the field such as geographically- and culturally-relevant workforce development and training. Another example is inclusion of R&D programs within a utility's DSM portfolio, and designing these in such a way that allows and even encourages individuals and historically underrepresented groups to apply. It's important for utilities and regulators to collaborate in creating the space for innovation and people-driven solutions to have room to flourish in our industry.

Kevin DeMaster, Mitsubishi Electric

Briefly describe your company or organization's work and your role

Mitsubishi Electric Trane US is a leading global manufacturer of high efficiency cooling and heating equipment. We manufacture commercial and residential equipment distributed through a channel of engaged distributors and contractors across the country. Residential and Commercial Mini-Split Heat Pump and Variable Refrigerant Flow (VRF) product solutions are very high efficiency ducted and ductless products that achieve energy savings and customer comfort.

My role, as Manager of Efficiency and Utility Programs is to actively partner with utilities and program implementation companies to fill their needs such as support education and awareness of these HVAC solutions and to advance the sales of high efficiency Mitsubishi HVAC equipment.

What do you enjoy most about your work in energy efficiency?

Prior to Mitsubishi Electric I supported the utility energy efficiency industry as an Implementer for nearly 10 years. That experience working with the industry on energy efficiency solutions and deployment of programs has built a deep network of people interested in greatly increasing energy efficiency impacts. I now enjoy being an industry partner to meet the needs of the industry to promote one of the most inquired about HVAC solutions for residential and commercial applications.

How has technology in energy efficiency changed during your career? How do you predict it will continue to change?

In the five years with Mitsubishi Electric Trane US, we have advanced the product capabilities and solution options to meet most home and commercial heating applications and often solving problems where traditional HVAC solutions have fallen short. In addition, we have many control solutions that have expanded to give users the experience or preferences they desire. We continue to enhance the diverse offering of products, continuously increasing efficiency, and new product solutions that will help support efforts as the market embraces Beneficial Electrification on a much greater scale.

Are there new "cutting edge" energy efficiency technologies that you are excited about?

Our inverter compressor heat pump technology is already considered cutting edge. Even industry "experts" rarely fully understand all the solutions and capabilities and therefore this makes conversations always new and fresh. However, we continue to investigate and develop advanced cutting edge products that solve issues such as integration and controls with other home HVAC technologies, demand response solutions, and other solutions that address the desire to integrate with or displace fossil fuel for space and water.

What new technologies are you hoping we will see in the energy efficiency field soon?

Product development is always looking at products that meet needs in the US. Today we have products in other parts of the world that we do not have here such as air-to-water and others that we are evaluating bringing to this market. Additionally, we are looking at solutions that might be specific to the US market either because they fit a unique market need or the utilities energy efficiency programs or initiatives like beneficial electrification will push us to provide. Either way we will see products and controls that continue to evolve.

How can we best support technological innovation in the energy efficiency field?

Awareness can be one of the biggest hurdles today. Transforming contractor and consumer understanding and more rapid adoption will create new growth in the market allowing products to further develop to their greatest potential. Examples of this could include our Hyperheating products that today provide 100% heating far below the current 5F and capabilities to deliver approximately 80+% capacity at -13F. Just this simple awareness, overcomes the perceptions of traditional equipment shortcomings but the advancement of today's cold climate technology, but greater adoption will advance the heating performance even further. On the cooling side we have just released a product that is now able to provide cooling for critical applications with innovation down to -40F, which was previously -20F.

How can we get more people to work on developing new technologies within the efficiency field?

We support efforts that are focused around improving equipment. Often pilots become avenues to help facilitate that development. Bringing collaboration and requests together through existing platforms are logical steps to combine financial funding and requests to focus efforts. This would be a request that I might be better answered by our product development group.