Climate-Forward Efficiency Symposium

February 24, 2022

2:30–4:00 PM ET

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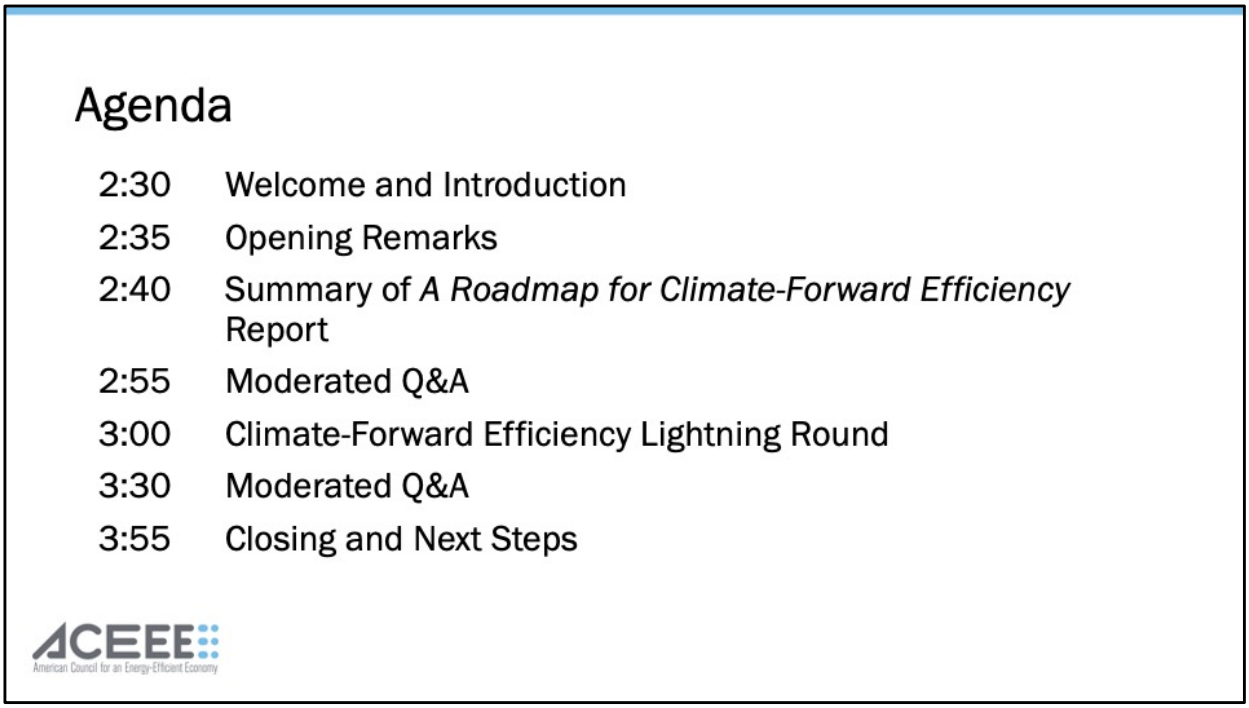
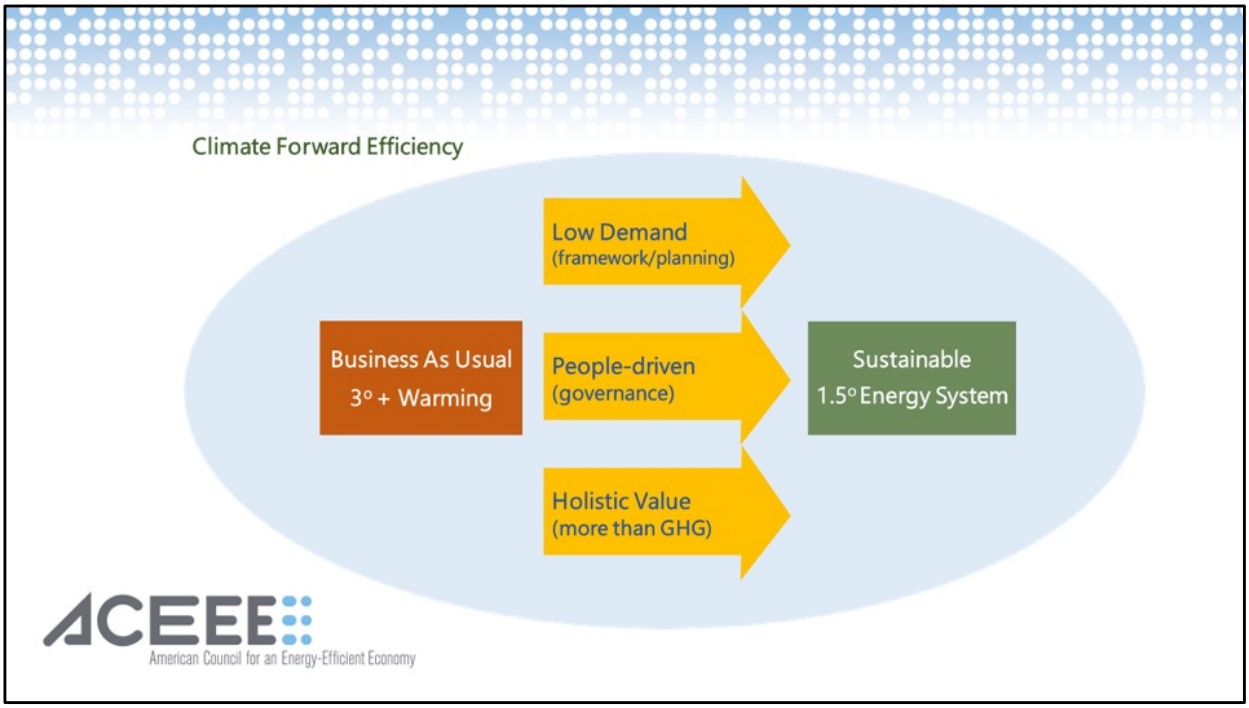
EDWARD: My name is Edward Yim, Director of ACEEE's Utilities Program and I'll be facilitating this webinar.



EDWARD: The agenda for this webinar which is on our webpage called Climate-Forward Efficiency Initiative, is as follows:

- There will be short introductory remarks by myself and our Executive Director, Steve Nadel
- We'll then go straight into our summary presentation of our latest report
- Followed by a short Q&A session
- We'll then have a lightning round of presentations by nine distinguished speakers, which will be followed by a moderated Q&A session

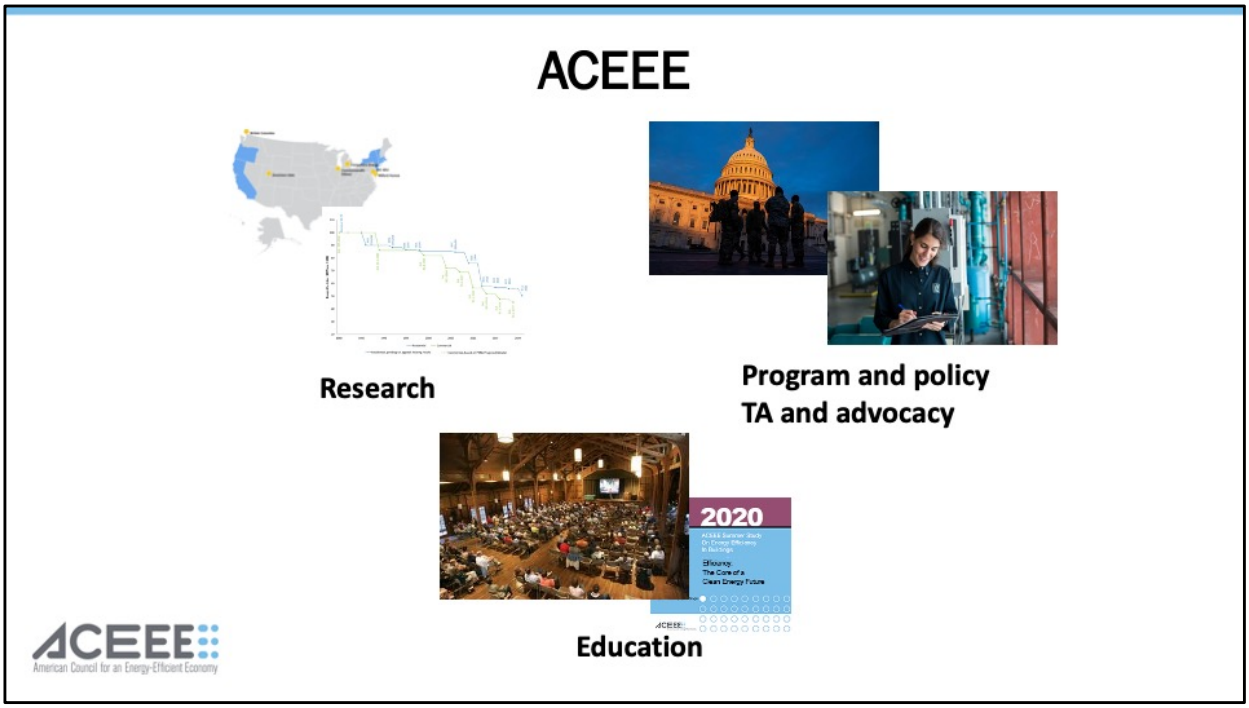
So, let's get into the topic.



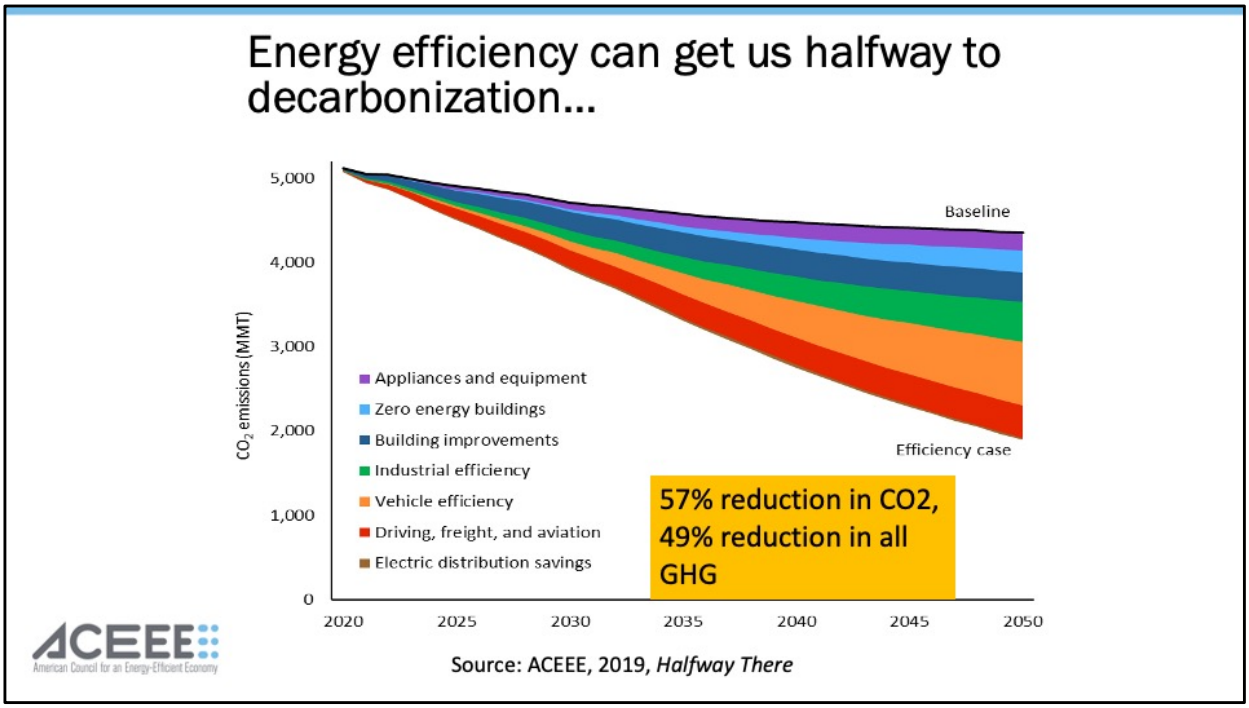
As you all know, there is a fundamental difference between decarbonization that is grounded in maximum efficiency, and one that isn't. The former option costs less, it is better for the environment and health, and it often better reflects the values of the communities where these measures are deployed. And the smaller initial footprint that efficiency produces allows societies to decarbonize much quicker. So, a truly transformative path that moves us from business as usual toward 1.5°C decarbonization should go through energy efficiency. So, I'm very excited about the Climate-Forward Efficiency Initiative, which will allow us to make this essential pivot.

EDWARD: Now I'd like to introduce Steve Nadel, the Executive Director of ACEEE. His bio is way too extensive for me to summarize, so I'll leave it at his title. He'll provide a more comprehensive view of this effort. Steve?

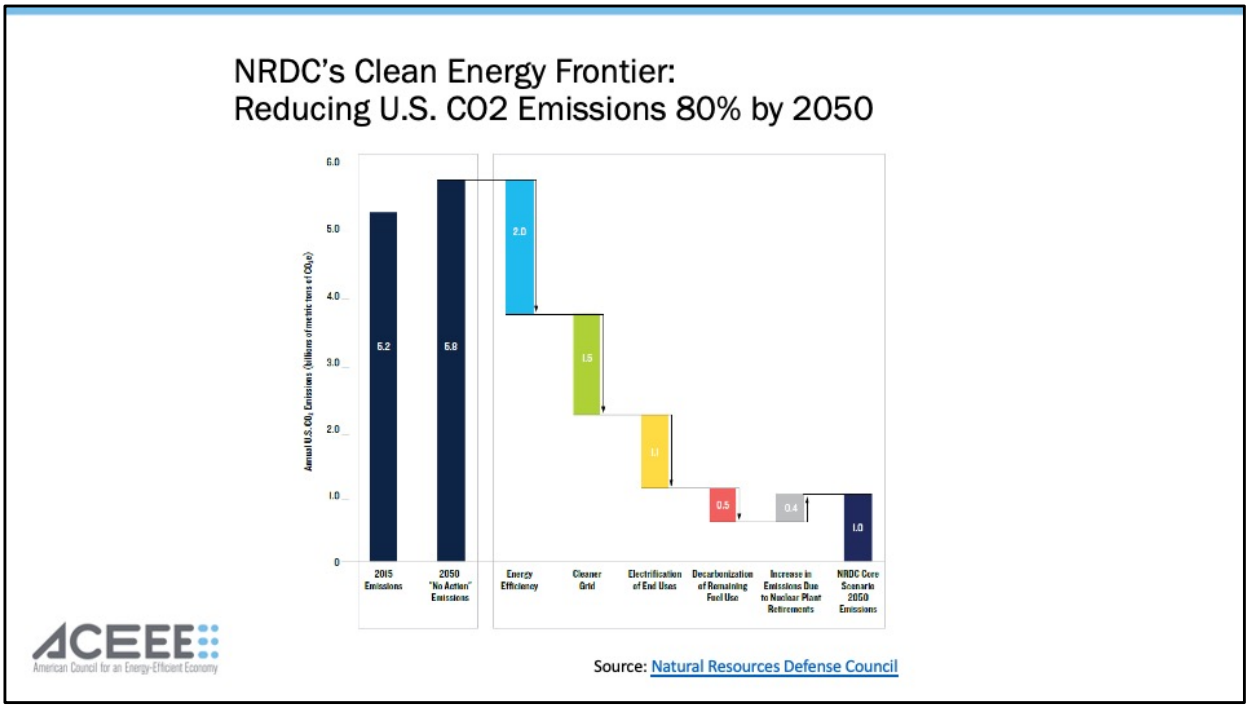
STEVE: Thank you. I'm happy to participate and look forward to hearing both Mike talk about our roadmap and all the other presentations and discussion.



STEVE: Just by way of brief background, ACEEE is a nonprofit research organization that uses our research as a foundation for our education as well as our program and policy technical assistance and advocacy activities.



Two years ago, we did a study looking at what is the role of energy efficiency in helping to address climate change. We came to the conclusion that energy efficiency can reduce U.S. greenhouse gas emissions in half. In other words, it will get us half-way to the goal of full decarbonization. And climate-forward efficiency in the utility sector will be an important part. As you can see many different colors in this graph — there are opportunities in all the different sectors, whether it is residential, commercial, industrial, or transportation.



Other studies also show that energy efficiency is a critical component of efforts to reduce greenhouse gas emissions. This figure, from an NRDC study on how the U.S. can reduce carbon dioxide emissions by 80%, estimates that energy efficiency — shown in the blue bar — is the largest component of needed efforts to reduce emissions. Clean electricity generation, such as renewable electricity, is shown in green and is the second largest component. Electrification of vehicles. Buildings and some industrial processes – shown in yellow — is the third largest component.

Many Reasons to Pursue Energy Efficiency

- Saves money
- Creates jobs
- Reduces environmental harms
  - **Climate change**
  - **Other air pollutants (SOx, NOx, mercury, PM2.5)**
  - **Land use and water**

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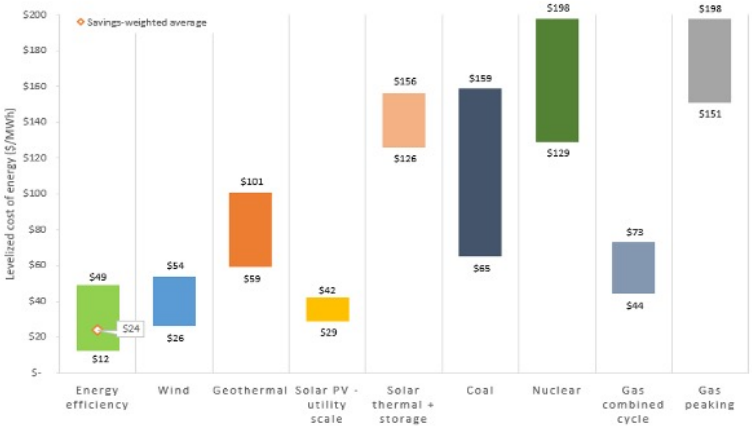
We see energy efficiency as a critical ingredient in this. Obviously, for a decade we've been talking about how efficiency saves money, how it creates jobs, and how it reduces environmental harms. In recent years, climate change has been a key environmental harm that efficiency can help avert. But I'd also note other pollutants, whether it's SOx, NOx, mercury, or fine particles, these often are emitted in conjunction with the greenhouse gases. We need to look at all of them together, particularly in environmental justice communities. Climate change is important, but some of these other pollutants can be even more important. But they actually usually occur together so every reduced PM, NOx, or SOx, we often (but not always) will also reduce greenhouse gas emissions.

Levelized Cost per kWh



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Source: ACEEE, 2021, *The Cost of Saving Electricity for the Largest U.S. Utilities*. Supply-side costs from Lazard 2020.

Energy efficiency does tend to be low cost. This slide compares our estimates of the average cost of energy efficiency from a review of hundreds of programs to costs of various different power sources. As you can see, efficiency is a little bit lower than wind and solar and a lot lower than everything else. I would note that the wind and solar doesn't include storage. But as they go up, more storage will be needed, which will somewhat increase their costs.

Decarbonization Components Complement Each Other

- Efficiency
- Electrification
- Renewables
- Carbon-free fuels
- New ways of doing things (e.g. structural wood instead of steel and concrete)

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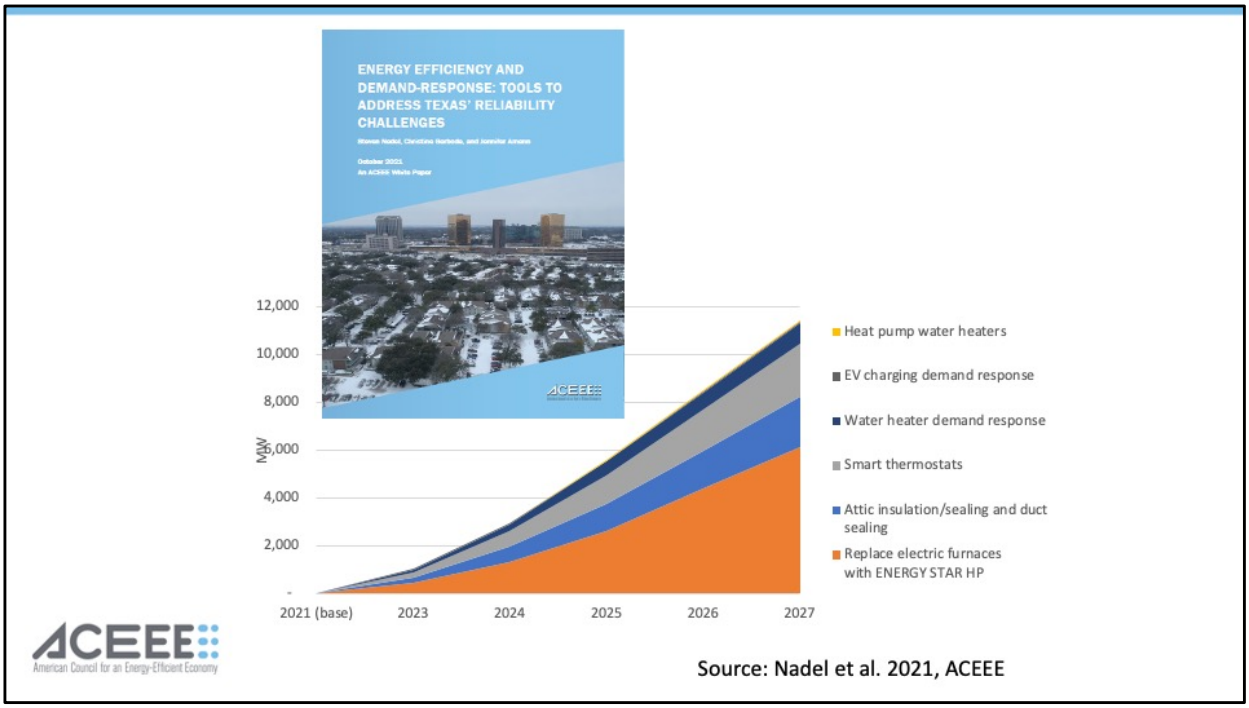
We think these various decarbonization components complement each other. Efficiency done in parallel with electrification, renewables, carbon-free fuels, and new ways of doing things, such as structural wood instead of steel and concrete in appropriate applications. Many of these are effectively variations on efficiency but we need to do them all together if we are going to decarbonize.

Two analogies: 1) peanut butter and jelly. If efficiency is peanut butter, we have lots of different jellies. It's hard to do one without the other. Yes, I know there are some diehards who just love peanut butter and not the jelly...most people don't, just ask your kids! 2) a basketball analogy. People have what's called the "pivot foot"...they look to who to pass to. In this case, efficiency is the "pivot foot" and it will work with the rest of the team, whether it's electrification or renewables, carbon-free fuels, etc. But it's a central component.



Just to give one example, this is a study we did late last year on using energy efficiency and demand response to address Texas' reliability challenges. This particular chart looks at winter peak demand. In Texas, we found that the biggest demand reductions could be through a form of efficiency replacing existing electric furnaces with much more efficient heat pumps. Also, insulation and air-sealing of attics was a big one, smart thermostats, as well as various types of demand response are really going to address the problem in Texas and problems unique to the rest of U.S. All of these need to work together.

Contact Information

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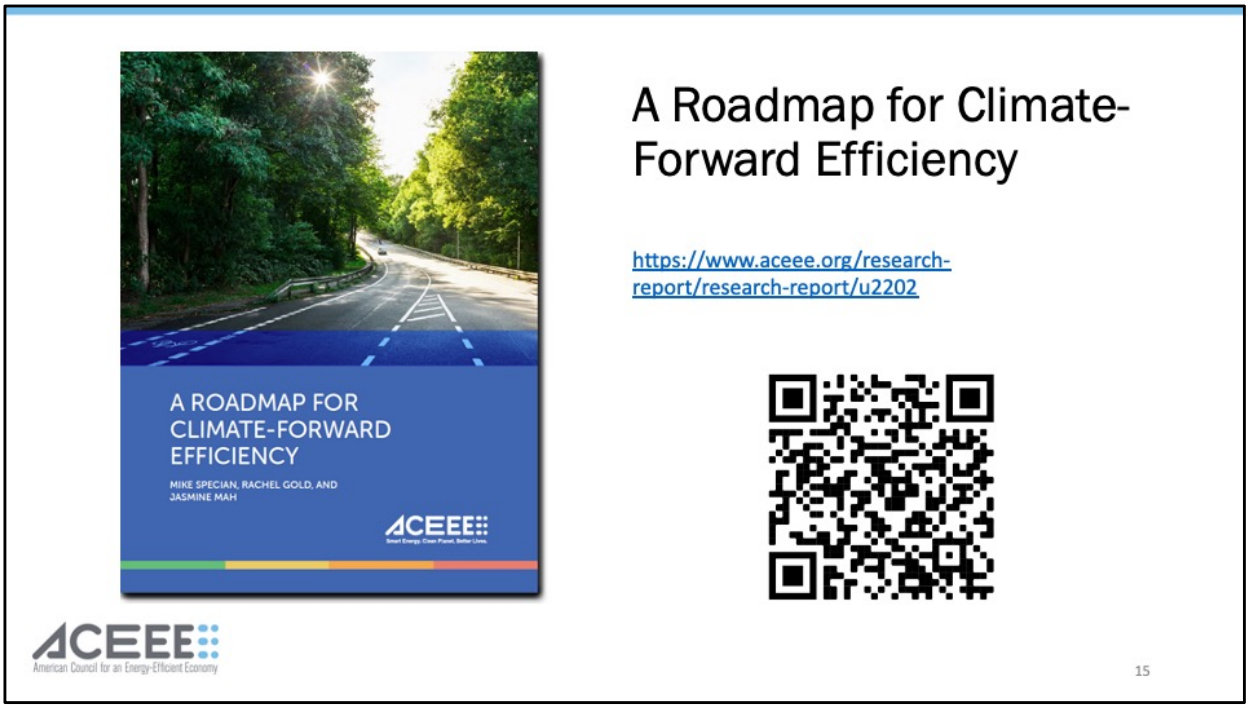
With that, I'll turn it back to Edward, and here is my contact information if people have questions. Thank you, and Edward, back to you.

EDWARD: Thank you, Steve, for that compelling vision and that analysis of how we can accelerate decarbonization through efficiency. Now I would like to introduce Mike Specian. Mike is the utilities manager at ACEEE and previously served on the emerging technologies team at the Building Technologies Office of the U.S. Department of Energy. Along with Rachel Gold and Jasmine Mah, Mike authored the report *A Roadmap for Climate-Forward Efficiency*, which include specific strategies for aligning energy efficiency with climate change action. Mike, take it away to provide a summary of that report.

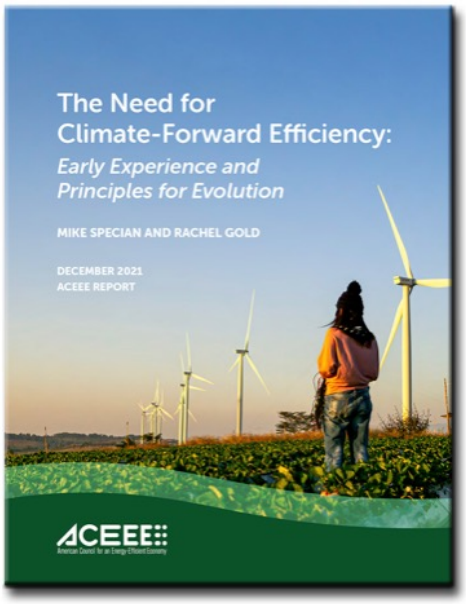
MIKE: Thank you, Edward, for that introduction.



MIKE: Before I dive into the details of this report, I want to start by placing it in context. This report is the second released as part of ACEEE's Climate-Forward Efficiency Initiative. We launched the initiative about a year ago with the question, "Do utility energy efficiency programs need to evolve to align with deep decarbonization goals?" We suspected the answer was yes, but we were not certain.

The Need for Climate-Forward Efficiency: Early Experience and Principles for Evolution

https://www.aceee.org/research-report/u2106



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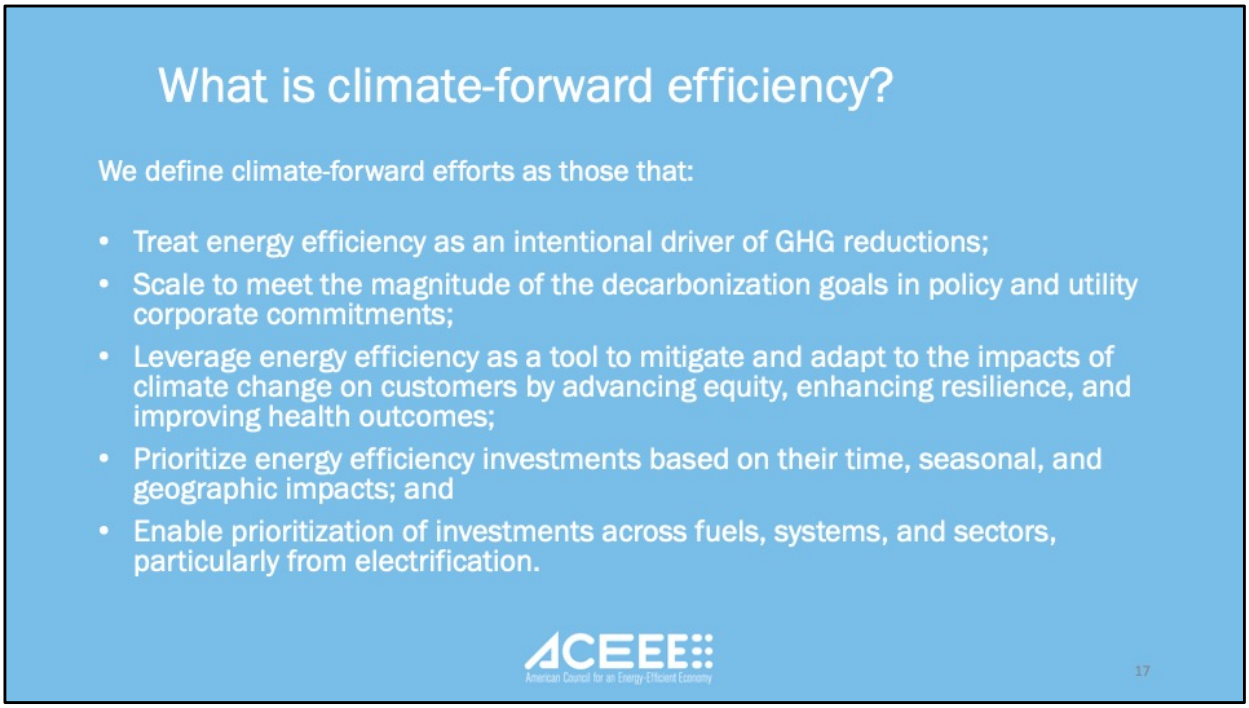
So, in December we published the first report of this initiative that concluded for a variety of reasons: yes, this is a transition that needs to take place. That the future of energy efficiency is *climate-forward* efficiency. But just to make sure we're all on the same page, let me define that.

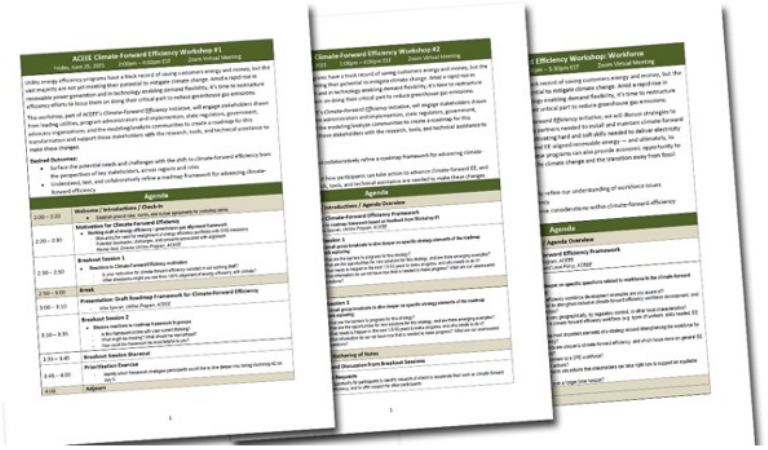


Climate-forward efficiency actions are those that:

- Treat energy efficiency as an intentional driver of greenhouse gas (GHG) reductions;
- Scale to meet the magnitude of the decarbonization goals;
- Leverage energy efficiency as a tool to mitigate and adapt to the impacts of climate change on customers by advancing equity, enhancing resilience, and improving health outcomes;
- Prioritize energy efficiency investments based on their time, seasonal, and geographic impacts; and
- Enable prioritization of investments across fuels, systems, and sectors, particularly from electrification.

So given that there is a need to make this transition, what do we do about it? What actions do we take? What strategies do we employ? These are big questions.

We conducted expert interviews and facilitated 3 climate-forward efficiency workshops



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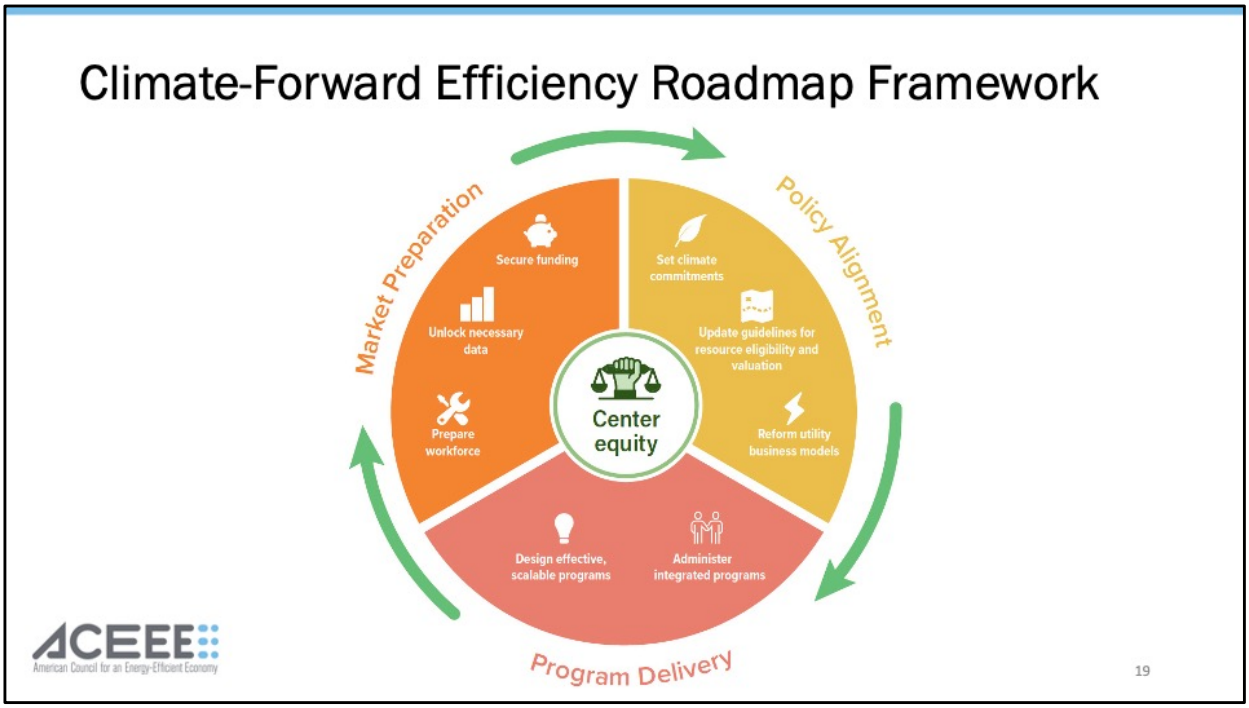
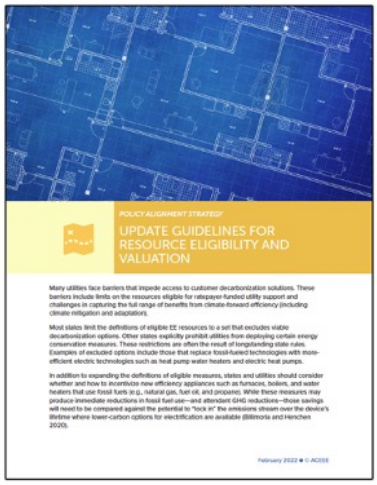
So, starting in April we began soliciting input from experts through extended interviews, workshops, and external review. The recommendations that I am about to share are the product of over 80 experts in the energy efficiency space. That does not mean that our recommendations are comprehensive, but this report does represent a fairly robust assessment of what stakeholders need to do to make sure utility energy efficiency programs are meeting the needs of this moment and the future.



So without further ado, here are the nine roadmap strategies to accelerate climate-forward efficiency. You will notice that 8 of the strategies are sorted into three buckets: those that deal with getting policy and regulation right, those that deal with program design and operation, and those that deal with preparing the market. The arrows indicate that each of these strategies informs and impacts the others. These 8 strategies surround a ninth strategy: centering equity. We believe that equity needs to be considered and embedded in all aspects of this transition, so we placed it right at the center, adjacent to everything else we need to do.

Structure of the Report



POLICY ALIGNMENT STRATEGY

UPDATE GUIDELINES FOR RESOURCE ELIGIBILITY AND VALUATION

Many utilities face barriers that impede access to customer decarbonization solutions. These barriers include limits on the resources eligible for ratepayer-funded utility support and challenges in capturing the full range of benefits from climate-forward efficiency (including climate mitigation and adaptation).

Most states limit the definitions of eligible EE resources to a set that excludes viable decarbonization options. Other states explicitly prohibit utilities from deploying certain energy conservation measures. These restrictions are often the result of longstanding state rules. Examples of excluded options include those that replace fossil-fueled technologies with more-efficient electric technologies such as heat pump water heaters and electric heat pumps.

In addition to expanding the definitions of eligible measures, states and utilities should consider whether and how to incentivize new efficiency appliances such as furnaces, boilers, and water heaters that use fossil fuels (e.g., natural gas, fuel oil, and propane). While these measures may produce immediate reductions in fossil fuel use—and attendant GHG reductions—those savings will need to be compared against the potential to "lock in" the emissions stream over the device's lifetime where lower-carbon options for electrification are available (Billimoria and Henchen 2020).

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CLIMATE-FORWARD EFFICIENCY ROADMAP ● 25

POLICY ALIGNMENT STRATEGIES

Advancing climate-forward efficiency will also require reform to CETs, which often fail to fully capture beneficial program impacts[*,**] and can thus prevent technologies or program approaches from being included in a utility's portfolio of offerings. ACEEE surveys have found that existing tests are inconsistently applied across states, which motivated the publication of a recommended set of benefit-cost analysis principles in the *National Standard Practice Manual for Benefit-Cost Analysis of DERs (NSPM)* (NESP 2021). The *NSPM* lays out a general process that states and others can follow to incorporate their policy goals into CETs.[†] Its publication has sparked valuation conversations in multiple states, resulting in revamped tests. States interested in pursuing climate-forward efficiency can use the *NSPM* process to develop jurisdiction-specific tests that align with their policy goals.

Fully valuing EE faces some headwinds. In many regions, traditional system benefits are falling along with growing renewable energy generation and low natural gas prices. Some consumer advocates are concerned about rising costs of DSM and rate impacts, even as EE remains the least-cost resource on average (Cohn 2021). Moreover, for many communities, cost-effectiveness conversations tend to be inaccessible, which compromises their robust representation in reform discussions. In addition, some commissions and intervenors have historically expressed skepticism about evaluators' ability to measure nonenergy impacts with the same "accuracy" level as other impacts. As a result, many regulators consider it inappropriate to use valuations of nonenergy impacts in system planning.

[*] Cost-effectiveness testing primarily establishes a "go/no-go" criterion for energy efficiency programs or portfolios. This is distinct from the crucial task of establishing the objectives around which utilities optimize their portfolios.

[**] Many standard cost tests—including the total resource cost (TRC) test, utility cost test (UCT), participant cost test (PCT), and ratepayer impact measure (RIM) test—fail to account for the impacts GHG emissions. A societal cost test (SCT) can account for these impacts, but only if the state requires the proper inputs.

[†] This includes accounting for EE's nonenergy benefits, such as decarbonization. About two-fifths of U.S. states have included the value of carbon emissions in their CETs, though often not at a high enough level to drive appropriate screening and selection of decarbonization measures.

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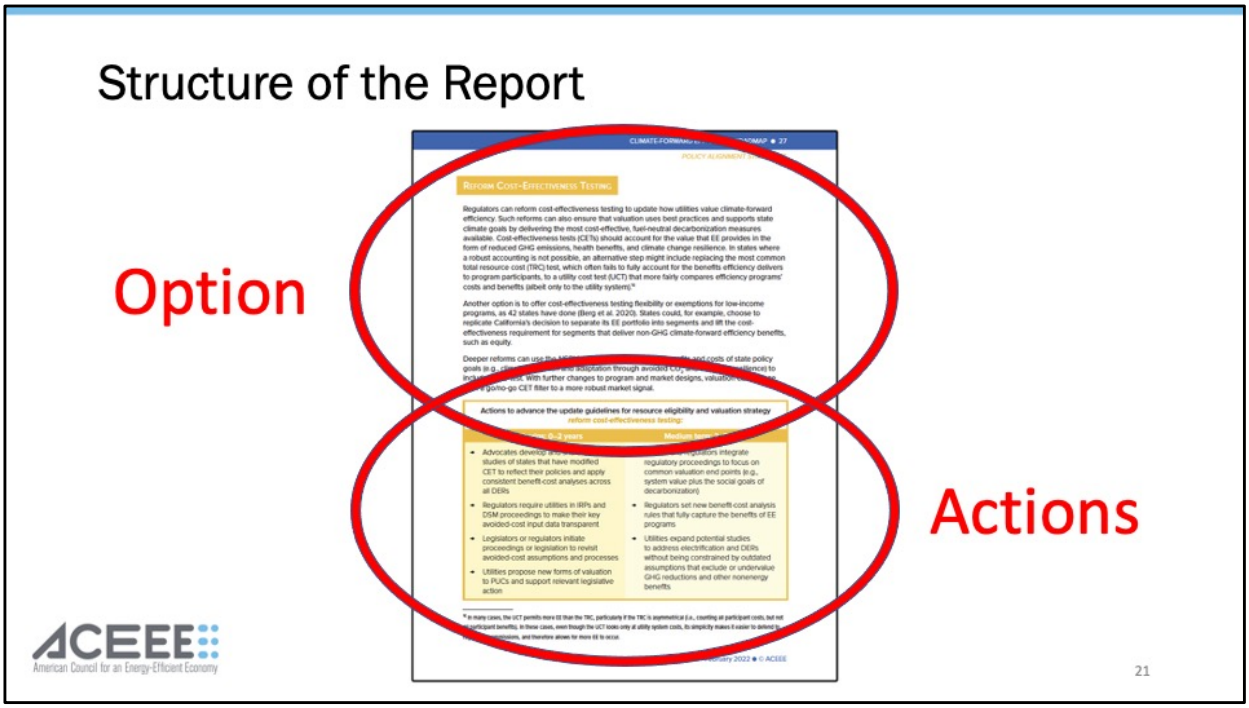
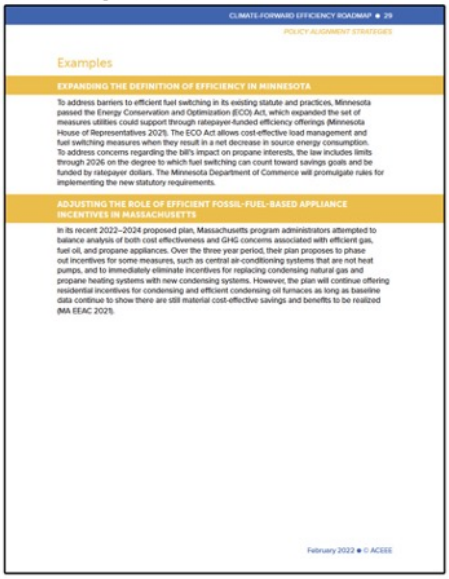
As you read this report, you will notice that every strategy follows the same structure. We begin with a concise overview of the strategy.



Then we offer 3–4 options for realizing the strategy. Each of those options is accompanied by a table of discrete actions that stakeholders can take in the near- and medium-terms.

Structure of the Report



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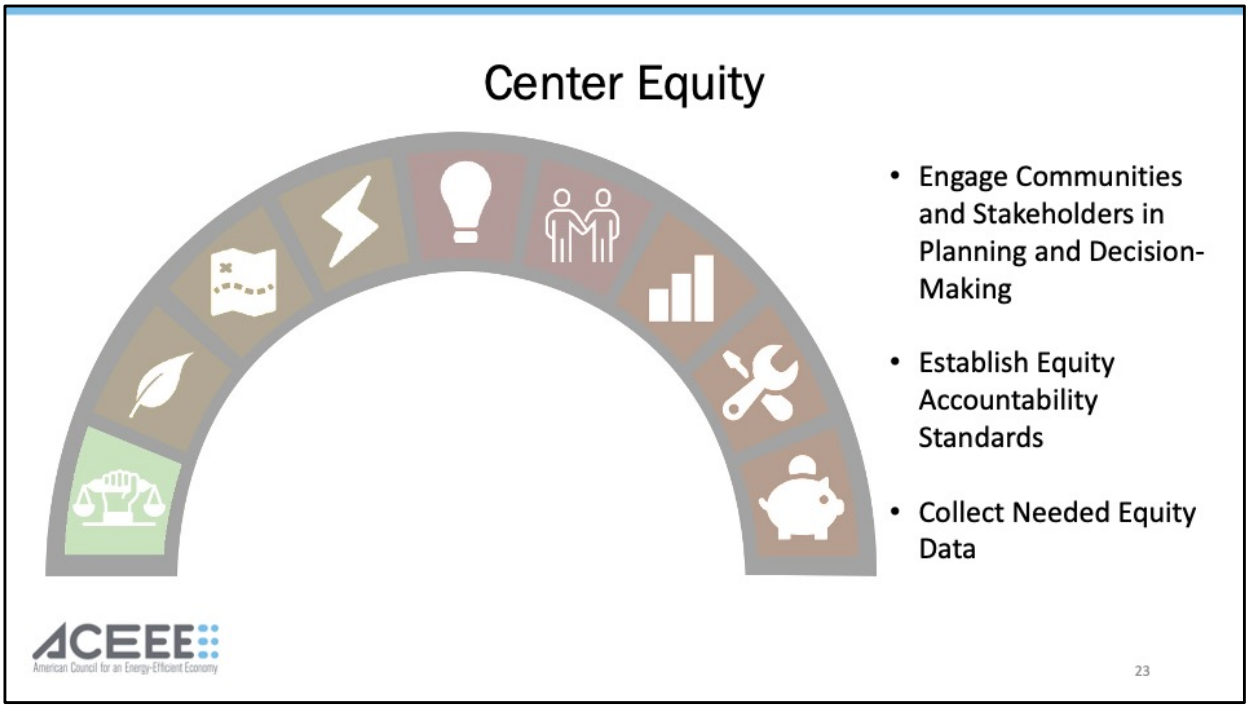
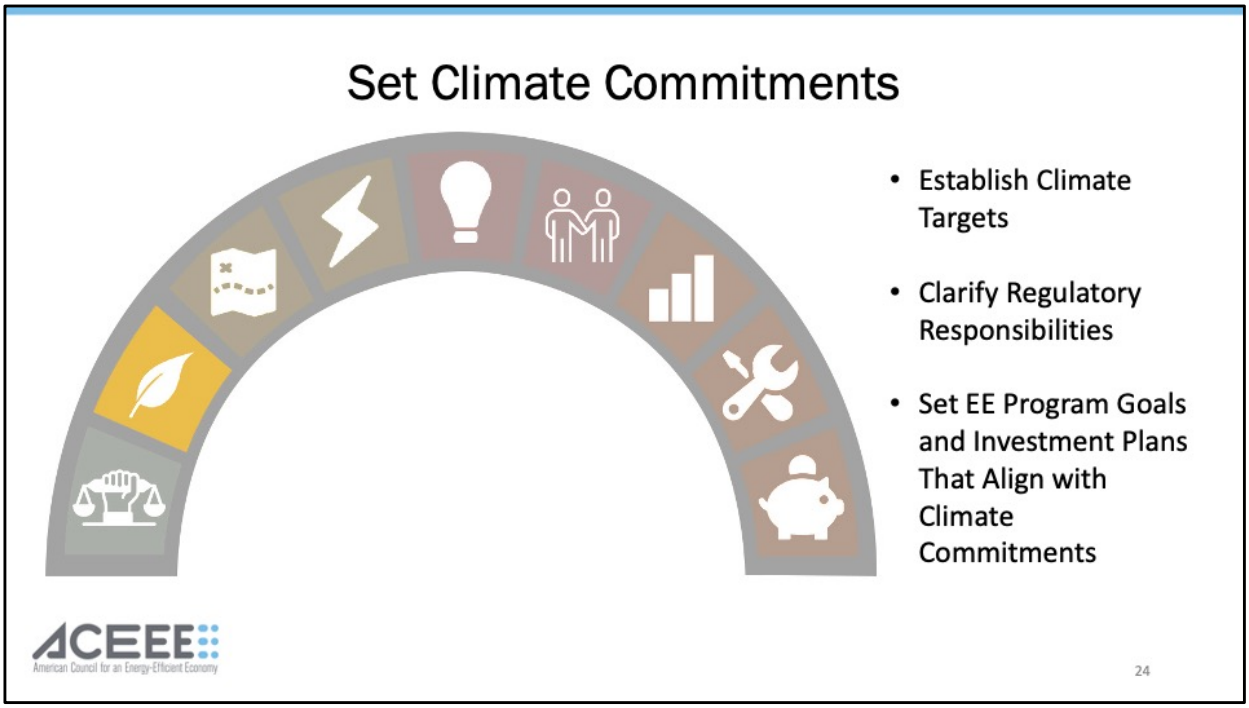
And each strategy section also includes additional standalone examples where we see the strategy either in practice or in preparation.



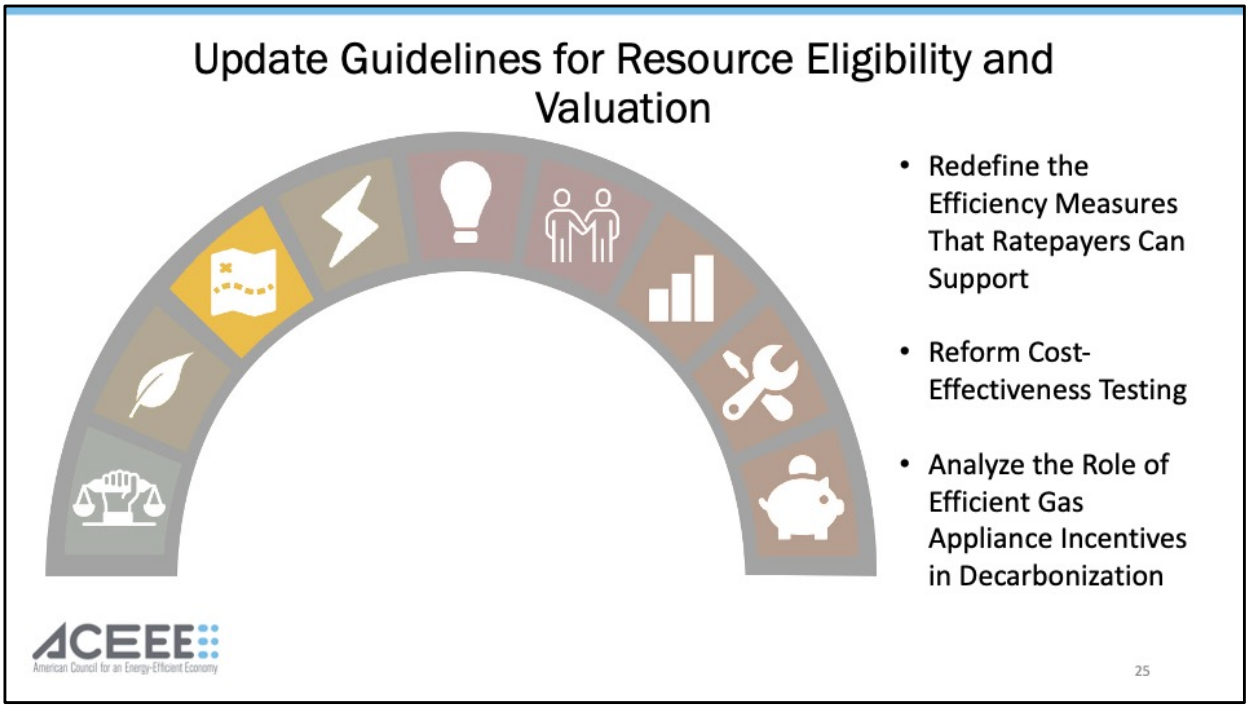
The first strategy is **Center Equity**. The reason is that members of low-income, environmental justice, or otherwise underserved communities already bear a disproportionate share of high energy burdens and the impacts of climate change. The goal is to create energy solutions that equitably distribute the benefits and burdens to all community members. The three options under this strategy are:

Engage Communities and Stakeholders in Planning and Decision-Making
Establish Equity Accountability Standards
Collect Needed Equity Data

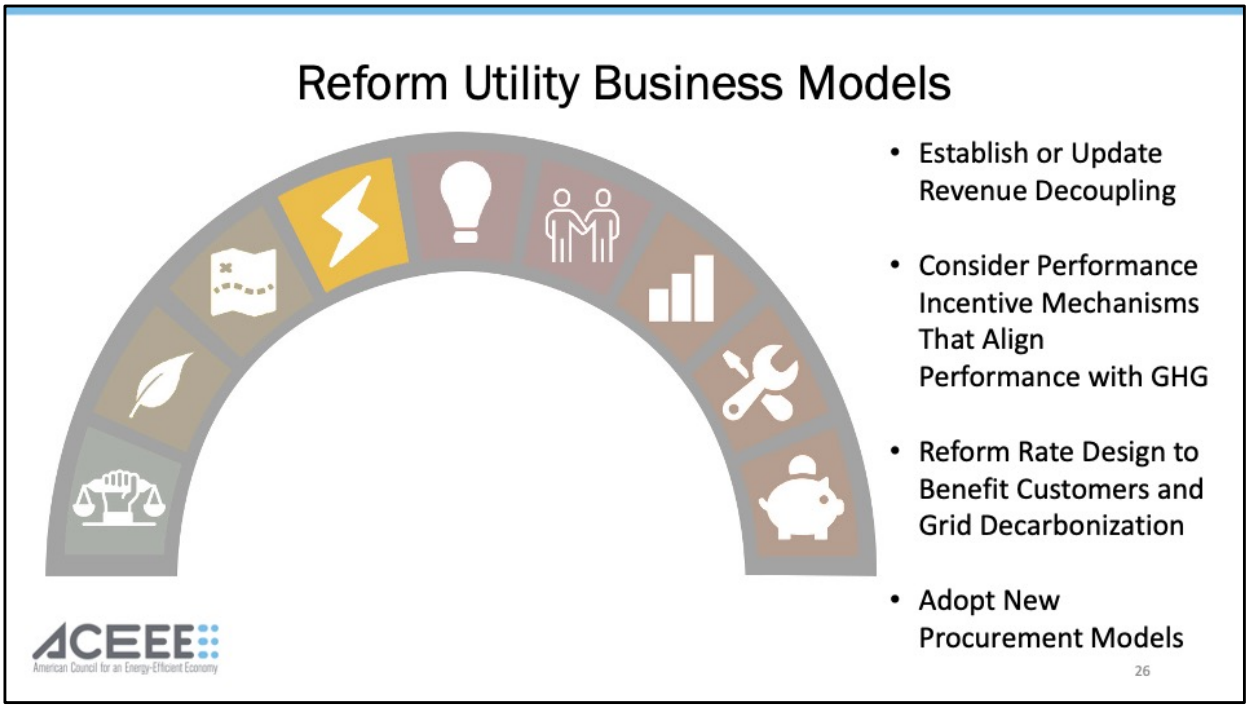
We believe that utilities should commit to a collaborative program design process that incorporates the needs of and feedback from the communities they intend to serve. Part of that involves making sure that surveys, meetings, marketing — whatever mediums are used — should be accessible in terms of language, location, etc. State legislators can set equity performance standards, but you can't manage what you can't measure, so steps must be taken to collect data on underserved communities and how these programs impact them.



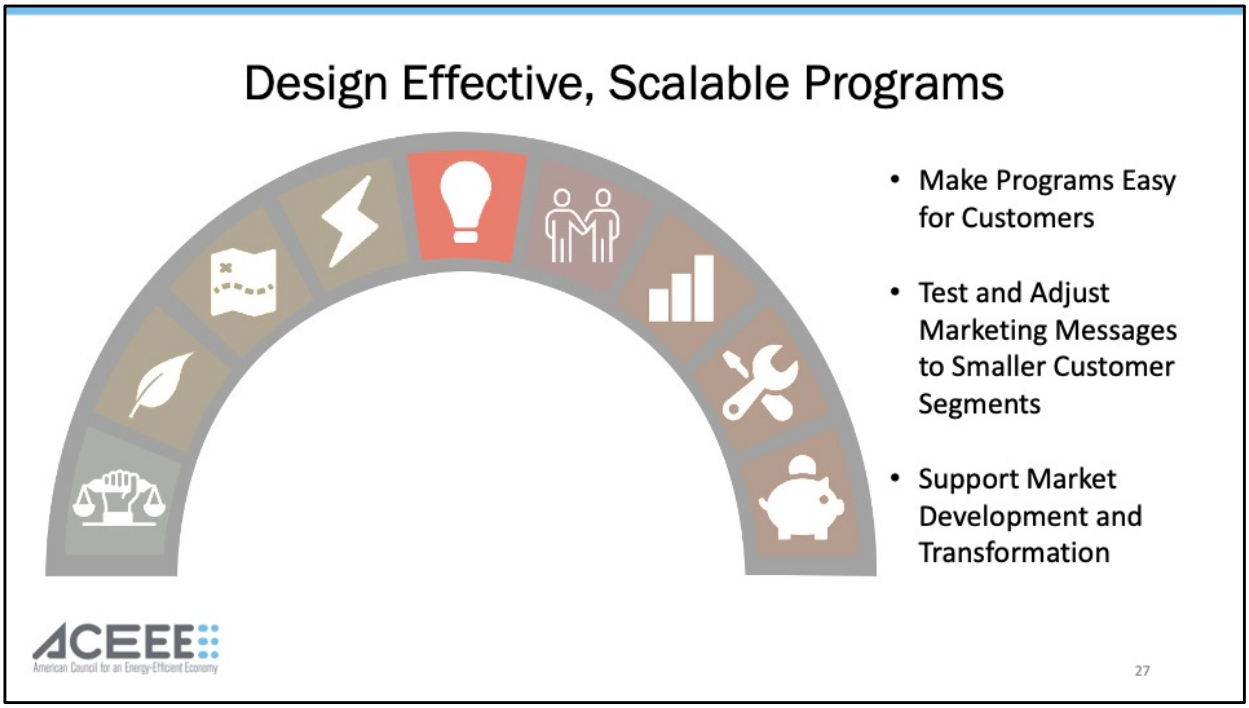
The second strategy is **Set Climate Commitments**. Setting climate commitments provides utilities with a guiding light. It gives them practical targets to shoot for, which can improve planning. The options here are for states and utilities to *Establish* science-based *Climate Targets*, such as limiting global warming to 1.5°C. However, some commissions do not consider environmental protection (or equity or market transformation, for that matter) to be part of their regulatory charge, so legislators can *Clarify Regulatory Responsibilities* by explicitly redefining or clarifying that commission decisions should consider those elements. With those pieces in place, utilities will then be in a position to translate their or their state's climate mandates into more explicit demand-side management targets, allowing them to *Set EE Program Goals and Investment Plans That Align with Climate Commitments*.



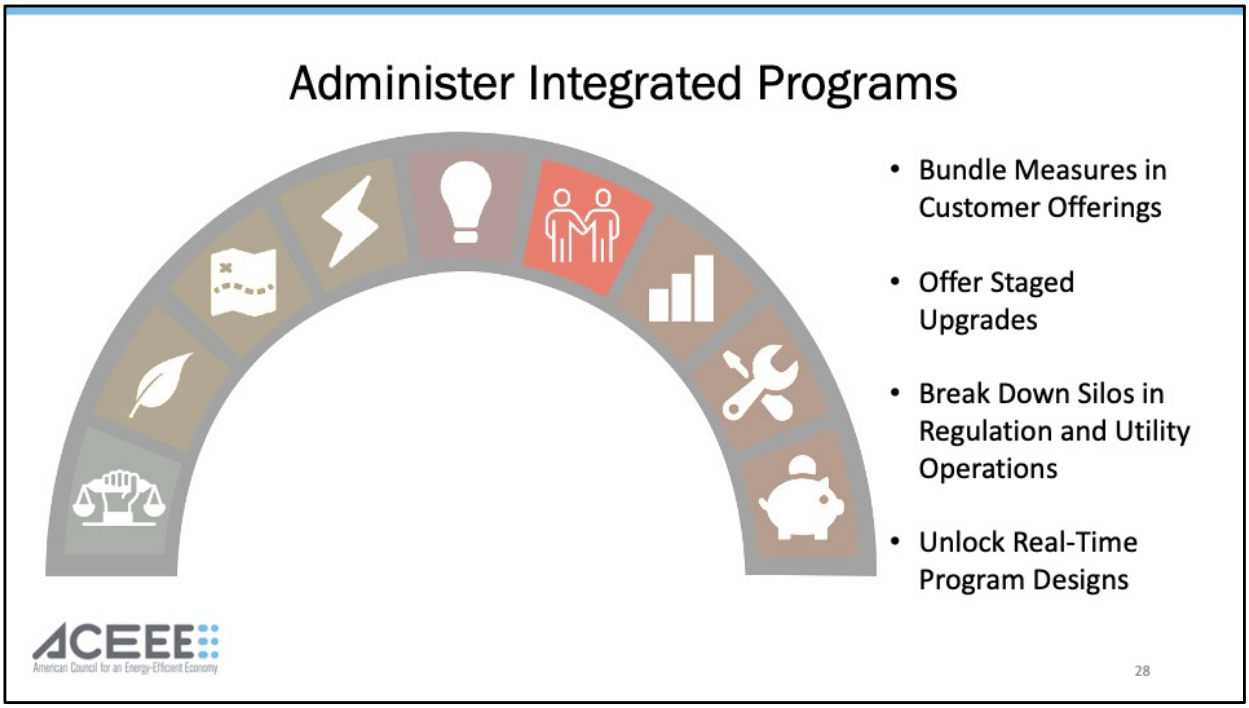
The third strategy is to **Update Guidelines for Resource Eligibility and Valuation**. Many utilities face barriers getting the best decarbonization technologies in the hands of their customers. One option to address this is for states to *Redefine the Efficiency Measures that Ratepayers Can Support*. One example would be lifting prohibitions against fuel switching so that utilities can incentivize technologies that will save the most energy and avoid the most emissions, regardless of what fuel powers them. Another helpful step is to *Reform Cost-Effectiveness Testing* so that we count all the benefits that climate-forward efficiency provides including GHG reductions, resilience, better health outcomes, etc. We also recommend that states *Analyze the Role of Efficient Gas Appliance Incentives in Decarbonization*. The short-term energy, emissions, and cost savings may or may not exceed the impacts of incentivizing fossil-fueled equipment that may operate for decades, so each region will have to make a determination of how to handle natural gas according to their own circumstances.



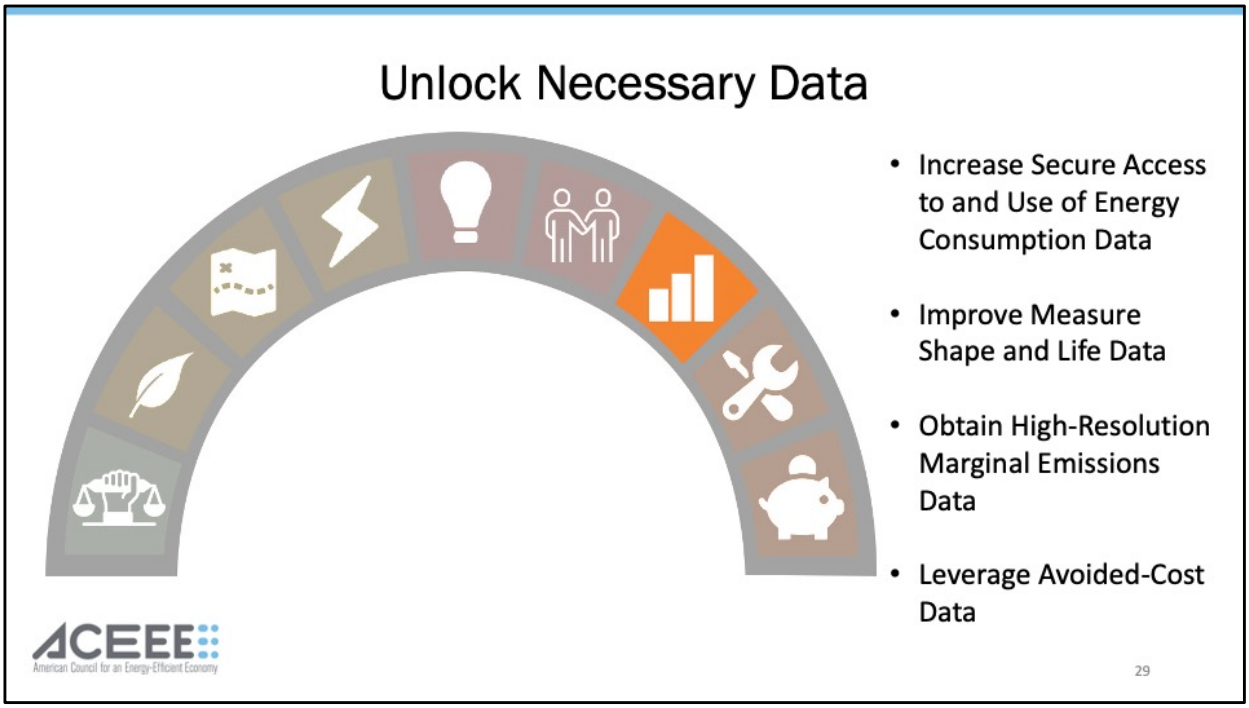
The final policy alignment strategy is to **Reform Utility Business Models**. Utilities should be able to financially benefit from well-designed and well-executed climate-forward efficiency programs. But in many places utilities still profit from volumetric sales of energy. One option is for states to *Establish or Update Revenue Decoupling*, which removes the incentive to maximize the number of kilowatt-hours sold. Then, states should *Consider Performance Incentive Mechanisms That Align Performance with GHG* reductions, so that utilities that meet certain climate-forward efficiency goals can be rewarded for doing so. At the same, we understand that the grid is going to be more carbon intensive at some times, so regulators should *Reform Rate Design to Benefit Customers and Grid Decarbonization*, while utilities should *Adopt New Procurement Models* that use technology- and ownership-neutral methods to ensure that utilities procure the most cost-effective and climate-aligned portfolio of resources.



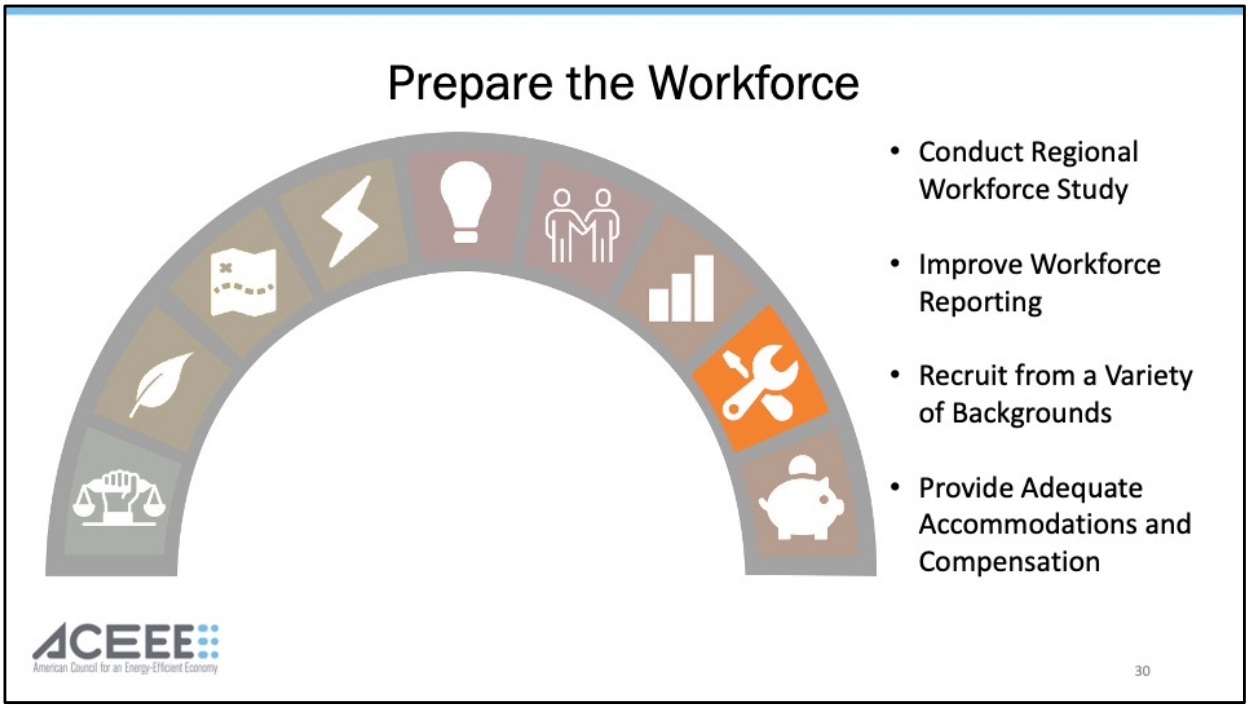
The first program delivery strategy is to **Design Effective, Scalable Programs**. Climate-forward efficiency programs may have more expansive goals, and also may appeal to more diverse customer desires. Therefore, the conventional utility program model must evolve to ensure their customers' goals are being met effectively and in a way that scales to meet the magnitude of our climate challenge. Because energy is still a complicated subject for a lot of people, and only becomes more so when you are trying to decide between envelope upgrades, new HVAC systems, time-of-use rates, etc. utilities need to *Make Programs Easy for Customers*. Part of that involves appealing to what motivates customers to make these investments in the first place, so utilities should *Test and Adjust Marketing Messages to Smaller Customer Segments* to make sure those customers are being spoken to with the appropriate message and through messengers that appeal to what they care about. Utilities can also *Support Market Development and Transformation* including offering midstream and upstream incentives to retailers and product manufacturers to help ensure low-carbon technologies are available and affordable for customers.



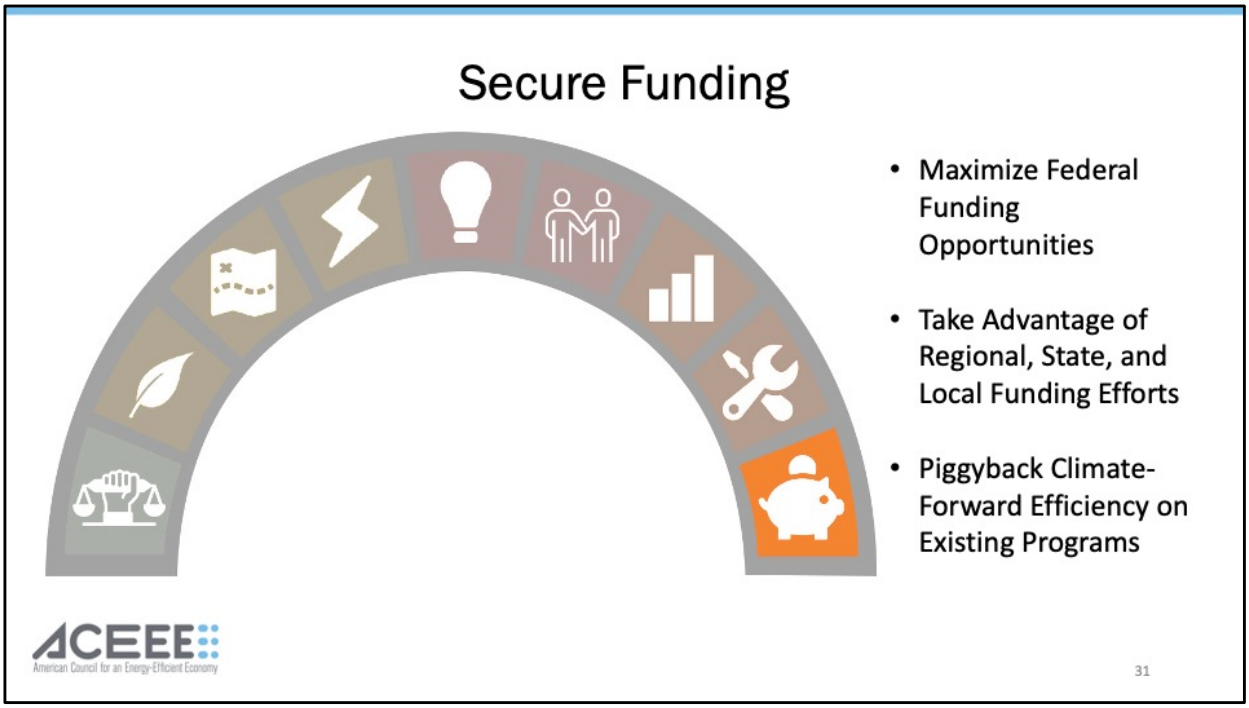
The sixth strategy is to **Administer Integrated Programs**. A truly holistic decarbonization strategy will involve a combination of energy efficiency, demand response, electrification, renewable energy, and storage. Most utilities employ separate internal teams for one or more of those areas. However, if they are organized properly, aligning programs under a common entity or framework could streamline the process for customers and lead to better outcomes in the end. One option for doing this is to *Bundle Measures in Customer Offerings* such as a combination building envelope and heat pump upgrades. Utilities can also *Offer Staged Upgrades* so that customers unable to afford the full upfront cost of the transition can sequence those measures as a pace that works for them. A third option is to *Break Down Silos in Regulation and Utility Operations* as a way to better integrate and optimize customer-sited resources through a combined utility demand-side management planning team. And utilities should also *Unlock Real-Time Program Designs*, like meter-based pay-for-performance that can be enabled by intelligent, connected technologies that are able to capture real-time emissions reductions.



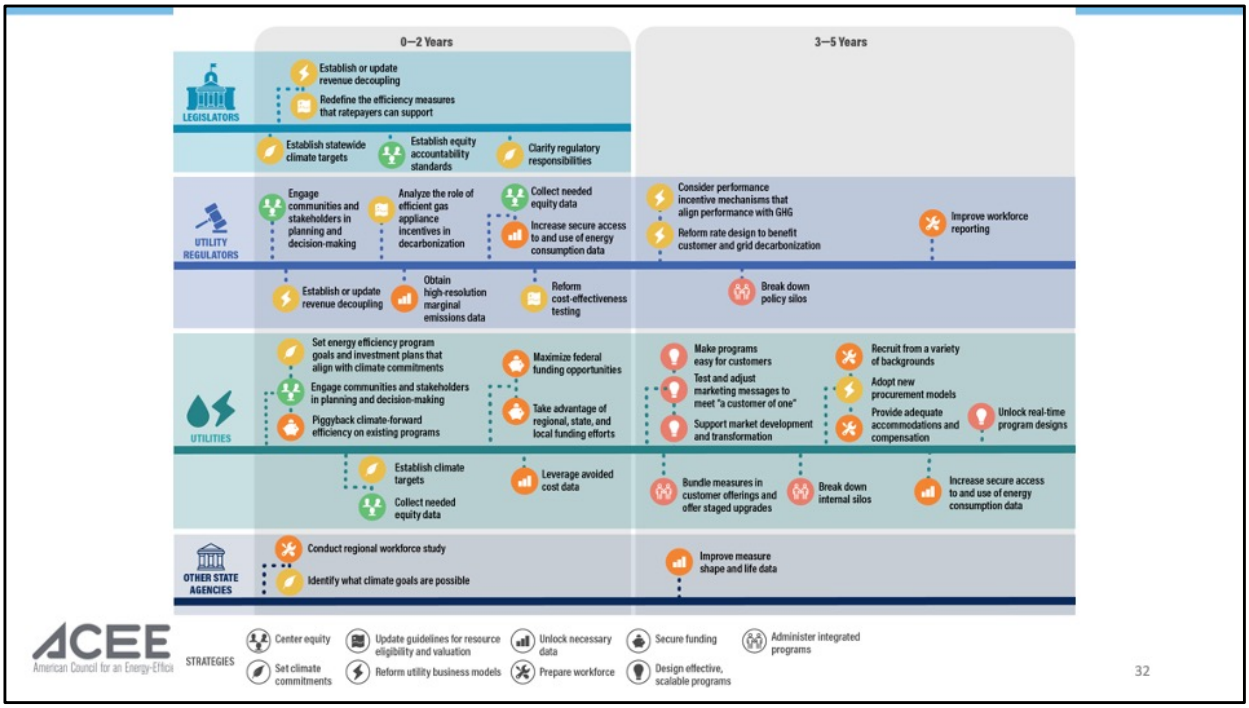
The first market preparation strategy is to **Unlock Necessary Data**. Planning, implementing, and evaluating climate-forward efficiency programs will require more types of data and at a higher resolution than traditional efficiency programs. Regulators can *Increase Secure Access to and Use of Energy Consumption Data*. One application would be to disaggregate AMI interval data into individual end uses, which can reveal opportunities to address loads correlated with the grid's carbon-intensive periods. An associated option is to *Improve Measure Shape and Life Data*, which we can then map onto *forecasts of marginal emissions rates* — or in other words, how much carbon dioxide we can avoid emitting per kWh saved through efficiency years into the future. In combination, those data will tell you which energy conservation measures will be most effective at reducing cumulative emissions over the lifetime of the equipment. To choose between options, it will be helpful to *Leverage Avoided-Cost Data* in such a way that the assumptions and methodologies that go into them can be open to public scrutiny, helping to ensure, for example, that avoided costs align with decarbonization goals in a way can be used for decision-making.



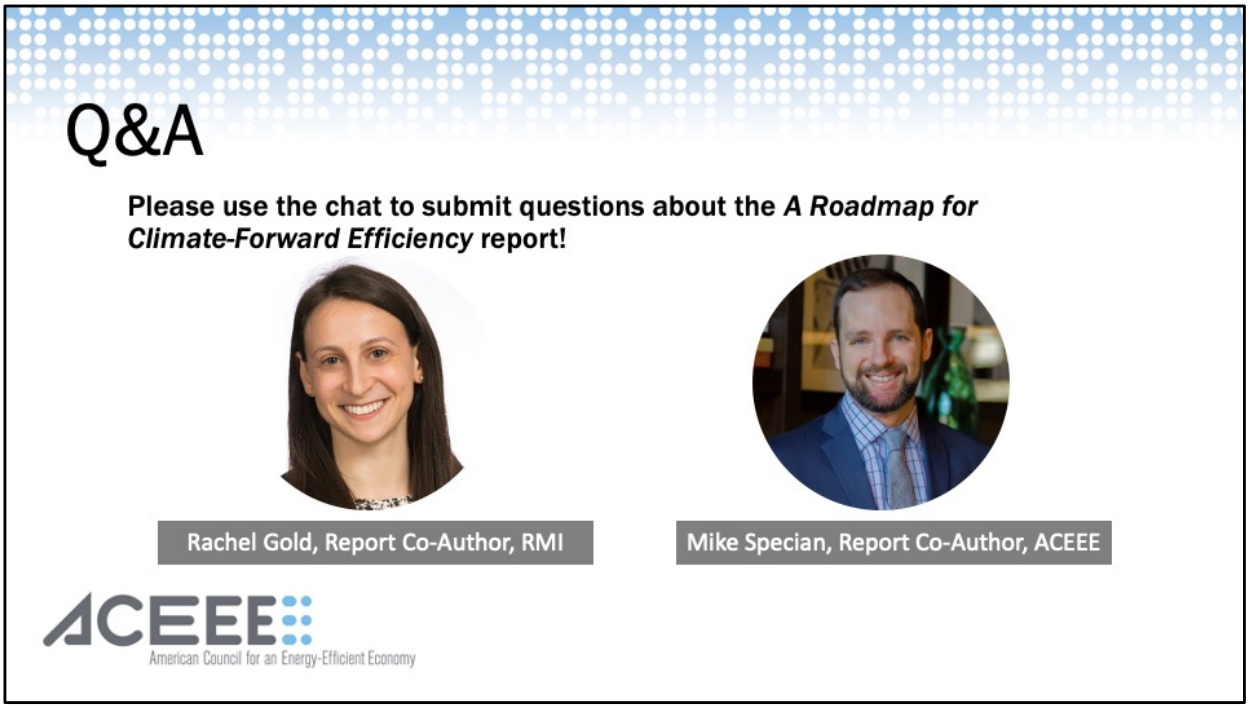
The eighth strategy is to **Prepare the Workforce**. The reality is we can have the best policies and programs in the world, but if we do not have a workforce capable of implementing these updated utility programs, we're not going anywhere. States that have not done so already should consider *Conducting a Regional Workforce Study* that compares the skills and certifications that utilities would require of contractors installing equipment like heat pumps and advanced controls with those that currently exist in the field. We are also calling for *Improved Workforce Reporting*, so that regulators can exercise oversight over workforce issues or possibly issue performance-based incentives for utilities for meeting certain workforce goals, such as *Recruiting* workers *from a Variety of Backgrounds*. For states that value the creation of long-lasting, family-supporting occupations, *Providing Adequate Accommodations and Compensation* for those workers can help as well.



The ninth and final strategy is **Secure Funding**. All of this work needs to be paid for, but the upside of climate-forward efficiency is that it can serve multiple policy goals. And many of those goals are shared by other agencies and organizations. So to lower the impact on ratepayers, we recommend braiding utility funding with other funding sources in a way that leverages the common goals of multiple organizations. Utilities can *Maximize Federal Funding Opportunities* by, for example, leveraging DOE's Weatherization Assistance Program to support energy efficiency improvements for low-income families, or leveraging federal preventative care and medical support funds to improve buildings in ways that enhance the health benefits to residents. Utilities can also *Take Advantage of Regional, State, and Local Funding Efforts*, such as using Regional Greenhouse Gas Initiative funds or Volkswagen settlement funds for climate-forward efficiency activities. Or utilities could get creative and *Piggyback Climate-Forward Efficiency on Existing Programs*, like when the Los Angeles Department of Water and Power partnered with other City of Los Angeles departments to conduct building audits by piggybacking on a city program that inspects premises for habitability.



If you are wondering who actually needs to execute all of these strategies, in our assessment the most prominent roles exist for state legislators, utilities and program administrators, and utility regulators. Though there are also roles for state agencies, program implementors, and others. This graphic provides a rough timeline of which actions need to be taken by which actors, and when. The details of this roadmap, of course, will depend on your state or territory's initial conditions and unique circumstances, so this should only be considered a guide, but it does provide a good basis from which you can get started or continue your ongoing efforts.



EDWARD: Thank you so much for the presentation, Mike. As a reminder, this roadmap is available for download on the ACEEE website. We have a few minutes for questions and answers, before that I want to introduce Rachel Gold, one of this report's co-authors. Rachel serves as a principal of RMI's Carbon Free Electricity program and works with utilities, regulators, and advocates to involve utility business models and regulations to support the rapid and equitable decarbonization of electricity systems.

Q: What are some good or promising examples that states or utilities looking to adopt or implement this type of roadmap can look to?

RACHEL: Thank you, Edward. I think there are two categories of examples that stand out to me. And we will hear from a lot of folks from these states in the Q&A and lightning round session soon. One is states and utilities who are taking a leadership role in updating the authority of public utilities commissions and changing the way that goals or mandates are structured for utilities. We will soon hear some great examples from Massachusetts, Colorado, Minnesota, and many states doing that work.

To me, what is really exciting is looking to the states that are taking that direction from legislators, that direction from public utility commissions, and taking it to the next level in implementing it. Two that stand out for me are the District of Columbia, where we will hear

about the new Sustainable Energy Utility contract, which uses an innovative set of metrics to define success, including things like deep retrofits and greenhouse gas reductions. That's one great example where the success of the energy efficiency program is going to be measured based on those characteristics. Another that I will highlight is Colorado, where we are seeing in addition to greenhouse gas mandates that are focused on the electricity sector, we are seeing that move into the natural gas sector as well. That is forcing a conversation about what it looks like to rapidly decarbonize the gas sector. Efficiency has an important role there, but so does electrification and low-carbon fuels. It is exciting to see that evolution as well.

MIKE: One of the things that we wanted to do as part of this symposium is to share those examples, so I'm looking forward to our next segment when we'll get to hear many people share those examples. Rather than give an explicit list, I would encourage everyone to take a look at the climate-forward efficiency report, *The Need for Climate-Forward Efficiency*, which includes a list of states and utilities who are taking actions already. The report includes a great list of examples. It may not be comprehensive, but it will give you a lot more answers that I can say in words right now. We also included more examples explicitly associated with each of the strategies that we outlined in the *Roadmap* report with a large number of the options that I outlined as well. Of course, we probably don't have everything. So, for those of you who are aware of climate-forward actions that are taking place that are not in these reports or do not come up in these conversations, please share them with us so we can add to our understanding of this issue as it continues to develop.

Q: What is the outlook for utilities to incentivize climate-forward efficiency when they are the likely candidate due to their owning customers, but are profitable from large capital investments in terms of generation and transmission?

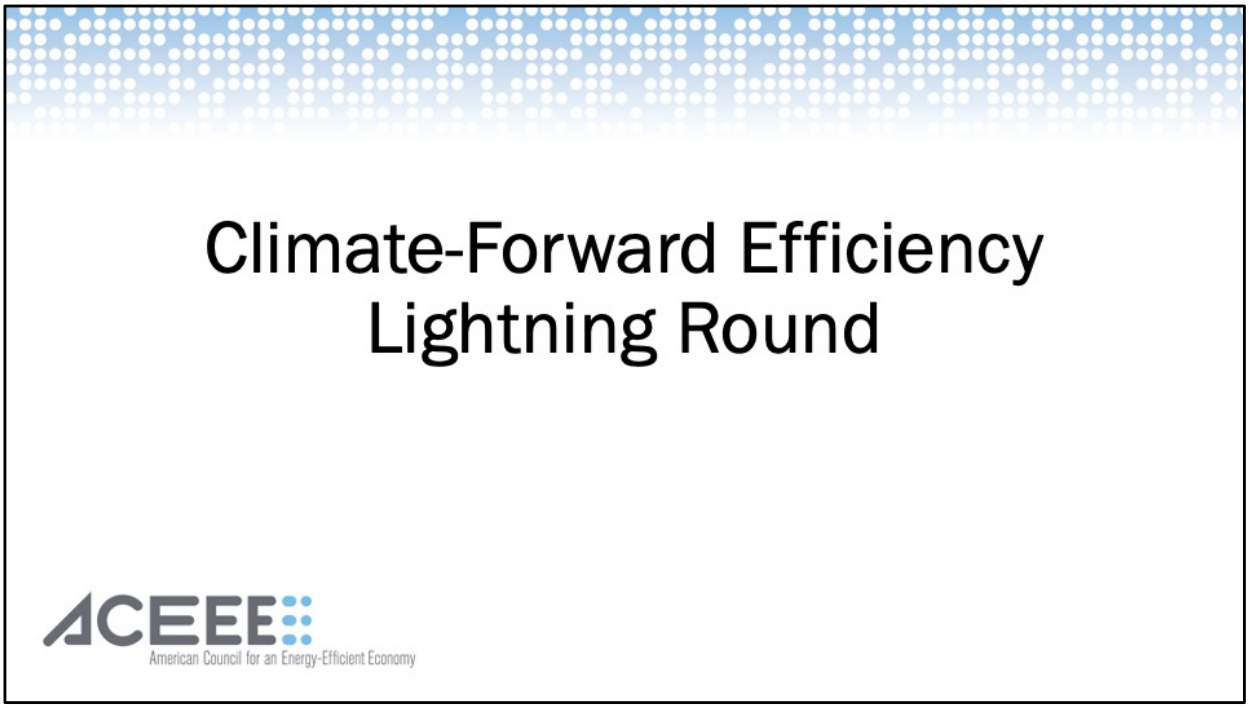
RACHEL: Great question. This question recognizes the fundamental challenge of the traditional utility business model that we have had in place, and which has served us well for a long time in terms of deploying large capital investments, but which introduces challenges when we want to deploy customer-owned or distributed resources.

I will highlight three quick things. Two are strategies that ACEEE has been advocating for in a long time, but which we are seeing evolution. One is revenue decoupling, which is severing that link between sales and profits in a way that makes it so that efficiency is at least treated on a neutral basis with other resources. Some of the ways we think about revenue decoupling may need to be updated, and some of those policies may need to be tweaked. ACEEE has done some work on that over the last few years.

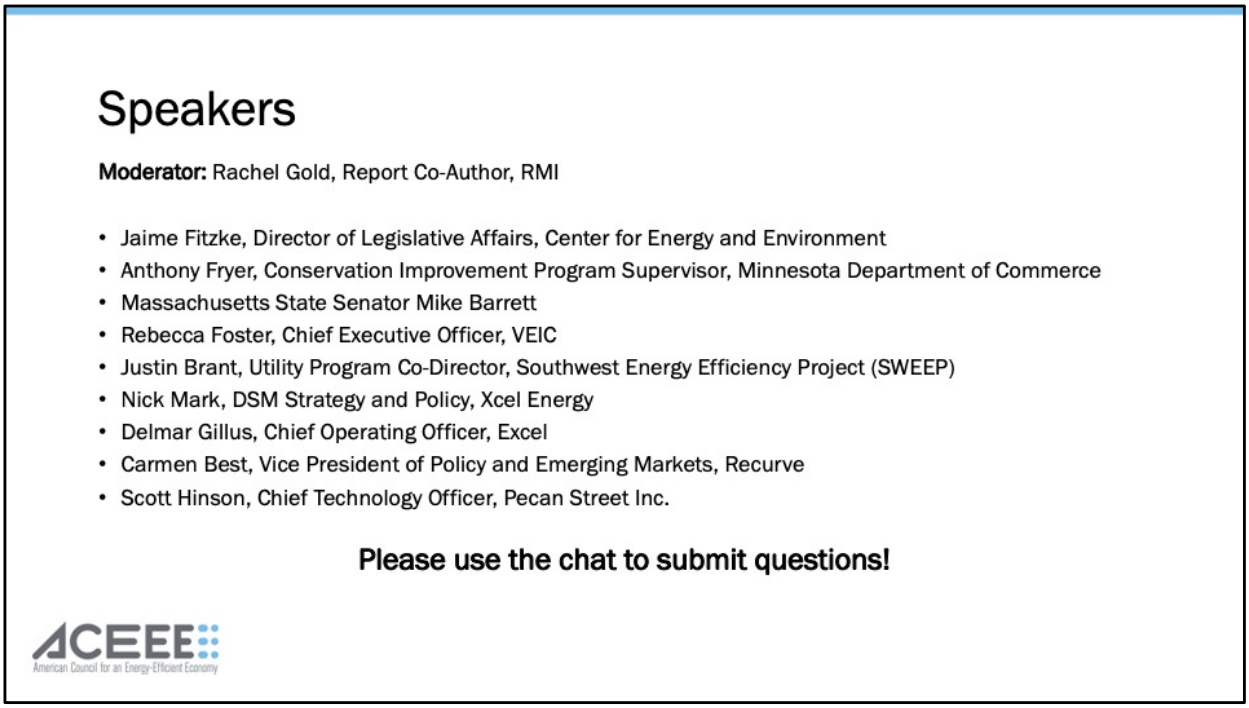
The second is performance incentive mechanisms (PIMs), making sure there is a shareholder-based incentive for delivering on energy efficiency and, in particular, delivering on greenhouse gas reductions that we want to see from energy efficiency. Finally, there is a broader set of tools that we are seeing emerge around the country that help to sever that link between capital and operating expenses. One that I have been really interested in lately is the total expenditures (totex) ratemaking model that we are seeing in the UK. We are starting to see some states starting to think about whether that would be applicable and whether that would

be appropriate with U.S. accounting gap rules — more to come on that!

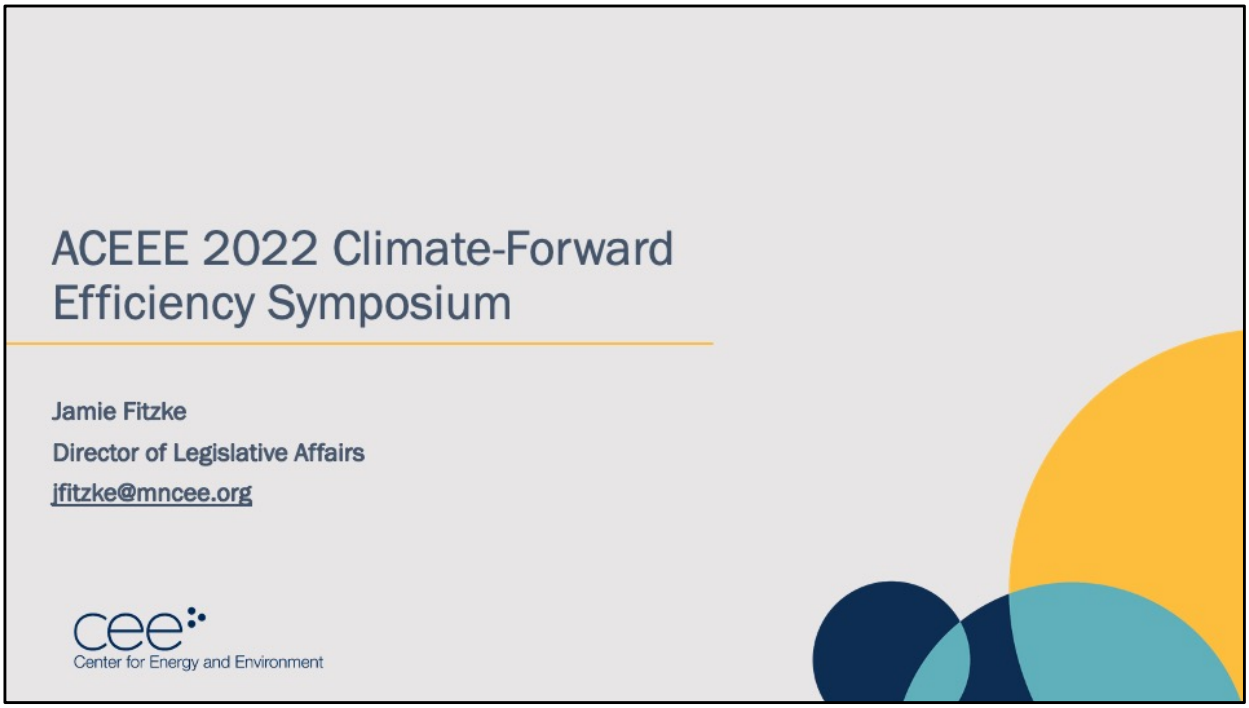
But there are a lot of regulatory tools that we can use so that utilities have the right set of incentives. I think we are seeing six or seven states have open dockets on this question around performance-based ratemaking right now.



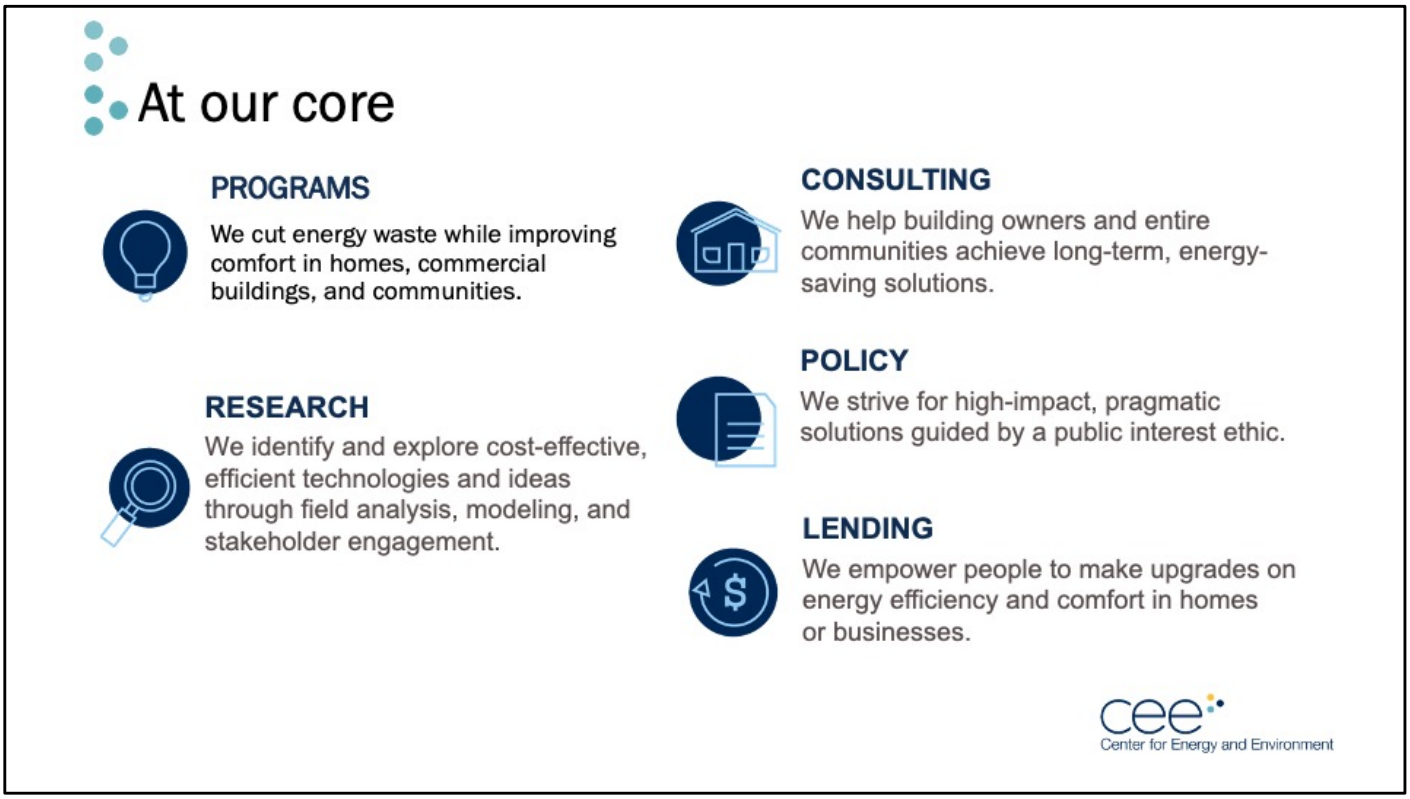
EDWARD: Thank you both. For this next section, we have a distinguished group of speakers who will each have about three minutes to introduce themselves and share an example or focused idea on climate-forward efficiency. I will now hand the segment over to Rachel to moderate.



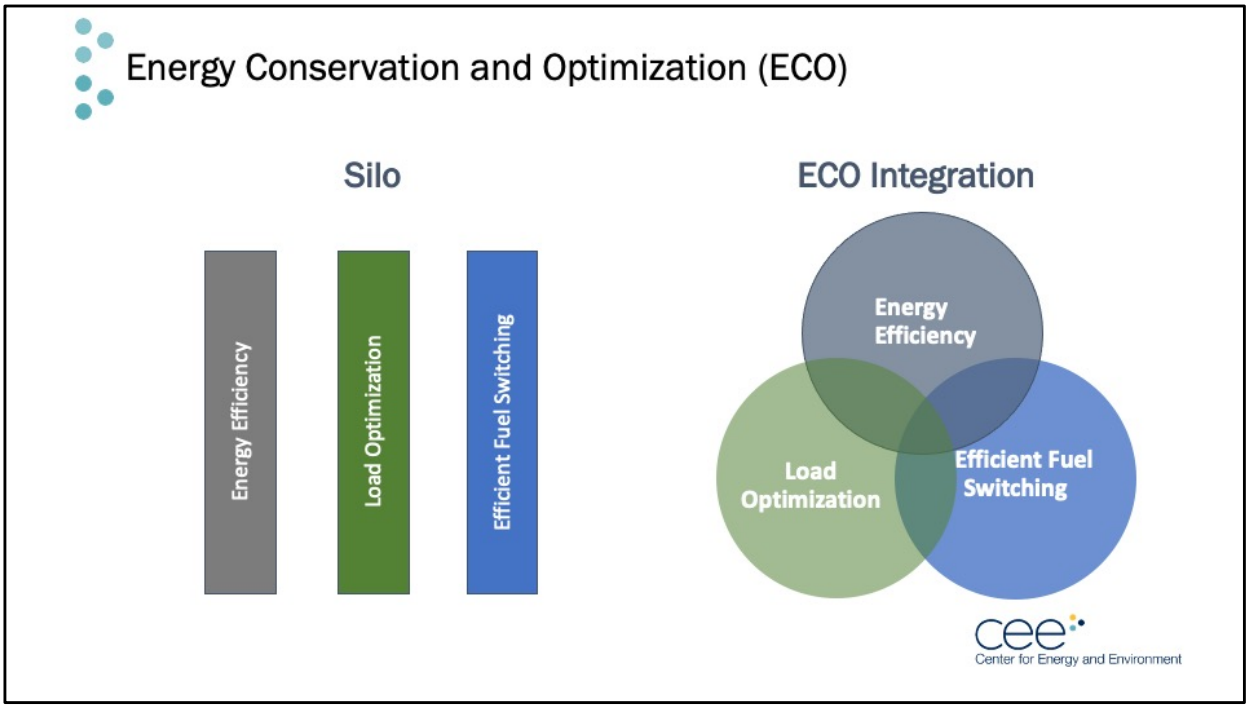
RACHEL: I'm pleased to kick off this segment, we're going to have a lot of fun hearing from a lot of great folks. So, to start, I'm going to toss it to Jamie Fitzke, who is the Director of Legislative Affairs for Center for Energy and Environment to tell us a bit about what's going on in Minnesota and the Midwest.



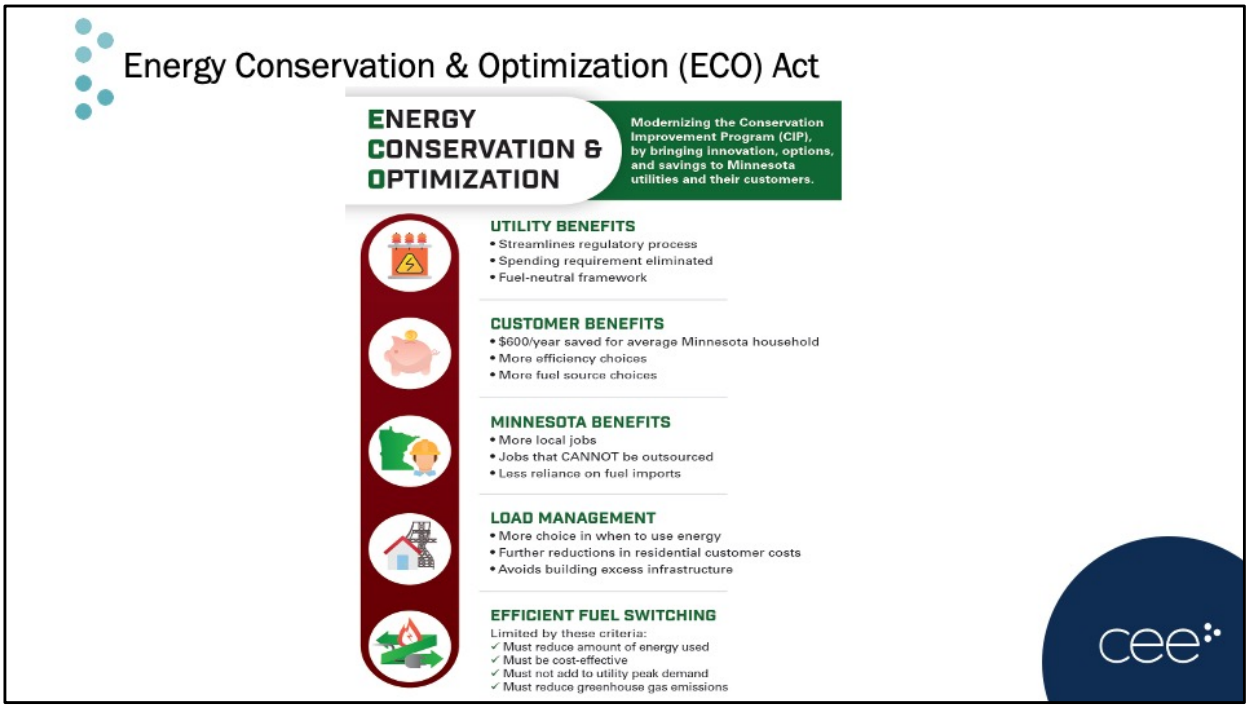
JAMIE: Great, thank you Rachel, really appreciate it



For any of you who may be unfamiliar for the Center for Energy and Environment, CEE is a nonprofit based in Minneapolis, but we do work throughout the Midwest, and we've been working on energy efficiency for over 40 years in research and development, programming, building and community consulting, lending, and policy.



In May of 2021, Minnesota's legislature passed the Energy Conservation and Optimization Act, or ECO for short. And to understand how transformative ECO is to demand-side management and decarbonization, it's helpful to know how Minnesota's customer-facing programs have historically worked. Everything was pretty much siloed. There was energy efficiency, load optimization (but that was typically done through PUC dockets), and then there was efficient fuel switching (what was a complete non-starter; it was not allowed in Minnesota). So what ECO looks to do is integrate and leverage all those components to provide customer-facing programs, and then it provides customers with more options in when and how much energy they use, and what fuel source that they use.



And the most significant change to Minnesota's energy policy is the ability to offer fuel switching programs. So, it was critically important to safeguard and continue Minnesota's cost-effective and widely successful utility energy efficiency programs in ECO. And while developing ECO legislation, there were some core principles that helped to guide its formation: decarbonization, and encouraging smart, efficient fuel switching while ensuring energy efficiency wasn't supplemented by it. So, there was careful consideration to when efficient fuel switching is allowed, the criteria, and how it is counted or qualifies.

And it's different for each utility service and business model. For example: electric IOUs. They continue to receive a financial incentive for energy efficiency savings and need to meet their energy efficiency goal of 1.75% before they can recoup any costs for their efficient fuel switching programs. But, and it's also key to note here, efficient fuel switching does not count toward their energy saving goals, and utilities do not receive a financial incentive for efficient fuel switching, because well, they get to build their load. Figured that was a pretty nice incentive!

Municipal and cooperative utilities have a lower energy efficiency threshold to meet, and efficient fuel switching counts toward their energy savings goal once they meet that minimum. And that was done because they don't have an incentive structure and they are not publicly owned.

Probably the most interesting is natural gas IOUs. Switching a customer to an electric measure is counted as the same as energy efficiency. It counts towards the energy savings goal, which also then qualified towards earning the savings incentive. It's probably stating the obvious, but this was done to give natural gas utilities motivation to reduce product consumption and then further decarbonize.

And at the bottom of this slide, it lists the four criteria that are needed to be met for efficient fuel switching improvements to qualify, which includes greenhouse gas reductions. And a little different that Minnesota's decided to do than maybe a few other states that allow fuel switching, is these calculations are source, not site, and includes full fuel cycle emissions.

Now ECO is in the regulatory phase, and on today's panel and leading those efforts is Anthony Fryer with Minnesota's Department of Commerce. And I'm going to say, well, figuring out all the technical details from this legislation continues to be quite an adventure and once the regulatory side wraps up, I think we've all earned a vacation! Thank you.

RACHEL: Thank you, Jamie. And I'll turn it over to Anthony now, who is the Conservation Improvement Programs Supervisor from the Minnesota Commerce Department.

ANTHONY: Thank you, Rachel. As Jamie mentioned, I just want to talk a little bit more about the implementation of the ECO Act and of what we are looking at from a regulatory perspective at the moment. Everything that we do in terms of greenhouse gas emissions in the state of Minnesota is guided by an 80% reduction in gas emissions by 2050. That's sort of the umbrella policy that we're working towards. The Conservation Improvement Program (CIP) is the implementation of the state's efficiency resource standard. We have about 120 utilities that participate in the program and have annual savings goals that they attempt to achieve each year. The Minnesota Department of Commerce regulates utility performance in CIP and also provides technical assistance to help the utilities meet those goals.

Historically, a utility's CIP performance has been measured in terms of kWh and therms saved. What ECO does, and what Jamie alluded to, is it modernizes the CIP framework to provide a more holistic approach to efficiency programming. I wanted to highlight three areas in which climate considerations are being incorporated into our utility efficiency programs through CIP now.

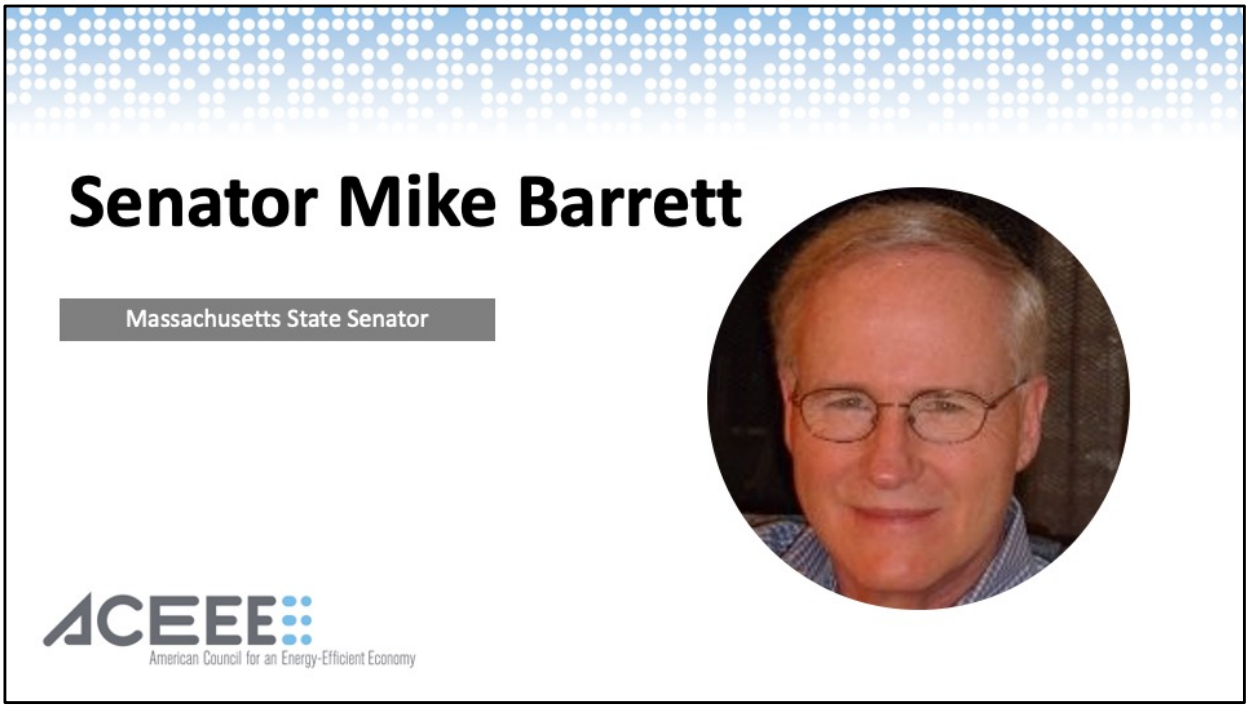
The first is through efficient fuel switching. Utilities are required to demonstrate the fuel switching improvement results in net reduction of greenhouse gas emissions compared to

whatever is being replaced. This is the first time that greenhouse gas emissions have been required as part of a CIP program. It also requires that the Department of Commerce consider whether a fuel switching improvement can be operated in a manner that facilitates the integration of renewable energy into the electric system. And currently, we are working with stakeholders to develop technical guidance for utilities to use in order to demonstrate the efficient fuel switching improvement meets the greenhouse gas reduction requirements and all of the other requirements that are listed in the statute.

Secondly, all the utilities are required to provide cost-effectiveness analysis for all of their Conservation Improvement Programs. And CO_2 values are included in that cost-effectiveness analysis in terms of the benefits of cleaner air because of avoided pollutants and carbon dioxide. So, for efficient fuel switching, there is this explicit GHG reduction requirement and then for all other programs in terms of cost-effectiveness there is a greenhouse gas reduction component to that as well.

The third thing I wanted to highlight is that each year the Department of Commerce is required to provide an annual report on energy and capacity savings associated with the CIP program. That also now includes an estimate of CO_2 savings achieved in a particular year as well.

So those are the three areas that we are incorporating climate considerations into CIP and also tracking the greenhouse gas emissions associated with the program and tracking those on an annual basis. So, with that, I'll hand it back to Rachel.



RACHEL: Thank you, Anthony. Now from the Midwest we are moving back East to hear from State Senator Mike Barrett, a climate leader. We look forward to hearing about what's going on in Massachusetts.

SENATOR BARRETT: Thank you, Rachel. Delighted to join you, and thank you and RMI for all your terrific work and advice to us in Massachusetts. And my thanks to ACEEE for this terrific program.

We did, as it happens, consider major climate legislation last year in 2021. And while we were at it, we wanted to go after two of the objectives that ACEEE sketches out in its roadmap. We wanted to establish statewide climate targets — and that was a general interest of ours quite apart from energy efficiency. And secondly, we did want to clarify the role that everyone must play in reaching those targets. So, clarifying regulatory responsibility was an important step 2.

With respect to step 1, we took a step that I haven't seen other states attempt but that has worked well for us. We not only set an overall emissions reduction target every 10 years leading up to 2050, we also actually brought that target setting and that goal setting down to every 5 years. So, every 5 years our state must set an emissions reduction goal all tracking toward 2050 so that we stay focused on the objective. But secondly, we created six sub-limits building toward the overall limit every five years and again all building toward 2050. Three of those sub-limits were an emissions reduction target beginning in 2025 for electric power

generation, but we also created one for emissions from residential buildings, a third one for emissions from commercial and industrial buildings. And by the way, we set a fourth target for natural gas infrastructure and systems. All the sub-limits have to be synergistic, contribute to the realization of the 5-year overall limit, and all of that again, trending toward 2050.

But here is what we had noticed in the state legislature. Our very good energy efficiency program — it's always ranked in the top 1 or 2 by ACEEE — was operating in a parallel universe. The folks involved — and it is utility-run in Massachusetts — really did not want to be part of the emissions reduction game, the climate race. I think they felt protective about their somewhat separate franchise. Realizing energy efficiency, as the report from ACEEE acknowledges, is not the same as realizing emissions reduction and the folks running our efficiency program were bound and determined not to link the two. So, the first thing we did in the climate act, after we set these limits and sub-limits every 5 years, was to require that our Secretary of Energy and Environmental Affairs set a goal for every 3-year energy efficiency program in terms of its contribution to realizing the 5-year targets and sub-targets.

For the first time, there had to be an explicit tie-in that said, in advance, here is what the next 3-year energy efficiency program is going deliver for us as we trend toward 2050 and realizing these every 5-year limits and sub-limits.

We then went further. We did build in the social cost of carbon. We explicitly said, in designing the next 3-year plan (it had happened to be for 2022–2024), incorporate the social value of greenhouse gas emissions reductions. It's very close to the social value of carbon, but it states it in an emissions reduction form. Give us the social value of greenhouse gas emissions reduction and build it into all the pricing for your energy efficiency program.

And then the final thing we did just to tie the sense of accountability and data tracking closely is that we said to the DPU, at the conclusion of every time period — and again, energy efficiency for us is a three-year effort — at the conclusion of every time period, tell us whether the Secretary's original objective was attained, and if not, tell us in what way the utilities and the program fell short and what we can then hope to do about it. So we're trying to really tie things very explicitly because it's been our perception that as good as energy efficiency program are, the stewards of those programs have all kinds of ownership investments in making sure that they don't become part of the larger emissions reduction fight. The legislature, in this case, stepped in to make that happen.

RACHEL: Thank you so much, State Senator Barrett, we really appreciate it. Now we're going to turn over to Rebecca Foster, who is the CEO of VEIC. She's going to share with us a bit about the work that VEIC has been doing on climate-forward efficiency. They really get into the implementation of climate-forward efficiency, so look forward to hearing about that, Rebecca.

REBECCA: Great, thank you, Rachel and hello, everyone. It's great to be with all of you today. As Rachel said, VEIC is right in the thick of this transition. Our mission is to generate the energy solutions that the world needs and we achieve that mission by working with clients across the country to deploy innovative and equitable decarbonization solutions. And my take is that this is the most important work that we need to be doing as an industry. Swiftly pivoting the nation's energy efficiency programs to focus on greenhouse gas reductions in addition to electricity savings is a critical step to combatting climate change. VEIC is working to model that critical transition now in a few different ways. First, I'll share some examples of our work in large scale efficiency programs we operate and then give an example from our national consulting practice.

Let's start with Vermont. There is a lot going on in the small state of Vermont where VEIC administers the Energy Efficiency Vermont program. One key shift is that for the first time, we are now measuring the success of our portfolio in part through a greenhouse gas emissions reduction metric. This has allowed us to really focus on new areas such as refrigerant management programs. We know that reducing refrigerant leaks improves electrical efficiency

but it also keeps highly potent greenhouse gases from leaking into the atmosphere. And our greenhouse gas metric allows us to measure both the energy related greenhouse gas reductions and the non-energy related reductions from things like refrigerant leakage.

Another key shift in Vermont is our move into electric vehicles. This was a change that required legislative action and VEIC worked with a coalition of utility partners and environmental advocates to lay out the rationale and the benefits of the change. Act 151 enables us to work in the area of greenhouse gas reductions in the transportation and heating sectors using electric efficiency funding provided there is a nexus with electricity. So, we are now working on electric vehicles running a statewide dealer training program and offering salesperson incentives. This work really bolsters the direct-to-customer electric vehicle incentives that are offered by the state of Vermont and by the Vermont electric utilities. By working in partnership with these entities, we are making it easier for customers to access EVs and we're speeding up EV adoption at all levels of the supply chain.

Rachel also mentioned our goals in the District of Columbia, where VEIC administers the Sustainable Energy Utility. We do have a greenhouse gas goal there now alongside our many other goals including deep retrofit goals, green jobs goals, and megawatt hour reduction goals. I'd be happy to go into those more during the discussion. It is truly both an art and a science to measure and meet all those criteria every year.

Before I close, just one more thing I'd like to offer is an example from VEIC's consulting work across the country in California. We are also a partner on the Clean Tech California program. This is a $120,000,000 statewide initiative that is seeking to decarbonize space and water heating in California while also ensuring that 48% of the benefits go to low-income and disadvantaged communities. The program includes everything from distributor engagement to contractor training to innovative pilots to prove out heat pump technology in very difficult to serve application like large, multifamily retrofits. The work that we are doing on Clean Tech California is in partnership with Energy Solutions and a slew of other organizations really committed to creating lasting greenhouse gas emissions reductions in space and water heating. And we're focused together on creating scalable models that can be shared with other states and are very excited to see where that leads.

In closing, I would just want to offer that we often hear that this is the decade of action on climate and VEIC believes that wholeheartedly and every day we are pushing the limits of innovation to try and make an impact. It's been great to share a bit of that with you today and I look forward to the Q&A. Thank you.

RACHEL: Thanks, Rebecca. Alright, so moving from the cold East, to the very currently cold Denver metro area. I'll turn it over to Justin Brant, who is the Utility Program Co-director at SWEEP. And Justin, excited to hear what's happening. What's happening in Colorado these days?

JUSTIN: Thanks, Rachel. So, in 2019 the legislature in Colorado established statewide greenhouse gas emissions reductions targets to reduce emissions from 2005 levels 26% by 2025, 50% by 2030, and 90% by 2050. The state government then worked to develop a roadmap of the suite of policies necessary to achieve those reductions with a focus on the near-term, sort of 2030 targets. The roadmap called for essentially complete decarbonization of residential and commercial buildings by 2050 and it laid out a number of strategy options, policy options to get there.

In 2021, the legislature took up a number of those bills. I'm going to highlight three in particular that will expand energy efficiency from natural gas utilities as well as building electrification in the state. House Bill 21-1238 updated the state's policy on natural gas demand-side management programs. It directs the public utility commission to establish goals for natural gas utilities based on all cost-effective and achievable energy efficiency. It removes a prohibition on fuel switching for natural gas utilities, and it also updates cost-effectiveness testing methodology. So, it adds the social cost of carbon and social cost of methane to the cost effectiveness test out here and mandates the use of a customer-focused discount rate instead

of the utility weighted average cost of capital. The bill also sets minimum spending requirements for income-qualified programs of 25% of residential funding and essentially requires the approval of decoupling proposals from natural gas utilities in the state.

Second, the legislature also adopted a clean heat standard for natural gas utilities. It established emission reduction standards for the investor-owned utilities so they are required to reduce emissions from 2015 levels by 4% in 2025 and 22% in 2030. To comply with the standard, the utilities are required to develop clean heat plans that lay out the suite of resources that they are going to use to meet the emissions reductions standards in the legislation. So this could include energy efficiency, beneficial electrification, leak reduction on the distribution system, biomethane, and a few other specific technologies that are called out in the legislation.

The legislation also sets a cost cap on complying with it, so that when plans are before the utility, if it's more than 2.5% of bills in the short-term, the Commission will have to consider the other costs and benefits of the programs. In addition, in terms of recovered methane, biomethane leak reduction, there are limits to the amount that those resources that are not directly reducing natural gas emissions can play in meeting the emissions standard.

Finally, the legislature also passed a bill requiring electric utilities in the state to develop program and plans related to beneficial electrification. Again, this prioritizes income-qualified programs in the state and requires the inclusion of the social cost of carbon and the social cost of methane in measuring the effectiveness of the programs.

Similar to Minnesota, we are in the implementation phase for all of these policies. The Public Utility Commission is currently writing the rules around the clean heat plans and gas demand side management bills I spoke of. Similarly, we expect the first clean heat plans must be filed by electric utilities this summer.

We're all working hard on implementing it and happy to answer any questions in the Q&A. Thanks, Rachel.

RACHEL: Thanks, Justin. And I think you've teed our next speaker up well. We are going to turn it over to Nick Mark, who is the Director of DSM Strategy and Policy over at Xcel Energy. So, we've heard a little bit about Minnesota and Colorado, two of the states Xcel serves, so Nick, looking forward to hearing your perspective on these issues.

NICK: Yeah, thanks. So, I think Xcel is the only entity that gets to operate under both the ECO legislation as well as the bills that we just heard about from Justin. And my team in particular, gets the privilege, I'd say, of getting to play in both of those spaces.

Our legislative bodies in 2021 were super busy, and we are working our way through the outcome. I think there are a lot of tremendous opportunities; I'm not going to cover the same ground that Jamie, Anthony, Justin already did as far as the details. When we think about these changes and the new frameworks that they have set up, we think about what they mean in terms of what programs we can offer our customers, where there may be challenges in hitting some of the goals, but also what opportunities they create again both for our customers and for us as a company. We've actually already been incentivizing natural gas to electric conversions in our Colorado territory through our gas DSM programs, and we're excited to bring that to Minnesota as those rules get finalized and figured out.

One of the things that we see is that although, at least in Colorado, there is a pretty close tie to some binding emissions targets (and we think that energy efficiency on both the electric and

gas side is going to be critical obviously to hitting both our state goals as well as our corporate goals), there is still a little bit of work yet to figure out around getting all of our policy mechanisms aligned. What I mean by that is although we consider some of the cost of GHG pollutants when we are thinking about cost effectiveness in Colorado, and indeed in Minnesota as well, those aren't necessarily reflected in the prices of energy that customers see. That creates a challenge in terms of driving participation. So we're working through how we motivate customers around something that at least on paper is cost-effective from a climate perspective, but their own pocketbook may be affected a little differently. It's not a new problem in the sense that trying to get customers to save gas over the last decade or so of historically low prices has been a challenge, and we've been able to be successful at it, but it is going to be tricky.

The other thing is that in both states, efficiency programs, unlike what we heard about in Massachusetts, don't have defined emission reduction goals associated with them. Their goals are measured in energy savings — and I think that's a reasonable thing for an energy efficiency program because although climate is super important, it's not the only thing you're trying to do with energy efficiency. But increasingly, we're seeing a need to think about exactly how those savings targets align with emissions targets. It will get particularly challenging for us as a utility that has a goal of being 80% carbon free by the end of this decade, and indeed we've already cut emissions by over 50%. As we take that carbon out of the electricity, and as it's increasingly generated from resources that don't consume fuel, how does that change your cost-effectiveness model? How does that change the way you're thinking about load building or the time of day or the location where you are either encouraging or avoiding use? And how do you make both the electric and gas systems work better together?

That's the last thing I'd touch on — Xcel is both a gas and an electric utility that serves large coal markets and we don't see the need for a gas LDC going away in the markets that we serve just based on the need for peak heating and the expense of retrofits in these markets. New construction might be a slightly different story, but most of the homes that we're going to be dealing with over the next couple of decades have already been built. And so, figuring out how we get more efficiency and less carbon out of those properties is really important. We think that the gas system is going to play a really important role in providing reliable heat on peak in a way that avoids the need to overbuild the generation capacity on the electric side. But you can do that while also having a very significant reduction in overall throughput and overall emissions on the gas side.

In turn, that brings us back to policy and the point that was, I think very appropriately, highlighted early on this afternoon around centering equity and making sure that as we work to change customer usage patterns and affect customer decisions around how they interact with their utility — how they fuel their lives — making sure we are properly addressing the costs incurred to serve those needs. And making sure that whether it's stranded asset risk or simply a high bill on the new system, making sure we are thinking about that proactively and by engaging with the people are likely to be affected.

RACHEL: Well, thank you so much. I think it's very clear that Xcel is thinking about all of the different elements of the climate-forward efficiency roadmap and so we appreciate your comments and your thoughts on that. I look forward to hearing more about it as we move forward. Next, I'm going to turn it just around the Great Lakes to Illinois. I'm going to introduce Delmar Gillus, the Chief Operating Officer of Elevate. There has been a lot going on in Illinois with the recent passage of the Climate and Equitable Jobs Act. Delmar, look forward to hearing a little bit more about that.

DELMAR: Thanks very much, Rachel and good afternoon, everyone. It's a great honor and very exciting to be on to participate in this conversation. As Rachel mentioned, by name is Delmar Gillus, I work at an organization called Elevate. Elevate focuses on ensuring everyone has access to clean air, clean water, and clean energy. In that capacity, we were part of what is called the Illinois Clean Jobs Coalition, which was a coalition of community-based organizations and environmental organizations that worked on Illinois' Climate and Equitable Jobs Act (CEJA). As part of that bill, I was asked to be one of the chief negotiators representing the coalition with a focus on equity.

So, as I talk about CEJA, the conversation around focusing on equity was very important and I was very excited, Rachel and Mike, the way that you drafted your paper because centering and focusing on equity was important. But when we look at CEJA, the core components were around jobs and economic justice, inclusive financing, carbon-free power, renewable energy,

energy efficiency, electric transportation, a just transition (especially for workers and communities that were impacted by fossil fuel), transitions to clean energy, utility accountability, grid planning, and low-income relief. What I was really excited about was that a lot of times you see these bills that are very focused on dealing with decarbonization, and then there is a separate section on equity that often focuses on training. What we did in this bill was center it around equity and made sure there was equity in every component.

In addition to that, the bill provides $82 million a year well into the 2040s that focuses on workforce development as well as contractor equity programs. From a centering equity perspective, just to give some context, 40% of the benefits, especially around solar, EV, and the grid, must go to equity-eligible communities. So, there is a very solid foundation.

What I'll spend the last 20 seconds or so talking about are just some high-level provisions. For instance, we created training hubs that focus on workforce development, but rather than workforce development just being training, it's really focused on creating jobs, retaining jobs, and most importantly the support services — everything from tools to equipment to things that people need to do their jobs. We also have built into the bill (and once again I was happy to see this in your paper) a strong section on accountability measures. One of the things that I was very passionate about was that if everyone in the state is paying into these programs, a company should not be able to access incentives without ensuring that they meet certain diversity and equity requirements. And as I mentioned, there were also very strong supports around support services and one of the things we were most proud of was that we were able to build a structure around building capital because oftentimes small, diverse businesses can't wait for a project to be completed and energized before they get their incentive dollars. We actually have incentive grant dollars built in so that companies can do pre-engineering work; they can do things like purchase equipment, supplies, solar panels, etc. for their projects in addition to getting incentives.

The bill is over a thousand pages long, and to talk about it for just 3 minutes (even the equity section) is a tall order, but Rachel and Mike, it was a pleasure to get an opportunity to preview it. I'll also put some information in the chat for those that want to dig into some of the equity provisions more, and I'm definitely happy to talk about it during the follow up. Thank you, Rachel.

RACHEL: Thank you, Delmar. It was indeed a tall order and I think you were equal to it, thank you. I'm going to turn it over now to Carmen Best, who is the Vice President of Policy and Emerging Markets at Recurve. Recurve has been doing a lot of really interesting work around data access and data usage and emerging markets for energy efficiency, so I'm excited to hear the implementation perspective from Carmen around this work.

CARMEN: Thanks, Rachel. I was trying to boil down my talking points to kind of two things that we're focusing on because to be brutally honest we've had a lot more than that that have been driving our work over the last year and a half and there is so much to share, so please reach out to me later if you want to dig in on more details.

But the two examples that I wanted to highlight are really a core illustration of the power of data-driven program designs, and my favorite, embedded measurement verification, so coupling program design with robust measurement and robust verification to drive toward these climate-forward solutions.

At the core of data solutions has to be the secure flow of data to build confidence in demand-side investments and ensure that they can, in turn, be used within market models. Because markets rely on trust and the exchange of information and the flow of data of being able to have this common view of performance is kind of the essence of what energy markets are going to need. And in particular energy efficiency growing into those markets are going to have

to step up the bar to be able to demonstrate their value in that context.

So the two examples that I wanted to highlight were a project that we did with the California ISO this last year and then another project called the Market Access Model that was adopted also in California. Home state, so I'm taking liberties there!

The California ISO project was done in partnership with the ISO to utilize a new baseline methodology for understanding the impacts of demand response. It came out of these extreme heat events that we had in California in 2020 and we coupled that analysis with our comparison group analysis. This was one of the first times that this methodology (while it's approved for the California ISO) had actually been able to be used or tested in the context of settlement for supply-side demand response resources. One of the things that enabled it was that we were able to utilize differential privacy to offer privacy protections to non-participant data sets and still be able to do the analysis without sacrificing the privacy of non-participants, but still have a better understanding of how participants were really driving change to the grid. This is a stepping stone for being able to use non-participant comparison groups (and comparison groups generally) in any aspect of demand-side analysis, and I would love to be able to get to that as the default comparison approach for assessing all kinds of energy efficiency investments.

The other one that I wanted to highlight is the Market Access Model. This was adopted in December 2021. The California Public Utilities Commission was answering the call from the governor of emergency resources needing to come forward. They adopted an open-source procurement model — they called it the Market Access Model, we call it at Recurve the Demand Flex Market. What it does is that it's a next-generation, meter-based performance model wherein technology-agnostic solutions can come forward from a wide range of aggregators and be able to be judged and assessed on a common measurement verification framework but then also be driving back to understanding how it's going to affect the grid for demand response reductions as well as long-term load shaping. So, it's a great example of being able to blend energy efficiency and demand response, and it's also utilizing California's new total system benefits metrics which I'd love to talk more about too.

RACHEL: Thank you so much, Carmen. And for more on total system benefits, check out *The Need for Climate-Forward Efficiency* where there is a lot of detail about that. On the topic of privacy and data, I'm excited to turn it over to our last speaker, Scott Hinson, who is the Chief Technology Officer at Pecan Street. Scott, take it away.

SCOTT: Thank you. I'm going talk about three things real fast. For those of you who don't know, Pecan Street is a 501(c)(3) nonprofit based in Austin, Texas, but we have test beds all over the country. We install monitoring equipment for all sorts of things behind-the-meter in folks' homes. We understand how people are using their energy, where changes of energy use would impact them the most, especially with time of use rates and things like that. For some of our volunteer participants, we collect about 10.5 million datapoints a day in those homes. We collect in upwards of 4 billion datapoints data daily from our testbeds across the country, and we're on a road to 7 billion by the end of the year because we are adding Detroit and Puerto Rico.

Historically we have looked at higher-income participant sets, and we are trying to fix that inequality. We are trying to get into areas where we can understand the impact of electrification on lower- and middle-income groups. We've got some of our first houses coming online right now. One of the homes that we just turned on for data collection is in Puerto Rico, and we've seen some very interesting things already, to the point of things like voltage regulation on the island being so bad that we were worrying about things breaking inside the

home. So now, all of a sudden, it's not just about energy efficiency, it's about quality of life and being able to run the water heater when you want to because the grid's gone out and they are running on batteries and all sorts of things like that.

Lastly, on the energy efficiency side, we have a number of reports on our website around energy efficiency and the potential savings, but I'd also like to make a plug for informed decisions on operation of devices. It's one thing to say you are going to electrify. That comes at a fairly high cost, but there are lower-cost ways to do it and easier ways to do it if the data are available and the control systems and standards are in place around controlling devices like heating and vehicle charging and things like that.

RACHEL: I have a couple questions I collected as you guys have been chatting. **Are any of you in states or where states are currently using the social cost of carbon as a metric and energy efficiency programs?**

MIKE BARRETT: Massachusetts is using the social cost of carbon. We obviously do not do it at the individual residential consumer level, but we are incorporating it into every calculation the DPU makes, every evaluation of our energy efficiency program, and every calculation the electric and gas utilities make as well.

JUSTIN: Same in Colorado. We are now using the social cost of carbon and social cost of methane for cost-effectiveness for gas and electric DSM as well as beneficial electrification programs.

ANTHONY: Same in Minnesota, as well.

RACHEL: Regarding climate change, how are states and utilities preparing for much higher cooling loads — both peak and average — along with increased electrification over the next decade and beyond? Also, what is happening in terms of legislative and regulatory efforts to reduce emissions generated by the electric grid?

REBECCA: I'll take that first question. Vermont has a long-term planning process that both the transmission utility, VELCO, participates in as well as all of the utilities around the state. There is a robust connection between the work Efficiency Vermont does on the demand-side and those supply-side planning processes so that we are all coordinating and collaborating. As a cold climate state, we are seeing as the climate changes we see more and more potentially inefficient cooling systems moving in, whether from air conditioners or central air conditioners, and doing a tremendous amount of work to try to transition folks over to heat pump technologies as the best approach to meet future needs for safe and efficient cooling at the same time that we are trying to meet needs from an electric system perspective to have reliable, affordable, and clean energy sources for Vermonters. That is just one example about how connecting dots across sometimes separate silos of electric system planning are helping us prepare, and at the same time raising consumer awareness about the need for cooling and what the best ways are to meet those new needs. There are many different facets to the work, but working on all fronts we've been able to achieve some good successes around heat pump adoption.

DELMAR: It is worth thinking about these changes. It is really important from the context of centering equity that we are planning and supporting underserved communities as they transition. A lot of the programs are now starting to take a hard look at how we are engaging underserved communities, what are we doing to ensure contractors of color have a role in the installation and maintenance of some of these new technologies. As we are talking about this transition, I wanted to highlight the importance of making sure that there is an equity focus on these transitions as these new programs come online.

CARMEN: Building off both of those answers, I'd like to give an example. Rebecca noted that VEIC is part of the Greentech Alliance in California, which is the residential deployment of heat pumps and heat pump water heaters. A big component of that is equity. Recurve is one of the subcontractors working on that project, and one of the ways we are operationalizing that is to do pre-analysis of where cooling loads might be changing, and where the biggest opportunities are for improved efficiency with heat pumps, or at least not harmful bill impacts. Or if there might be significant bill impacts, being able to couple those with strategies to mitigate them so that you do not accidentally exacerbate issues as you are trying to rectify access and clean energy solutions across the board. Also, for what Delmar was saying, operationalizing those equity questions, prioritization and adding in value adders into your value stack is a strategy that we are using in this market access program. We will see how those examples end up working out. It is the intentionality behind it and also some structural operationalizing of it that will be interesting to see how that works out.

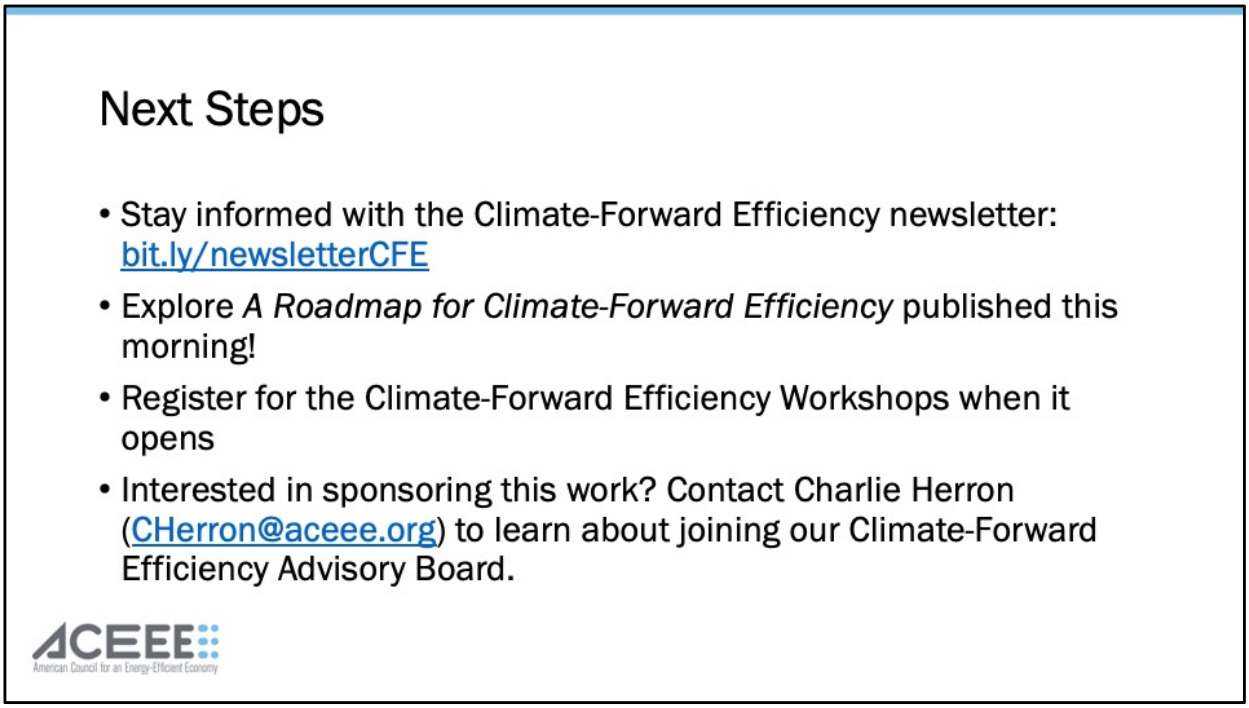
RACHEL: The findings in the paper are in some ways exciting. There are shining examples of cities, states, and utilities who are taking action, but it is relatively few who have done so thus far. It is sobering. **What are some of the efforts we are seeing to enhance state and local performance and accountability? Are there efforts to create better policies and lower perceived barriers to more states and places becoming effective performers? How can we raise the bar across the country?**

JAMIE: Minnesota has a split legislature. Our Senate is Republican. Our house is Democratic. I would say work in coalitions. If you are looking to pass legislation forward, understand some of the barriers you are working with, but broad coalitions do help to advance things from our perspective.

DELMAR: I don't know if this gets to the aspects of the question, but part of what we tried to do with the CEJA legislation, and this was based on past experience where organizations were taking advantage of the incentives but were not doing things to center equity and track metrics, is we basically built into and will be building into the program applications where if you are applying for dollars from the state, you have to meet certain criteria in order to access the dollars. For instance, are you hiring people from the workforce program? Are you meeting certain minimum diversity requirements? It also requires you with your subcontractors to capture some demographic data on the subs and organizations you are working with. So, there is a shared data collection aspect as well as some requirements. Jamie's comments are very important around coalition building and making sure that the coalitions have some shared guiding principles about how these programs are going to work and function, especially as it relates to metrics, data collection, reporting, and accountability. You cannot fix things that you are not measuring. One of the key steps is to begin to collect data and information about key metrics that are important to the states. The coalitions are a good way to push those forward.

REBECCA: One of the things I wanted to share is how Efficiency Vermont moved this work forward in Vermont. I could not agree more on coalitions and data. One of the pieces of data we surfaced that was so valuable in the legislature was in terms of energy burden. Vermonters' energy burden starts with transportation, then heating, then electricity is number three. It just so happens the greenhouse gas emissions are in exactly the same order. So reorienting the efficiency programs to focus on where the greatest greenhouse gases and costs are for Vermont families was a no-brainer. That helped us get the very conservative governor on board with the approach. I could not agree more on the importance of coalitions and bringing good data to the table that can speak to the needs of the policymakers.

RACHEL: Thank you everyone! I will now transfer for this back to Edward for some closing remarks.



EDWARD: Thank you, Rachel, and thank you to all of the guest speakers. That was terrific. And thank you all for attending the symposium. Before we close, I would like to go over some additional information about next steps.

ACEEE has a bunch of ideas about how to expedite this effort, but we want to hear about your ideas and what you think will expedite and scale up this effort. Our next event will consist of more focused discussions to hear about your ideas in smaller groups on key topics. Our Day 2 event will be held on Thursday, March 24 from 2:30pm–4:00pm EST, and it will consist of three facilitated breakout sessions that will occur concurrently. The results of those discussions will be shared with everyone. The topics of the sessions were curated based on a survey when you registered for today's event. The topics are:

- advancing efficiency measures for beneficial electrification
- measuring greenhouse gas reductions (i.e., moving forward on workable approaches and needed data, so this is a data access discussion on grid emissions, conversion factors, additionality, emissionality, quantifying the locational and durational impacts of demand-side resources)
- facilitating legislative and regulatory change (i.e., which states would present good opportunities for climate-forward efficiency this year and next year? This topic would give us a collaborative opportunity to survey the commission and state landscapes and identify high-impact opportunities where there may be a demand for climate-forward efficiency

among legislators and regulators.)

Nothing is more powerful for progress than a great example, so we will be looking for opportunities where we can set a great example. There were other topics that we will discuss in a separate forum such as the value of energy efficiency and how to reflect them accurately in the context of IRPs and DRP's, but also in the context of equity-driven plans like resilience plans, land use plans, and environmental plans. We will create an opportunity to discuss these other topics that will not be featured on Day 2.

Final reminders, I would like to recognize and thank Shannon Pressler, our awesome intern for her work with us in the past few months and her invaluable help in putting this event together. You will receive a link to a recording of today's event along with the slides and transcript. You can also download the roadmap report on our climate-forward efficiency page of our website. You should be able to see a link to that report. You can also sign up to receive updates by subscribing to this initiative. You will receive a bimonthly newsletter as well as opportunities to participate in future webinars and working groups. If you're interested in sponsoring any of this work, there are opportunities with our development team. You can email Charlie Herron for more.

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Upcoming ACEEE Conferences

Hot Water Forum	March 21-23	Atlanta, GA
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Summer Study on Energy Efficiency in Buildings	August 20-26	Pacific Grove, CA

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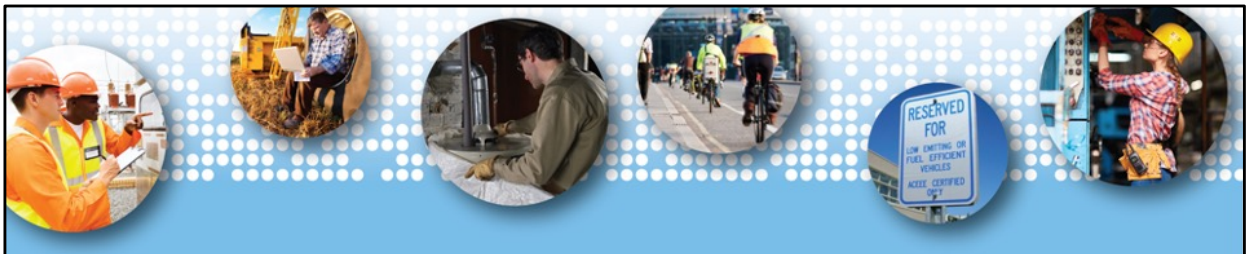

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