NATIONAL ENERGY EFFICIENCY REGISTRY: STATE-SPECIFIC ROADMAPS

October 2017

NATIONAL ENERGY EFFICIENCY REGISTRY (NEER): GEORGIA ROADMAP

Abstract

The NEER is a web-based platform that will help states document energy efficiency achievements to help meet their energy and environmental goals. Serving as a means to register and track energy savings and, as desired, enabling trading of instruments representing energy savings (and related environmental attributes), the NEER can support both voluntary energy efficiency initiatives and compliance with mandatory energy savings goals. This Roadmap provides an overview of major opportunities for applying NEER across states generally and for NEER Project Team states based on each state's circumstances. The Roadmap is meant to illuminate paths that states can consider for adopting NEER as a tool to support state energy objectives.

This document is the Georgia state-specific section of the NEER Roadmap.

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NEER Project Team and Acknowledgments

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Rodney Sobin (NASEO) served as major author and editor of this Roadmap with contributions and review from Molly Cripps, Kendra Abkowitz, and Alexa Voytek (Tennessee), David Gipson and Kris Anderson (Georgia), Robert Jackson and Joy Wang (Michigan), Jessica Burdette (Minnesota), Warren Cook and Kaci Radcliffe (Oregon), Kerry Campbell and Dennis Maloskey (Pennsylvania), Peggy Kellen and Michelle Zilinskas (TCR), Pat Stanton and Audrey Bragg (E4TheFuture), and David Terry and Sandy Fazeli (NASEO). Thanks are also due to stakeholders engaged in the each of the partner states through their individual roadmapping processes.

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NEER Roadmap

This document constitutes the Georgia state-specific portion of the National Energy Efficiency Registry (NEER) Roadmap.

Georgia NEER Roadmap

The State of Georgia has several possibilities for utilizing NEER. Georgia does not have an Energy Efficiency Resource Standard (EERS), however, there are significant energy efficiency activities taking place throughout the state. Utilities in the state, including Georgia Power and Oglethorpe Power, utilize integrated resource plans (IRPs) that take energy efficiency into consideration.[1] Georgia has building energy codes applicable to new construction and major renovations. The state has a lead-by-example program that challenges state agencies to meet energy savings targets and is growing its guaranteed energy savings performance contracting (GESPC) program. Property assessed clean energy (PACE) financing is authorized and in the development process. And, in addition, there may be local and private sector energy efficiency programs and initiatives where NEER can serve. Further, the state is subject to air quality requirements under the federal Clean Air Act, including National Ambient Air Quality Standards (NAAQS), the Cross-State Air Pollution Rule (CSAPR) and the Regional Haze Program, where energy efficiency may play a role in helping achieve compliance.

NEER has potential to help Georgia address state energy and environmental objectives by supporting enhanced quantification, qualification, and tracking of energy savings achieved through energy efficiency activities. In looking to energy efficiency opportunities in Georgia, it is important to recognize potential for both utility and non-utility associated programs and investment. Often discussions and analyses of energy efficiency focus largely or solely on utility customer-funded programs while underappreciating contributions and opportunities afforded by non-utility actors. In fact, Georgia NEER participants believe that voluntary, non-utility programs have the highest potential for NEER application within the state.

This Roadmap document illustrates several pathways for NEER application in Georgia, primarily within the context of non-utility programs.

Utility-related programs

As noted, Georgia does not have an EERS or similar policy requiring utilities to achieve targeted levels of energy savings. However, Georgia Power and, to a lesser extent, electric membership cooperatives offer some demand-side management (DSM) programs. State law allows the Public Service Commission (PSC)-regulated utilities to be compensated and earn return from PSC-approved DSM programs. Georgia Power is required to include energy efficiency in its IRP and cooperative electric utilities served by Oglethorpe Electric Cooperative go through an IRP-like planning processes that include DSM.

Lacking an established EERS and related utility efficiency tracking system, NEER can be a useful means for the state, the PSC, and utilities to record and track energy savings undertaken through DSM programs and more broadly. NEER could help the state and its utilities to validate and track energy savings to see if IRP-planned savings occur, identify and recognize other demand-side energy resources,

[1] Georgia Power is the investor-owned utility. Electric membership corporations (electric co-ops) served by Oglethorpe Electric Corporation is a power supply cooperative that serves electric membership corporations (electric co-ops).

and use such information for future IRP and related planning to better discern and include energy efficiency as a procurable grid resource.

The PSC currently oversees Georgia Power's DSM programs and already requires robust M&V and related reporting. If Georgia, or its utilities, decide to pursue other types of energy efficiency programs, such as voluntary utility targets, industrial programs, or an EERS, NEER may serve as a platform for recording, reporting, and validating energy savings.

Tracking building and facility energy efficiency performance

NEER can be a suitable tool for tracking energy efficiency project and program savings that occur outside of utility-based programs.[2] Across Georgia, large numbers of buildings are being built to "above code" standards of energy efficiency while many existing buildings undergo retrocommissioning, upgrades, and renovations to achieve greater energy efficiency.

Within Georgia, new and existing building and facility energy efficiency improvements are undertaken under a variety of policies and programs, including:

- State or local lead-by-example standards or targets applicable to certain public sector or publicly supported buildings and facilities (e.g., Georgia Energy Challenge targets for state agencies, Energy Efficiency and Sustainable Construction Act of 2008**,** and state and local GESPCs).
- Local requirements applicable to certain non-public-sector buildings (e.g., Atlanta's benchmarking and disclosure policy).
- Publicly financed (e.g., low-income weatherization and Low-Income Housing Tax Credit (LIHTC)-financed) and locally incentivized programs (e.g., property assessed clean energy [PACE] financing).
- Voluntary programs (e.g., Atlanta Better Buildings Challenge, corporate programs).

The exact pathway for applying NEER to these different program types can vary but the basic approach is similar. The program's administrator can designate NEER as the platform for registering, recording, and tracking energy savings/energy waste reduction. It would define QA/QC requirements for the programs. These can include NEER "basic" (a self-certification without independent verification of savings), NEER "enhanced" (more rigorous measurement and verification [M&V] with independent verification), or customized ("SCCP") criteria for the program.

Many state and local policies, such as local benchmarking and disclosure programs, and voluntary programs use "energy use intensity" (EUI), measured as British thermal units (Btu) per square foot, as their main metric. EUI is typically derived by entering energy use data into ENERGY STAR Portfolio Manager, in which the resulting EUI is also weather normalized. Changes in EUI (which may also be adjusted for changed occupancy and usage) are used to determine progress (or lack of progress) toward meeting energy performance targets.

For programs that use Portfolio Manager and the EUI metric, energy billing data entered into Portfolio Manager can be used first to provide energy use as kilowatt-hours (kWh) of electricity and Btu or therms

[2] Building energy efficiency programs and standards and ESPCs can also include water conservation and savings as objectives as well as other resource and environmental aspects. NEER is initially focused on energy savings but could also be configured to include onsite renewable energy, water conservation, and perhaps other performance aspects.

of natural gas (and other fuels) used. Energy savings can be derived by comparing that usage with a pre-upgrade baseline in existing buildings or a modeled baseline (building code or common practice) for new construction (with appropriate weather or other adjustments). Numerous standard M&V approaches are available to validate energy savings.

While EUI is an important metric of building energy efficiency, physical units of electricity and fuel savings provides other useful data that can support state and local energy planning, energy resilience and assurance objectives, and air quality goals. NEER could be used to enhance the quantification and credibility of savings and energy waste reduction to support these other objectives.

Other energy waste reduction programs do not rely on EUI metrics. In some cases, EUI is inappropriate, such as for exterior lighting upgrades, wastewater treatment facilities, and industrial processes. Also, GESPCs are subject to M&V reporting requirements in which the ESCO must show energy savings achieved and whether those savings meet contractually guaranteed levels.

In any of these types of programs, NEER can serve as a platform for recording and tracking energy savings and energy waste reductions. The following use cases illustrate general approaches for applying NEER but can be adapted to wider sets of program designs and circumstances.

State or local lead-by-example program: new construction

In this example, a state or locality could have an "above code" energy standard for public-sector buildings, requiring design and construction to meet higher levels of energy performance than would be realized from meeting the building energy code or common building design practice.[3] Energy use of new buildings built under the "above code" policy would be compared with energy use that would be modeled to have occurred if the building had been built to meet existing building code or common practice.

Measuring and tracking energy use and savings as compared to standard design, construction, and operation would indicate if the "above code" policy is succeeding. It could help improve the program's efficacy, point to operations and maintenance (O&M) energy waste reduction opportunities, provide data on cost as well as physical energy unit savings useful for both fiscal and energy planning purposes, and support analyses of air quality and other environmental impacts.

In this case, the state or local jurisdiction would create an account in NEER and establish a level of QA/QC (including M&V requirements) that meets its needs, ranging from a self-reporting under NEER "basic" to a more rigorous validation of energy waste reduction under NEER "enhanced" that may be useful for regulatory purposes, such as for possible air quality compliance purposes. The jurisdiction could also establish customized QA/QC criteria—NEER's "SCCP" option.

Applicable building or facility operators and agencies would compare actual energy use with modeled energy use (and apply any required normalization for weather and usage) to derive energy savings. These savings would be submitted to NEER, which would validate that they were documented in accord with QA/QC requirements. Such savings would be recorded in an asset output log. The data could be easily retrieved by the jurisdiction for analysis, public reporting, and other purposes. Registered energy

[3] Georgia's Energy Efficiency and Sustainable Construction Act (EESCA) of 2008 provides standards for state facility projects.

savings data can also be translated into avoided emissions of criteria air pollutants and/or carbon dioxide by air quality regulators, the State Energy Office, local jurisdiction, or others using a variety of tools and emission factors for purposes of air quality management and any greenhouse gas objectives that may exist.

State or local lead-by-example: existing facility upgrades

In this example, a state or locality may have a policy to encourage or require energy waste reduction upgrades. The jurisdiction may directly procure upgrades from contractors or may use the GESPC mechanism through an ESCO.

As above, the jurisdiction would establish a NEER account and appropriate QA/QC criteria. In using NEER as a registration and tracking platform, the jurisdiction should clarify by contract who can claim the rights to energy savings, the contractor/ESCO or the jurisdiction or agency that owns the project.[4] Similarly, if portions of projects are incentivized by utilities, the parties should clarify claims to energy savings.[5]

Energy savings would be determined in accordance with the jurisdiction's QA/QC requirements, again ranging from a self-certification under NEER "basic" to having independent verification under NEER "enhanced" with tailoring possible to meet the jurisdiction's requirements. Numerous standard M&V approaches comporting with the International Performance Measurement and Verification Protocol (IPMVP) are available based on bill analysis, sampled measurement and monitoring, modeling, and other approaches.[6] While NEER does not determine M&V requirements for particular programs, it would affirm that QA/QC requirements, such as for M&V, are met for registered energy savings. For upgrades undertaken through an ESPC, the ESCO typically performs M&V to document that it has met their savings guarantees.

Also, as above, a jurisdiction using NEER can readily access data from NEER's asset output log to track energy savings for analysis, public release, and other purposes. Such data can be fed into broader state energy planning and policy and avoided emissions estimated for air quality management and sustainability policy purposes.

Voluntary building or facility upgrades

Georgia is home to many major corporate headquarters. A growing number of these companies have adopted energy and sustainability corporate objectives. Many companies implement energy efficiency, renewable energy, and other measures at their own facilities across the state. Some also encourage or even require energy and environmental management standards in their supply chain. NEER can support these and it can also open the opportunity for the buying and selling of energy savings instruments in a voluntary market.

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[4] In some states and policy scenarios, energy savings credits may be traded like renewable energy certificates are traded to meet regulatory requirements, claim financial incentives, or earn revenues in voluntary markets.

[5] For example, a utility may claim some or all energy savings for measures it incentivized.

[6] IPMVP available via the Efficiency Valuation Organization https://evo-world.org/en/. The IPMVP structure is used in M&V protocols developed for the Federal Energy Management Program (FEMP), PJM Interconnection, ISO-New England, and others. The U.S. Department of Energy's Uniform Methods Project and various state and utility technical reference manuals build off the IPMVP.

Companies performing energy efficiency in their own facilities could opt to use NEER privately to register and track energy savings. The process would be broadly similar to the state and local lead-by-example scenarios, but with companies creating NEER accounts, establishing QA/QC requirements, and then registering applicable energy savings with NEER. NEER could offer an additional measure of credibility to corporate energy savings claims. Companies could also use the NEER platform as they participate in voluntary initiatives and challenges such as Better Buildings.

A company seeking to encourage or require energy efficiency improvements in its supply chain could specify use of NEER to register energy savings from supplier firms.[7] In that case, the company would establish QA/QC requirements with NEER and ask suppliers to establish NEER accounts and submit their energy savings for registration and reporting.

The broadest scenario would be for a wide private energy efficiency market using NEER as a platform. A company may wish to support energy efficiency efforts outside of its corporate boundaries either as a direct part of its sustainability and social responsibility policies or possibly to offset energy waste reduction or renewable energy performance shortfalls in its own facilities. Such a company may wish to purchase energy savings certificates from, for example, low-income weatherization programs or energy efficiency projects in economically disadvantaged communities, to serve social responsibility goals while also supporting sustainability objectives. In such cases, companies, nongovernmental organizations, agencies, and localities wishing to buy and sell energy savings credits would each have NEER accounts to allow the processing of the transaction and exchange of instruments.

Emissions and air quality applications

By reducing the need for electricity generation and onsite fuel consumption, energy efficiency mitigates adverse environmental impacts, including emissions of air pollutants and their health effects.[8] Air quality regulators can consider energy efficiency at different levels for varied purposes under different regulatory programs, ranging from broad planning and projection purposes to formalized crediting of energy efficiency for enforceable regulatory purposes. Further, avoided carbon dioxide (CO_2) and other greenhouse gases can contribute to state, local, and private climate and resilience policy targets and goals.

During planning discussions for the Clean Power Plan, the Georgia Environmental Finance Authority (GEFA) engaged Georgia's Environmental Protection Division (EPD) and PSC to discuss how energy efficiency could play a role. As part of this discussion, GEFA hired Navigant to produce a study analyzing the extent to which energy efficiency could meet Georgia's Clean Power Plan (CPP) requirements. While the CPP will likely not be implemented, at least in its previous form, state agencies in Georgia were able to proactively discuss energy efficiency and its benefits. However, the discussions also highlighted the difficulty of incorporating energy efficiency into emissions reductions plans. While it is a possibility,

[7] Precedents include companies using supply chain relationships to encourage or require suppliers to adopt the ISO 9001 Quality Management System standard and ISO 14001 Environmental Management System standard. There may be similar initiative concerning the emerging ISO 50001 Energy Management Standard.

[8] NASEO Energy Efficiency Pathway Templates offer a discussion of energy efficiency as an emissions reduction tool, including for Clean Air Act planning and compliance purposes, and serve as a template states can use to facilitate discussions with air quality managers. The templates and related resources are available at http://naseo.org/ee-pathways.

Georgia does not expect NEER to play a significant role in its NAAQS State Implementation Plans (SIPs) at this time. Thus, the following section is primarily for illustrative purposes.

The EPA has outlined pathways for incorporating energy efficiency and renewable energy into NAAQS SIPs in an "EE/RE Roadmap Manual" that builds on existing formal guidance.[9] There are some precedents for including energy efficiency formally in NAAQS SIPs.[10] An analogous SIP process under the Regional Haze Program may also be amenable to including energy efficiency. Figure GA-1. indicates counties measuring ozone at levels above the 2015 ozone NAAQS. However, more recent data may affect EPA's determination of attainment status of counties. Figure GA-2. shows "Class I Areas" under the Regional Haze Program. Note pertinent Georgia counties and Class I Areas. Also, the Regional Haze Program requires states to coordinate regionally to abate visibility impairment to other states' Class I Areas.

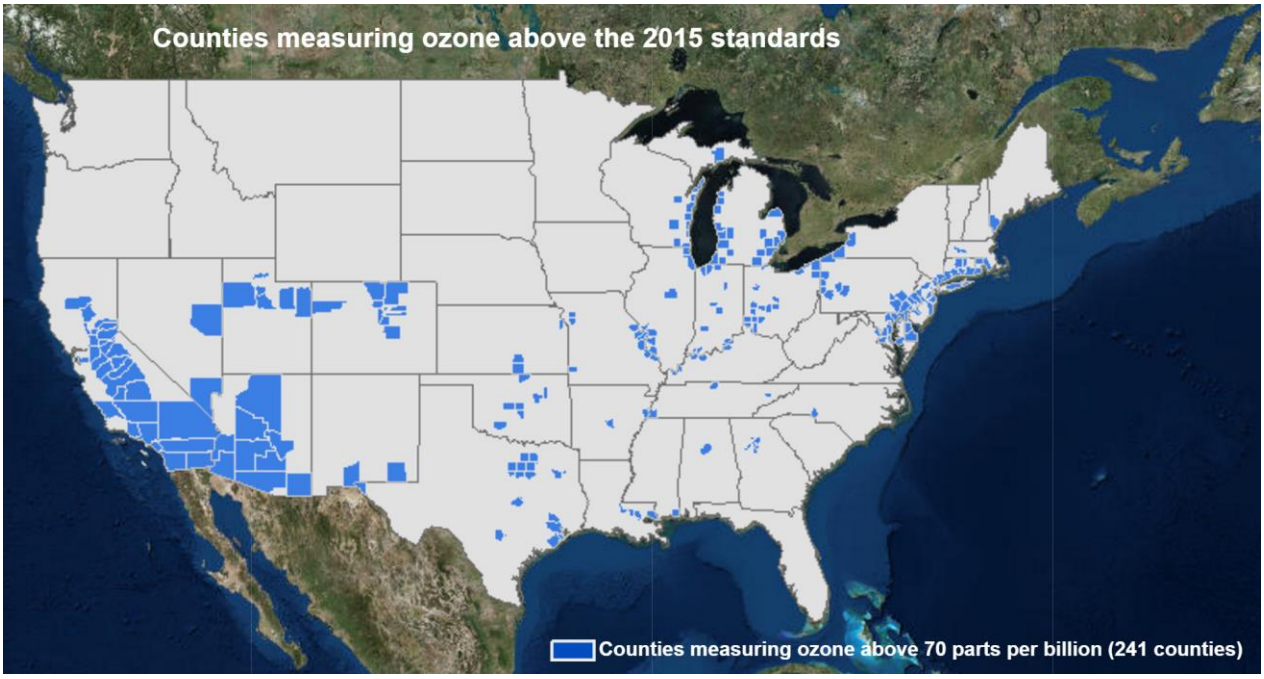
Georgia is also subject to the Cross-State Air Pollution Rule (CSAPR) for fine particles (sulfur dioxide [SO_2] and annual nitrogen oxides [NOx]) and ozone (ozone season NOx). Some states have "set aside" modest numbers of NOx allowances for allocation to EE/RE projects under previous NOx budget trading programs.[11] Under a NOx allowance set-aside program, a state could issue allowances for qualifying energy efficiency/energy waste reduction (and renewable energy) projects. Such allowances could be sold to earn a bit of revenue supporting energy efficiency/waste reduction (or renewable energy) or could be retired to reduce allowable tonnage of emissions and show progress toward NAAQS compliance.

[9] U.S. EPA, 2012, "Roadmap for Incorporating Energy Efficiency/Renewable Energy Policies and Programs into State and Tribal Implementation Plans," https://www.epa.gov/energy-efficiency-and-renewable-energy-sips-and-tips

[10] For example, the Texas Commission on Environmental Quality included NOx reductions from building codes as well as local government and utility energy efficiency programs in a 2005 Dallas-Ft. Worth area SIP revision. See https://www.tceq.texas.gov/airquality/stationary-rules/nox/eere.html

[11] U.S. EPA, 2006, "State Clean Energy-Environment Technical Forum Roundtable on State NOx Allowance EE/RE Set-Aside Programs, June 6, 2006, Call Summary." https://www.epa.gov/sites/production/files/2016-03/documents/summary_paper_nox_allowance_6-6-2006.pdf.

Figure GA-1. Counties measuring ozone above the 2015 standards



Source: U.S. EPA

Figure GA-2. Mandatory Class I Areas (under Regional Haze Program)

Source: U.S. EPA

NEER-registered energy savings can be translated into avoided criteria pollutant emissions from the power sector by using such tools as EPA's eGRID and AVERT,[12] or using dispatch or other models tailored to a particular state, utility service territory, or regional transmission organization. Emissions impacts of reduced onsite natural gas or other fuel use can be derived using published emission factors (e.g., EPA AP-42),[13] equipment specifications, or other means.

Air quality agencies can use NEER-registered energy savings and their concomitant avoid emissions for projection and planning purposes. They can use such energy savings to support and validate inclusion of energy efficiency in SIPs. A state opting to offer "EE/RE set-aside" allowances for NOx or other tradable emissions could use NEER-registered savings as a basis for set-aside allowance distribution.

In the case of set-aside allowance applications, energy efficiency project owners or other savings claimants (such as an ESCO or other energy service provide) would create NEER accounts. They would show project eligibility, document energy savings in accord with M&V and QA/QC standards that the air quality agency may require, and attest to have rights to project energy savings. The state could require NEER vetting of savings as a basis for awarding set-aside emission allowances.

Finally, NEER can support state and local greenhouse gas objectives where they exist (e.g., City of Atlanta Greenhouse Gas Action Plan). NEER-registered savings from utility-supported programs, lead-by-example state and local programs, private voluntary NEER-registered savings, efficiency finance mechanisms, and other sources (e.g., low-income weatherization, building energy codes) could be tallied by air quality agencies or other authorities to track CO_2 (and potentially other greenhouse gas) emission impacts if that is desired.

Conclusion

The state of Georgia partnered in the NEER project to help develop and explore opportunities for applying NEER in support of state energy and environmental policy objectives. Georgia has a wide range of efficiency activities occurring across the state. The range of programs includes mandated utility DSM programs, state lead by example programs, local government programs, and voluntary private sector programs. NEER has the potential to assist this full range of programs.

This roadmap covers the range of opportunities; however, in Georgia specifically, NEER is most likely to benefit lead-by-example (state and local) and private sector voluntary programs in the near term. Such activities and the energy savings they deliver and can potentially deliver are unevenly quantified and tracked. Acknowledgement and tracking of such energy savings (and their environmental benefits) would improve recognition of energy efficiency programs' and policies' contributions to energy and environmental policy objectives, and can enhance state energy, air quality, and other planning.

Georgia will continue to engage with the NEER team and will explore other opportunities as they arise. In addition, Georgia will share information about NEER with stakeholders in Georgia to continue the dialogue.

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[12] U.S. EPA, Emissions & Generation Resource Integrated Database (eGRID) https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid and AVoided Emissions and generation Tool (AVERT) https://www.epa.gov/statelocalenergy/avoided-emissions-and-generation-tool-avert

[13] U.S. EPA, AP-42: Compilation of Air Emission Factors, https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emission-factors

NATIONAL ENERGY EFFICIENCY REGISTRY (NEER): MICHIGAN ROADMAP

Abstract

The NEER is a web-based platform that will help states document energy efficiency achievements to help meet their energy and environmental goals. Serving as a means to register and track energy savings and, as desired, enabling trading of instruments representing energy savings (and related environmental attributes), the NEER can support both voluntary energy efficiency initiatives and compliance with mandatory energy savings goals. This Roadmap provides an overview of major opportunities for applying NEER across states generally and for NEER Project Team states based on each state's circumstances. The Roadmap is meant to illuminate paths that states can consider for adopting NEER as a tool to support state energy objectives.

This document is the Michigan state-specific section of the NEER Roadmap.

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NEER Roadmap

This document constitutes the Michigan state-specific portion of the National Energy Efficiency Registry (NEER) Roadmap.

Michigan NEER Roadmap

The State of Michigan has a history of pursuing energy waste reduction through multiple means, including electricity and natural gas utility programs, building energy codes, state and public-sector facility programs, loans and other financial support for energy efficiency (and renewable energy), and voluntary programs serving the private and public sectors. The state is also subject to air quality requirements under the federal Clean Air Act, including National Ambient Air Quality Standards (NAAQS) and the Cross-State Air Pollution Rule (CSAPR), where energy waste reduction can play a role in helping achieve compliance. Further, in February 2016, Governor Rick Snyder joined a bipartisan group of 17 state governors in signing the Governors' Accord for a New Energy Future to promote clean energy, clean transportation choices, and modernization of the electric grid.

NEER has the potential to help Michigan address state energy and environmental objectives by supporting enhanced quantification, qualification, and tracking of energy savings achieved through energy waste reduction activities. While utility-associated programs are central to Michigan's energy waste reduction approach, it is important to recognize that large portions of energy waste reduction and efficiency investments and implementation occur outside of utility ratepayer-funded programs. Often discussions and analyses of energy waste reduction and energy efficiency focus largely or solely on such utility programs while underappreciating contributions and opportunities afforded by non-utility actors.

This Roadmap document illustrates several pathways for NEER's application in Michigan, both within and outside the context of its utility-led programs.

Utility-related programs

The Michigan Legislature passed Public Acts 341 and 342 in 2016. Amending and building on Public Act 295 of 2008, Energy Optimization Standards, Public Act 342 establishes strong targets for Michigan energy utilities, including a goal of meeting at least 35% of the state's electricity demand in 2025 through a combination renewable energy and energy waste reduction.[1] The Public Act also provides electric and natural gas savings targets of 1% per year and 0.75% per year, respectively, for investor-owned, cooperative, and municipal energy utilities.

The law requires electric utility "providers" to establish Michigan Public Service Commission (MPSC)-approved renewable energy and energy waste reduction plans to meet respective renewable energy and energy waste reduction targets. Providers may make limited substitutions between renewable energy credits and energy waste reduction credits, each worth, respectively, 1 megawatt-hour (MWh) of eligible generation and 1 MWh annual incremental electricity savings. However, Public Act 342 does not allow transfer of energy waste reduction credits between entities, thus forestalling the opportunity for NEER to act as trading platform for energy waste reduction credits within the Public Act's context.[2]

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[1] Sec. 1.(3)(b) indicates that the energy waste reduction portion includes annual energy savings since October 6, 2008 recognized by the Michigan Public Service Commission pursuant to Commission-approved energy optimization or energy waste reduction plans.

[2] Sec. 85.

Analysis of the Public Act suggests at least two places where NEER could function in direct support of the Act:

- Providing an energy waste reduction credit certification and tracking program.[3]
- Supporting qualification and quantification of customer self-directed energy waste reduction activities.[4]

Unless chosen as the energy waste reduction credit certification and tracking mechanism, current Public Act 342 language constrains potential NEER applications in support of utility-based energy waste reduction programs. One could envisage additional applications if the Act were amended, such as to provide for energy waste reduction credit trading or allowing utilities to purchase energy waste reduction offered by third parties, such as from energy service companies (ESCOs), industrial energy efficiency and combined heat and power (CHP) projects, low-income weatherization programs, and other private- and public-sector energy efficiency and energy waste reduction activities. NEER could serve to qualify, certify, and track energy savings provided by third parties to quality assurance/quality control (QA/QC) standards required by the MPSC or other pertinent bodies.

Again, while utility ratepayer-funded energy efficiency is very important and central to Michigan's energy waste reduction and broader energy strategies, large amounts of energy waste reduction are provided by non-utility actors and even larger amounts are possible beyond the realm of utility programs.

Energy waste reduction credit certification and tracking

Section 87.(1) of Public Act 342 states that the MPSC "shall establish an energy waste reduction certification and tracking program. The certification and tracking program may be contracted to and performed by a third party through a system of competitive bidding." The section states that the certification and tracking program "shall include all of the following:

> "(a) A determination of the date after which energy waste reduction must be achieved to be eligible for an energy waste reduction credit.
> "(b) A method for ensuring that each energy waste reduction credit substituted for a renewable energy credit under section 28 or carried forward under section 83 is properly accounted for.
> "(c) If the system is established by the commission, allowance for issuance and use of energy waste reduction credits in electronic form."

NEER is well-suited to provide the certification and tracking function.

- Public Act 342's energy waste reduction metric of a credit equaling 1 MWh of annual incremental electricity savings matches NEER's avoided electric energy metric.
- Public Act 342 requires that utility providers file energy waste reduction plans to be approved by the MPSC. This corresponds with the NEER Asset Registration function where Michigan-specific eligibility and QA/QC requirement could be applied.

[3] Sec. 87(1).
[4] Sec. 93.

- MWhs of electric energy waste reduction corresponds to the NEER Asset Output Log, with use of MPSC-approved QA/QC requirements (such as timing of energy savings, eligibility of measures or projects, and measurement and verification [M&V]).
- NEER could issue energy waste reduction credits in electronic form; track and assure propriety of exchanges between energy waste reduction and renewable energy credits and any carry-forward of credits; and account for issuance, ownership, and retirement of credits.

Under this pathway, NEER could bid to serve as Michigan's energy waste reduction credit and certification and tracking program. If selected, NEER would apply Specific Compliance/Certification (SCCP) criteria and other requirements as consistent with Public Act 342 and approved by the MPSC.

Qualifying and quantifying self-directed energy waste reduction activities

Section 93 of Public Act 342 allows certain large industrial and commercial utility customers to be exempted from utility bill charges that fund utility energy waste reduction programs. Those customers must file with their electricity providers and implement self-directed energy waste reduction plans. Those customer self-direct plans become part of the electric provider's energy waste reduction plan, but are exempted from public disclosure. Self-direct customers are required to report to their providers annually the energy efficiency measures taken and energy waste reduction achieved.

The section also states that the self-direct customer shall provide an annual report documenting the energy efficiency measures taken under the self-directed plan in the previous years and energy savings achieved. It states that the report shall provide sufficient information for the utility and MPSC to monitor progress and provide a reliable estimate of savings achieved. Further, the report is to be accompanied by an affidavit attesting to the report's truth and accuracy.

NEER could serve as a mechanism to validate self-directed program energy savings. Statutory wording does not appear to require a NEER-type mechanism but NEER could strengthen credibility of savings claims and may also be used by self-direct customers for additional purposes, such as to validate energy savings measures undertaken for corporate objectives and under voluntary federal, state, and local programs or to quantify energy waste reduction achieved with non-utility-based incentive programs.

For this application, NEER would apply SCCP and eligibility criteria in accord with utility and/or MPSC requirements.

Potential future utility energy waste reduction applications

As noted, Public Act 342 strictures constrain opportunities for NEER application if it is not selected as the energy waste reduction credit certification and tracking facility. It is possible that in the future, policy can evolve to broaden the scope of eligible energy waste reduction projects and implementers while allowing exchange of energy waste reduction credits. If this were to occur, NEER could provide a mechanism for third parties to provide energy waste reduction credits to regulated utilities as well as to serve as a platform for exchange.

Tracking building and facility energy efficiency and energy waste reduction

NEER can be a suitable tool for tracking energy efficiency project and program savings occurring outside of utility-based programs.[5] Across the United States, large numbers of building and facilities are being built to "above code" standards of energy efficiency while many existing buildings undergo retrocommissioning, upgrades, and renovations to achieve greater energy efficiency.

These new and existing building and facility energy efficiency/energy waste reduction improvements may be undertaken under a variety of policies and programs, among them:

- State or local lead-by-example standards or targets applicable to certain public sector or publicly-supported (e.g., state-bonded) buildings and facilities.
- State or local requirements applicable to certain non-public-sector buildings and facilities (e.g., benchmarking and disclosure, retrocommissioning).
- Publicly financed (e.g., low-income weatherization and Low-Income Housing Tax Credit (LIHTC)-financed) and state or locally incentivized programs (e.g., property assessed clean energy [PACE] financing).
- Voluntary programs (e.g., Michigan Battle of the Buildings, Better Buildings and Better Plants Challenges, Detroit and Grand Rapids 2030 Districts, ENERGYSTAR, LEED (Leadership in Energy and Environmental Design), corporate programs).

The exact pathway for applying NEER to these different program types can vary but the basic approach is similar. The program's administrator can designate NEER as the platform for registering, recording, and tracking energy savings/energy waste reduction. It would define QA/QC requirements for the programs. These can include NEER "basic" (a self-certification without independent verification of savings), NEER "enhanced" (more rigorous measurement and verification [M&V] with independent verification), or customized ("SCCP") criteria for the program.

Many state and local policies (benchmarking and disclosure, new state building standards) and voluntary programs (e.g., Michigan Battle of the Buildings) use "energy use intensity" (EUI), measured as British thermal units (Btu) per square foot, as their main metric. EUI is typically derived by entering energy use data into ENERGY STAR Portfolio Manager, in which the resulting EUI is also weather normalized. Changes in EUI (which may also be adjusted for changed occupancy and usage) are used to determine progress (or lack of progress) toward meeting energy performance targets.

For programs that use Portfolio Manager and the EUI metric, energy billing data entered into Portfolio Manager can be used first to provide energy use as kilowatt-hours (kWh) of electricity and Btu or therms of natural gas (and other fuels) used. Energy savings/energy waste reduction can be derived by comparing that usage with a pre-upgrade baseline in existing buildings or a modeled baseline (building energy code or common practice) for new construction (with appropriate weather or other adjustments). Numerous standard M&V approaches are available to validate energy savings/energy waste reduction.

[5] Building energy efficiency programs and standards and ESPCs can also include water conservation and savings as objectives as well as other resource and environmental aspects. NEER is initially focused on energy savings but could also be configured to include onsite renewable energy, water conservation, and perhaps other performance aspects.

NEER can support programs and objectives that use EUI as a metric. However, while EUI is an important metric of building energy efficiency, physical units of electricity and fuel savings provides other useful data that can support state and local energy planning, energy resilience and assurance objectives, and air quality goals. For example, distinguishing electricity from natural gas savings is important for understanding energy savings effects on emissions, electric grid planning, and natural gas infrastructure adequacy. NEER could be used to enhance the quantification and credibility of savings and energy waste reduction to support these other objectives.

Other energy waste reduction programs do not rely on EUI metrics. In some cases, EUI is inappropriate, such as for exterior lighting upgrades, wastewater treatment facilities, and industrial processes. Also, energy savings performance contracts (ESPCs), sometimes called guaranteed energy savings contracts, are typically subject to M&V reporting requirements in which the ESCO must show energy savings achieved and whether those savings meet contractually guaranteed levels.

In any of these types of programs, NEER can serve as a platform for recording and tracking energy savings and energy waste reductions. The following use cases illustrate some general approaches for applying NEER but can be adapted to wider sets of program designs and circumstances.

State or local lead-by-example program: new construction

In this example, a state or locality could have an "above code" energy standard for public-sector buildings, requiring design and construction to meet higher levels of energy performance than would be realized from meeting the building energy code or common building design practice. Energy use of new buildings built to "above code" policy would be compared with energy use that would be modeled to have occurred if the building had been built to meet existing building energy code or common practice.

Measuring and tracking energy use and savings as compared to standard design, construction, and operation would indicate if the "above code" policy is succeeding. It could help improve the program's efficacy, point to operations and maintenance (O&M) energy waste reduction opportunities, provide data on cost as well as physical energy unit savings useful for both fiscal and energy planning purposes, and support analyses of air quality and other environmental impacts.

In this case, the state or local jurisdiction would create an account in NEER and establish a level of QA/QC (including M&V requirements) that meets its needs, ranging from self-reporting under NEER "basic" to a more rigorous validation of energy waste reduction under NEER "enhanced" that may be useful for regulatory purposes, such as for possible air quality compliance. The jurisdiction could also establish customized QA/QC criteria—NEER's "SCCP" option.

Applicable building or facility operators and agencies would compare actual energy use with modeled energy use (and apply any required normalization for weather and usage) to derive energy savings/waste reduction. These savings would be submitted to NEER, which would validate that they were documented in accord with QA/QC requirements. Such savings would be recorded in an asset output log. The data could be easily retrieved by the jurisdiction for analysis, public reporting, and other purposes. Registered energy savings data can also be translated into avoided emissions of criteria air pollutants and/or carbon dioxide by air quality regulators, the State Energy Office, local jurisdiction, or others using a variety of tools and emission factors for purposes of air quality management and any greenhouse gas objectives that may exist.

State or local lead-by-example: existing facility upgrades

In this example, a state or locality may have a policy to encourage or require energy waste reduction upgrades. The jurisdiction may directly procure upgrades from contractors or may use the ESPC mechanism through an ESCO.

As above, the jurisdiction would establish a NEER account and appropriate QA/QC criteria. In using NEER as a registration and tracking platform, the jurisdiction should clarify by contract who can claim the rights to energy savings, the contractor/ESCO or the jurisdiction or agency that owns the project.[6] Similarly, if portions of projects are incentivized by utilities, the parties should clarify utility claims to energy savings.[7]

Energy savings would be determined in accordance with the jurisdiction's QA/QC requirements, again ranging from a self-certification under NEER "basic" to having independent verification under NEER "enhanced" with tailoring possible to meet the jurisdiction's requirements. Numerous standard M&V approaches comporting with the International Performance Measurement and Verification Protocol (IPMVP) are available based on bill analysis, sampled measurement and monitoring, modeling, and other approaches.[8] While NEER does not determine M&V requirements for particular programs, it would affirm that QA/QC requirements, such as for M&V, are met for registered energy savings/energy waste reduction. For upgrades undertaken through an ESPC, the ESCO typically performs M&V to document that it has met their savings guarantees.

Also, as above, a jurisdiction using NEER can readily access data from NEER's asset output log to track energy savings/energy waste reduction for analysis, public release, and other purposes. Such data can be fed into broader state energy planning and policy and avoided emissions estimated for air quality management and sustainability policy purposes.

Voluntary building or facility upgrades

A growing number of companies have adopted energy and sustainability goals as part of their corporate objectives. Companies can implement energy waste reduction, renewable energy, and other measures at their own facilities. They can also encourage or even require energy and environmental management system standards in their supply chain. Examples include the ISO (International Organization for Standardization) 14001 Environmental Management System and 50001 Energy Management System standards. NEER can support these and it can also open the opportunity for the buying and selling of energy efficiency/energy waste reduction instruments in a voluntary market.

Companies performing energy efficiency/energy waste reductions in their own facilities could opt to use NEER privately to register and track energy savings. The process would be broadly similar to the state and local lead-by-example scenarios, but with companies creating NEER accounts, establishing QA/QC

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[6] In some states and policy scenarios, energy savings credits may be traded like renewable energy certificates are traded to meet regulatory requirements, claim financial incentives, or earn revenues in voluntary markets.

[7] For example, a utility may claim some or all energy waste reduction for measures it incentivized under its Public Act 342 energy waste reduction plan.

[8] IPMVP available via the Efficiency Valuation Organization https://evo-world.org/en/. The IPMVP structure is used in M&V protocols developed for the Federal Energy Management Program (FEMP), PJM Interconnection, ISO-New England, and others. The U.S. Department of Energy's Uniform Methods Project and various state and utility technical reference manuals build off the IPMVP.

requirements, and then registering applicable energy savings with NEER. NEER could offer an additional measure of credibility to corporate energy savings claims. Such companies could also use the NEER platform as they participate in voluntary initiatives and challenges such as the Detroit and Grand Rapids 2030 Districts, Michigan Battle of the Buildings, Better Buildings, ENERGYSTAR and green building certifications like LEED (Leadership in Energy and Environmental Design) and Green Globes.

A company seeking to encourage or require energy waste reduction in its supply chain could specify use of NEER to register energy savings from supplier firms.[9] In that case, the company would establish QA/QC requirements with NEER and ask suppliers to establish NEER accounts and submit their energy savings/waste reduction for registration and reporting.

The broadest scenario would be for a wide private energy efficiency market using NEER as a platform. A company may wish to support energy efficiency efforts outside of its corporate boundaries either as a direct part of its sustainability and social responsibility policies or possibly to offset energy waste reduction or renewable energy performance shortfalls in its own facilities. Such a company may wish to purchase energy savings certificates from, for example, low-income weatherization programs or energy waste reduction projects in economically disadvantaged communities, to serve social responsibility goals while also supporting sustainability objectives. In such cases, companies, nongovernmental organizations, agencies, and localities wishing to buy and sell energy savings credits would each have NEER accounts to allow the processing of the transaction and exchange of instruments.

Emissions and air quality applications

By reducing the need for electricity generation and onsite fuel consumption, energy waste reduction mitigates adverse environmental impacts, including emissions of air pollutants and their health effects.[10] Air quality regulators can consider energy efficiency at different levels for varied purposes under different regulatory programs, ranging from broad planning and projection purposes to formalized crediting of energy efficiency for enforceable regulatory purposes. Further, avoided carbon dioxide (CO_2) and other greenhouse gases can contribute to state, local, and private climate and resilience policy targets and goals.

The EPA has outlined pathways for incorporating energy efficiency and renewable energy into National Ambient Air Quality Standards (NAAQS) State Implementation Plans (SIPs) in an "EE/RE Roadmap Manual" that builds on existing formal guidance.[11] There are precedents for including energy efficiency formally in NAAQS SIPs.[12] An analogous SIP process under the Regional Haze Program may also be

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[9] Precedents include companies using supply chain relationships to encourage or require suppliers to adopt the ISO 9001 Quality Management System standard and ISO 14001 Environmental Management System standard. There may be similar initiative concerning the emerging ISO 50001 Energy Management System standard.

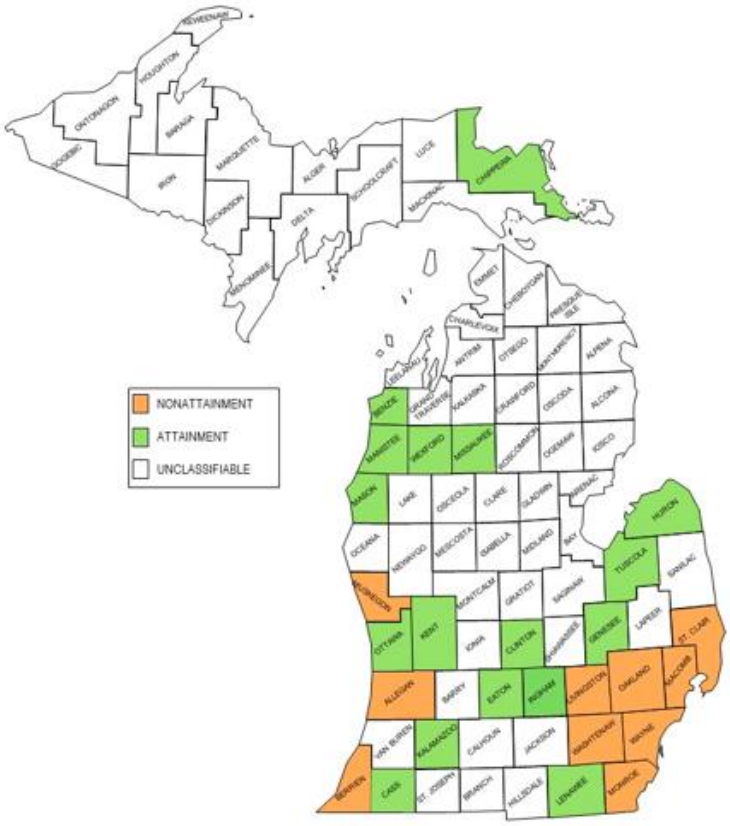
[10] NASEO Energy Efficiency Pathway Templates offer a discussion of energy efficiency as an emissions reduction tool, including for Clean Air Act planning and compliance purposes, and serve as a template states can use to facilitate discussions with air quality managers. The templates and related resources are available at http://naseo.org/ee-pathways.

[11] U.S. EPA, 2012, "Roadmap for Incorporating Energy Efficiency/Renewable Energy Policies and Programs into State and Tribal Implementation Plans," https://www.epa.gov/energy-efficiency-and-renewable-energy-sips-and-tips

[12] For example, the Texas Commission on Environmental Quality included NOx reductions from building energy codes as well as local government and utility energy efficiency programs in a 2005 Dallas-Ft. Worth area SIP revision. See https://www.tceq.texas.gov/airquality/stationary-rules/nox/eere.html

amenable to including energy efficiency/energy waste reduction. Figures MI-1. and MI-2. indicate counties measuring ozone at levels above the 2015 ozone NAAQS and “Class I Areas” under the Regional Haze Program, respectively. Also, the Regional Haze Program requires states to coordinate regionally to abate visibility impairment to other states’ Class I Areas.

Figure MI-1. Projected attainment status for Michigan counties under the 2015 ozone NAAQS



Source: Michigan Department of Environmental Quality

Figure MI-2. Mandatory Class I Areas (under the Regional Haze Program)

Source: U.S. EPA

Michigan is also subject to the Cross-State Air Pollution Rule (CSAPR) for fine particles (sulfur dioxide [SO_2], and annual nitrogen oxides [NOx]) and CSAPR Update for ozone (ozone season NOx). Some states have "set aside" modest numbers of NOx allowances for allocation to EE/RE projects under previous NOx budget trading programs.[13] Under a NOx allowance set-aside program, a state could issue allowances for qualifying energy efficiency/energy waste reduction (and renewable energy) projects. Such allowances could be sold to earn a bit of revenue supporting energy efficiency/waste reduction (or renewable energy) or could be retired to reduce allowable tonnage of emissions and show progress toward NAAQS compliance.

Energy waste reduction assessed and quantified by NEER can be translated into avoided criteria pollutant emissions from the power sector by using such tools as EPA's eGRID and AVERT,[14] PJM emission factors, or using dispatch or other models tailored to a particular state or utility service territory. Emissions impacts of reduced onsite natural gas or other fuel use can be derived using published emission factors (e.g., EPA AP-42),[15] equipment specifications, or other means.

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[13] U.S. EPA, 2006, "State Clean Energy-Environment Technical Forum Roundtable on State NOx Allowance EE/RE Set-Aside Programs, June 6, 2006, Call Summary." https://www.epa.gov/sites/production/files/2016-03/documents/summary_paper_nox_allowance_6-6-2006.pdf.

[14] U.S. EPA, Emissions & Generation Resource Integrated Database (eGRID) https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid and AVoided Emissions and generation Tool (AVERT) https://www.epa.gov/statelocalenergy/avoided-emissions-and-generation-tool-avert

[15] U.S. EPA, AP-42: Compilation of Air Emission Factors, https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emission-factors

Air quality agencies can use NEER-registered energy savings/energy waste reduction and their concomitant avoided emissions for projection and planning purposes. They can use such energy savings to support and validate inclusion of energy efficiency in SIPs. A state opting to offer "EE/RE set-aside" allowances for NOx or other tradable emissions could use NEER-registered savings as a basis for set-aside allowance distribution.

In the case of set-aside allowance applications, energy efficiency/energy waste reduction project owners or other savings claimants (such as an ESCO or other energy service provide) would create NEER accounts. They would show project eligibility, document energy savings in accord with M&V and QA/QC standards that the air quality agency may require, and attest to have rights to project energy savings. The state could require NEER vetting of savings as a basis for awarding set-aside emission allowances.

Finally, NEER can support state and local greenhouse gas objectives where they exist. NEER-registered savings from utility-supported programs, lead-by-example state and local programs, private voluntary NEER-registered savings, efficiency finance mechanisms, and other sources (e.g., low-income weatherization, building energy codes) could be tallied by air quality agencies or other authorities to track CO_2 (and potentially other greenhouse gas) emission impacts if that is desired.

Conclusion

The State of Michigan partnered in the NEER project to help develop and explore opportunities for applying NEER in support of state energy and environmental policy objectives. Public Act 342, passed in late 2016, requires energy utilities to achieve certain levels of energy waste reduction, document those reductions, and obtain energy waste reduction credits (a portion of which can be exchanged for renewable energy credits). It requires the state to meet at least 35% of its 2025 electricity demand through a combination of renewable energy and energy waste reduction. The law calls for creation of "an energy waste reduction certification and tracking program" that "may be contracted to and performed by a third party through a system of competitive bidding." NEER would be well suited to perform this function.

Short of selection as the energy waste reduction certification and tracking program, NEER could support validation of self-directed energy waste reduction programs occurring under Public Act 342. The Act requires documentation of projects and energy savings by self-direct customers. NEER could be a mechanism to support these provisions. NEER could play a role under future scenarios of ratepayer-funded energy waste reduction policy not currently available under Public Act 342, such as being a platform for energy waste reduction credit trading and facilitating the inclusion of third party energy waste reduction projects to help utilities comply with their obligations.

While utility ratepayer-funded energy waste reduction under Public Act 342 is critical to Michigan's energy policy, there remain large amounts of energy waste reduction occurring through projects and activities beyond the purview of utilities and Public Utility Commissions. As in many states, such activities and the energy waste reduction they deliver and can potentially deliver are unevenly quantified and tracked. Acknowledgement and tracking of such energy savings (and their environmental benefits) would improve recognition of energy waste reduction programs' and policies' contributions to energy and environmental policy objectives, and can enhance state energy, air quality, and other planning.

This Roadmap outlines broad approaches for using NEER to enhance tracking of state and local lead-by-example energy efficiency programs and building standards, publicly funded or incentivized programs, voluntary energy efficiency initiatives, and corporate energy and sustainability objectives.

Further, NEER-registered energy savings can be translated into avoided criteria air pollutant and greenhouse gas emissions which can support air quality planning, management, and compliance needs; emission allowance trading programs; and state and local climate and resilience targets.

NEER offers Michigan a tool to support multiple energy objectives.

NATIONAL ENERGY EFFICIENCY REGISTRY (NEER): MINNESOTA ROADMAP

Abstract

The NEER is a web-based platform that will help states document energy efficiency achievements to help meet their energy and environmental goals. Serving as a means to register and track energy savings and, as desired, enabling trading of instruments representing energy savings (and related environmental attributes), the NEER can support both voluntary energy efficiency initiatives and compliance with mandatory energy savings goals. This Roadmap provides an overview of major opportunities for applying NEER across states generally and for NEER Project Team states based on each state's circumstances. The Roadmap is meant to illuminate paths that states can consider for adopting NEER as a tool to support state energy objectives.

This document is the Minnesota state-specific section of the NEER Roadmap.

October 2017

Disclaimer

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NEER Project Team and Acknowledgments

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NEER Roadmap

This document constitutes the Minnesota state-specific portion of the National Energy Efficiency Registry (NEER) Roadmap.

Minnesota NEER Roadmap

The State of Minnesota pursues energy efficiency through multiple policies and programs. These include electricity and natural gas utility programs (through the Conservation Improvement Program, or CIP), building energy codes, state-bonded building standards, other state and public-sector programs, loans and other financial support for energy efficiency (and renewable energy), and voluntary programs serving the private and public sectors. The state is also subject to air quality requirements under the federal Clean Air Act, including National Ambient Air Quality Standards (NAAQS) and the Cross-State Air Pollution Rule (CSAPR), where energy efficiency can play a role in helping achieve compliance. Further, the state established greenhouse gas emission reduction targets under the Next Generation Energy Act. In February 2016, Governor Mark Dayton joined a bipartisan group of 17 state governors in signing the Governors' Accord for a New Energy Future to promote clean energy, clean transportation choices, and modernization of the electric grid.

NEER has potential to help Minnesota to address state energy and environmental objectives by supporting enhanced quantification, qualification, and tracking of energy savings achieved through energy efficiency activities. While the CIP and its utility-associated programs are central to Minnesota's energy efficiency approach, it is important to recognize that large portions of energy efficiency investments and implementation occur outside of utility ratepayer-funded programs. Often discussions and analyses of energy efficiency focus largely or solely on such utility programs while underappreciating contributions and opportunities afforded by non-utility actors.

This Roadmap document illustrates several pathways for NEER's application in Minnesota, both within and outside the context of its utility-led programs.

Utility-related programs

The CIP, established under the Next Generation Energy Act of 2007, is Minnesota's utility customer-funded program for supporting energy efficiency. While CIP-related funding supports some energy efficiency programs outside of utility supervision, such as the state's Sustainable Buildings 2030 energy standard (discussed below) and the Conservation Applied Research and Development program, most CIP funding supports utility-delivered energy efficiency programs. Investor-owned, cooperative, and municipal/public electric and gas utilities are required to achieve 1.5% incremental energy savings every year.[1] The Minnesota Department of Commerce oversees the CIP and an Energy Savings Platform into which utilities report annual performance and plans. The tool contains online calculators based on the state's Technical Reference Manual (TRM) for quantifying energy efficiency measure savings.

Minnesota's utility-related energy efficiency policy has a provision allowing certain large industrial utility customers (with no less than 20 MW average electric demand or no less than 500,000 MCF natural gas consumption annually) to opt out of the CIP and its associated fees. Such customers must show that they are under competitive pressures to allow exemption from fees supporting the CIP and that they are

[1] The law allows targets to be adjusted downward to a minimum of 1% savings under certain circumstances. As an owner of a nuclear power plant, Xcel Energy is required to achieve savings of 2.0% of average retail sales annually.

making "reasonable" efforts to identify and implement energy efficiency. Such opt-out customers are required to report to the Department of Commerce every five years, for up to ten years, to maintain their exempt status. The first 5-year reports were recently submitted and processed, meaning only one more report will be required of existing opt-out customers under current law.

The existing Energy Savings Platform for recording, tracking, and reporting utility-program energy savings, plus the modest reporting requirements for industrial opt-out customers, suggests very limited opportunity for NEER application under the current utility (including large industrial opt-out program) energy efficiency system in Minnesota.

However, it is possible that future policy and CIP program evolution could provide NEER opportunities. These possibilities include:

- Adoption or incorporation of NEER as part of or as an enhancement of the Energy Savings Platform, including for allowing exchange of credits,
- Strengthened validation and reporting requirements for industrial opt-out or, as they are called in some other states, self-direct customers, and
- Broadened scope of eligible energy efficiency projects and implementers to allow trade of energy savings credits, including having NEER as a platform for third parties to provide energy credits to regulated utilities.

Under these somewhat speculative scenarios, the state could select NEER as a part of its Energy Savings Platform and it could consider allowing trading of energy savings allowances among utilities. It could also designate NEER as the platform for registering and reporting energy savings/energy efficiency credits from opt-out/self-direct customers. It could also designate NEER for registration and exchange of third party-delivered energy savings to regulated utilities or opt-out/self-direct customers to help them meet CIP energy savings obligations.

For these possibilities, the state would establish CIP QA/QC requirements (including measure or project eligibility and evaluation, measurement, and verification [EM&V]) that registered energy savings would have to meet. Regulated utilities subject to CIP, opt-out/self-direct customers subject to energy savings obligations, and allowable third-party providers of eligible energy efficiency would establish NEER accounts. The Department of Commerce would oversee NEER's performance as the CIP platform and would query it for reporting and analysis as needed.

Again, while utility ratepayer-funded energy efficiency is very important and central to Minnesota's energy efficiency and broader energy strategies, large amounts of energy savings are provided outside of the utility-supervised program scope and still larger amounts remain achievable.

Tracking building and facility energy efficiency performance

NEER can be a suitable tool for tracking energy efficiency project and program savings occurring outside of utility-based programs.[2] Across the United States, large numbers of building and facilities are being

[2] Building energy efficiency programs and standards and ESPCs can also include water conservation and savings as objectives as well as other resource and environmental aspects. NEER is initially focused on energy savings but could also be configured to include onsite renewable energy, water conservation, and perhaps other performance aspects.

built to “above code” standards of energy efficiency while many existing buildings undergo retrocommissioning, upgrades, and renovations to achieve greater energy efficiency.

These new and existing building and facility energy efficiency improvements may be undertaken under a variety of policies and programs, among them:

- State or local lead-by-example standards or targets applicable to certain public sector or publicly-supported buildings and facilities (e.g., state-bonded facilities under Minnesota’s Sustainable Buildings 2030 standard and B3 Benchmarking requirements).
- State or local requirements applicable to certain non-public-sector buildings (e.g., benchmarking and disclosure, retrocommissioning).
- Publicly financed (e.g., low-income weatherization and Low-Income Housing Tax Credit (LIHTC)-financed) and state or locally incentivized programs (e.g., property assessed clean energy [PACE] financing).
- Voluntary programs (e.g., Better Buildings and Better Plants Challenges, ENERGYSTAR, LEED (Leadership in Energy and Environmental Design), corporate programs).

The exact pathway for applying NEER to these different program types can vary but the basic approach is similar. The program’s administrator can designate NEER as the platform for registering, recording, and tracking energy savings. It would define QA/QC requirements for the programs. These can include NEER “basic” (a self-certification without independent verification of savings), NEER “enhanced” (more rigorous measurement and verification [M&V] with independent verification), or customized (“SCCP”) criteria for the program.

Many state and local policies, such as Minnesota’s Sustainable Buildings 2030 energy standard, B3 Benchmarking, local benchmarking and disclosure programs, and voluntary programs use “energy use intensity” (EUI), measured as British thermal units (Btu) per square foot, as their main metric. EUI is typically derived by entering energy use data into ENERGY STAR Portfolio Manager, in which the resulting EUI is also weather normalized. Changes in EUI (which may also be adjusted for changed occupancy and usage) are used to determine progress (or lack of progress) toward meeting energy performance targets.

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Other energy efficiency programs do not rely on EUI metrics. In some cases, EUI is inappropriate, such as for exterior lighting upgrades, wastewater treatment facilities, and industrial processes. Also, energy savings performance contracts (ESPCs)—such as those undertaken under Minnesota's Guaranteed Energy Savings Program—are typically subject to M&V reporting requirements in which the ESCO must show energy savings achieved and whether those savings meet contractually guaranteed levels.

In any of these types of programs, NEER can serve as a platform for recording and tracking energy saving. The following use cases illustrate some general approaches for applying NEER but can be adapted to wider sets of program designs and circumstances.

State or local lead-by-example program: new construction

In this example, a state or locality could have an "above code" energy standard for public-sector buildings, requiring design and construction to meet higher levels of energy performance than would be realized from meeting the building energy code or common building design practice (e.g., Sustainable Buildings 2030 standard). Energy use of new buildings built under the "above code" policy would be compared with energy use that would be modeled to have occurred if the building had been built to meet existing building energy code or common practice.

Measuring and tracking energy use and savings as compared to standard design, construction, and operation would indicate if the "above code" policy is succeeding. It could help improve the program's efficacy, point to operations and maintenance (O&M) energy efficiency opportunities, provide data on cost as well as physical energy unit savings useful for both fiscal and energy planning purposes, and support analyses of air quality and other environmental impacts.

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As above, the jurisdiction would establish a NEER account and appropriate QA/QC criteria. In using NEER as a registration and tracking platform, the jurisdiction should clarify by contract who can claim the

rights to energy savings, the contractor/ESCO or the jurisdiction or agency that owns the project.[3] Similarly, if portions of projects are incentivized by utilities, the parties should clarify utility claims to energy savings.[4]

Energy savings would be determined in accordance with the jurisdiction's QA/QC requirements, again ranging from a self-certification under NEER "basic" to having independent verification under NEER "enhanced" with tailoring possible to meet the jurisdiction's requirements. Numerous standard M&V approaches comporting with the International Performance Measurement and Verification Protocol (IPMVP) are available based on bill analysis, sampled measurement and monitoring, modeling, and other approaches.[5] While NEER does not determine M&V requirements for particular programs, it would affirm that QA/QC requirements, such as for M&V, are met for registered energy savings. For upgrades undertaken through an ESPC, the ESCO typically performs M&V to document that it has met their savings guarantees.

Also, as above, a jurisdiction using NEER can readily access data from NEER's asset output log to track energy savings for analysis, public release, and other purposes. Such data can be fed into broader state energy planning and policy and avoided emissions estimated for air quality management and sustainability policy purposes.

Voluntary building or facility upgrades

A growing number of companies have adopted energy and sustainability goals as part of their corporate objectives. Companies can implement energy efficiency, renewable energy, and other measures at their own facilities. They can also encourage or even require energy and environmental management system standards in their supply chain. Examples include the ISO (International Organization for Standardization) 14001 Environmental Management System and 50001 Energy Management System standards. NEER can support these and it can also open the opportunity for the buying and selling of energy savings instruments in a voluntary market.

Companies performing energy efficiency in their own facilities could opt to use NEER privately to register and track energy savings. The process would be broadly similar to the state and local lead-by-example scenarios, but with companies creating NEER accounts, establishing QA/QC requirements, and then registering applicable energy savings with NEER. NEER could offer an additional measure of credibility to corporate energy savings claims. Such companies could also use the NEER platform as they participate in voluntary initiatives and challenges such as 2030 Districts, Better Buildings, ENERGYSTAR and green building certifications like LEED (Leadership in Energy and Environmental Design) and Green Globes

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[3] In some states and policy scenarios, energy savings credits may be traded like renewable energy certificates are traded to meet regulatory requirements, claim financial incentives, or earn revenues in voluntary markets.

[4] For example, a utility may claim some or all energy savings for measures it incentivized.

[5] IPMVP available via the Efficiency Valuation Organization https://evo-world.org/en/. The IPMVP structure is used in M&V protocols developed for the Federal Energy Management Program (FEMP), PJM Interconnection, ISO-New England, and others. The U.S. Department of Energy's Uniform Methods Project and various state and utility technical reference manuals build off the IPMVP.

A company seeking to encourage or require energy efficiency improvements in its supply chain could specify use of NEER to register energy savings from supplier firms.[6] In that case, the company would establish QA/QC requirements with NEER and ask suppliers to establish NEER accounts and submit their energy savings for registration and reporting.

The broadest scenario would be for a wide private energy efficiency market using NEER as a platform. A company may wish to support energy efficiency efforts outside of its corporate boundaries either as a direct part of its sustainability and social responsibility policies or possibly to offset energy savings or renewable energy performance shortfalls in its own facilities. Such a company may wish to purchase energy savings certificates from, for example, low-income weatherization programs or energy efficiency projects in economically disadvantaged communities, to serve social responsibility goals while also supporting sustainability objectives. In such cases, companies, nongovernmental organizations, agencies, and localities wishing to buy and sell energy savings credits would each have NEER accounts to allow the processing of the transaction and exchange of instruments.

Emissions and air quality applications

By reducing the need for electricity generation and onsite fuel consumption, energy efficiency mitigates adverse environmental impacts, including emissions of air pollutants and their health effects.[7] Air quality regulators can consider energy efficiency at different levels for varied purposes under different regulatory programs, ranging from broad planning and projection purposes to formalized crediting of energy efficiency for enforceable regulatory purposes. Further, avoided carbon dioxide (CO_2) and other greenhouse gases can contribute to state, local, and private climate and resilience policy targets and goals.

The EPA has outlined pathways for incorporating energy efficiency and renewable energy into National Ambient Air Quality Standards (NAAQS) State Implementation Plans (SIPs) in an "EE/RE Roadmap Manual" that builds on existing formal guidance.[8] There are precedents for including energy efficiency formally in NAAQS SIPs.[9] An analogous SIP process under the Regional Haze Program may also be amenable to including energy efficiency. Figure MN-1. indicates counties measuring ozone at levels above the 2015 ozone NAAQS. However, more recent data may affect EPA's determination of attainment status of counties. Figure MN-2. shows "Class I Areas" under the Regional Haze Program. Also, the Regional Haze Program requires states to coordinate regionally to abate visibility impairment to other states' Class I Areas.

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[6] Precedents include companies using supply chain relationships to encourage or require suppliers to adopt the ISO 9001 Quality Management System standard and ISO 14001 Environmental Management System standard. There may be similar initiative concerning the emerging ISO 50001 Energy Management System standard.

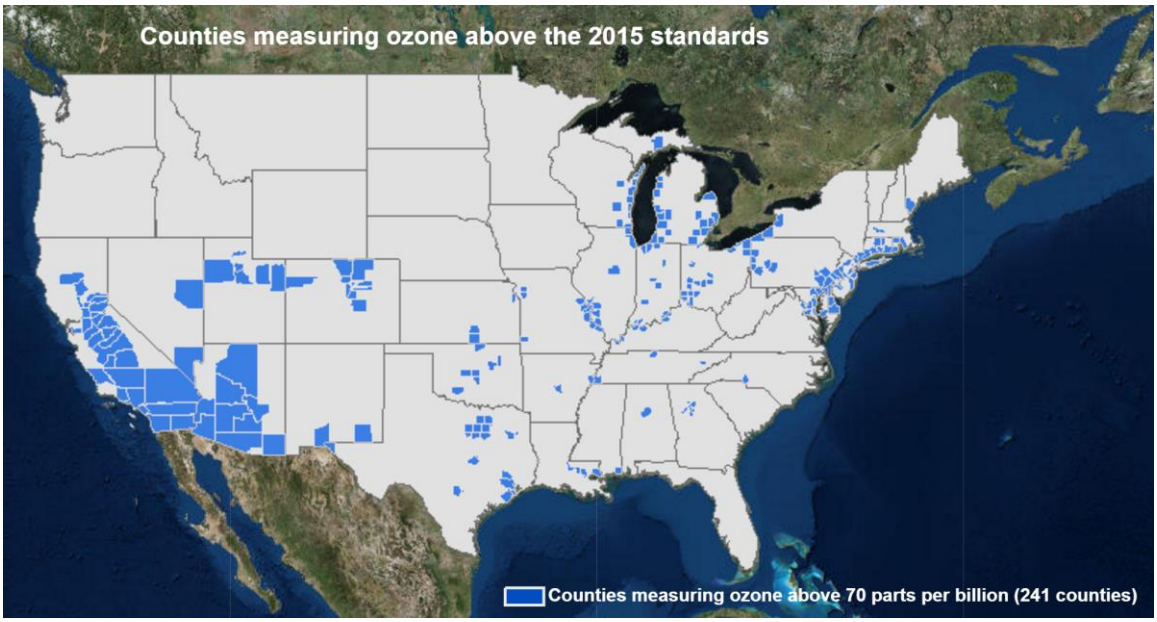
[7] NASEO Energy Efficiency Pathway Templates offer a discussion of energy efficiency as an emissions reduction tool, including for Clean Air Act planning and compliance purposes, and serve as a template states can use to facilitate discussions with air quality managers. The templates and related resources are available at http://naseo.org/ee-pathways.

[8] U.S. EPA, 2012, "Roadmap for Incorporating Energy Efficiency/Renewable Energy Policies and Programs into State and Tribal Implementation Plans," https://www.epa.gov/energy-efficiency-and-renewable-energy-sips-and-tips

[9] For example, the Texas Commission on Environmental Quality included NOx reductions from building energy codes as well as local government and utility energy efficiency programs in a 2005 Dallas-Ft. Worth area SIP revision. See https://www.tceq.texas.gov/airquality/stationary-rules/nox/eere.html

While no Minnesota counties are identified as exceeding to 2015 ozone standard, Minnesota is also subject to the Cross-State Air Pollution Rule (CSAPR) for fine particles (sulfur dioxide [SO_2] and annual nitrogen oxides [NOx]). Some states have "set aside" modest numbers of NOx allowances for allocation to EE/RE projects under previous NOx budget trading programs.[10] Under a NOx allowance set-aside program, a state could issue allowances for qualifying energy efficiency (and renewable energy) projects. Such allowances could be sold to earn a bit of revenue supporting energy efficiency/waste reduction (or renewable energy) or could be retired to reduce allowable tonnage of emissions and show progress toward NAAQS compliance.

Figure MN-1. Counties measuring ozone above the 2015 standards



Source: U.S. EPA

[10] U.S. EPA, 2006, "State Clean Energy-Environment Technical Forum Roundtable on State NOx Allowance EE/RE Set-Aside Programs, June 6, 2006, Call Summary." https://www.epa.gov/sites/production/files/2016-03/documents/summary_paper_nox_allowance_6-6-2006.pdf.

Figure MN-2. Mandatory Class I Areas (under Regional Haze Program)

Source: U.S. EPA

NEER-registered energy savings can be translated into avoided criteria pollutant emissions from the power sector by using such tools as EPA's eGRID and AVERT,[11] or using dispatch or other models tailored to a particular state or utility service territory. Emissions impacts of reduced onsite natural gas or other fuel use can be derived using published emission factors (e.g., EPA AP-42),[12] equipment specifications, or other means.

Air quality agencies can use NEER-registered energy savings and their concomitant avoided emissions for projection and planning purposes. They can use such energy savings to support and validate inclusion of energy efficiency in SIPs. A state opting to offer "EE/RE set-aside" allowances for NOx or other tradable emissions could use NEER-registered savings as a basis for set-aside allowance distribution.

In the case of set-aside allowance applications, energy efficiency project owners or other savings claimants (such as an ESCO or other energy service provide) would create NEER accounts. They would show project eligibility, document energy savings in accord with M&V and QA/QC standards that the air

[11] U.S. EPA, Emissions & Generation Resource Integrated Database (eGRID) https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid and AVoided Emissions and generation Tool (AVERT) https://www.epa.gov/statelocalenergy/avoided-emissions-and-generation-tool-avert

[12] U.S. EPA, AP-42: Compilation of Air Emission Factors, https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emission-factors

quality agency may require, and attest to have rights to project energy savings. The state could require NEER vetting of savings as a basis for awarding set-aside emission allowances.

Finally, NEER can support state and local greenhouse gas objectives where they exist. NEER-registered savings from utility-supported programs, lead-by-example state and local programs, private voluntary NEER-registered savings, efficiency finance mechanisms, and other sources (e.g., low-income weatherization, building energy codes) could be tallied by air quality agencies or other authorities to track CO_2 (and potentially other greenhouse gas) emission impacts if that is desired.

Conclusion

The State of Minnesota partnered in the NEER project to help develop and explore opportunities for applying NEER in support of state energy and environmental policy objectives. The existing utility-based energy efficiency program has an existing Energy Savings Platform for recording, tracking and attributing energy savings to relevant utilities. An existing large industrial opt-out program exempts certain customers for CIP participation but requires reasonable efforts for identifying and implementing energy savings, but reporting requirements are modest. This suggests very limited NEER opportunities under the existing CIP. However, several potential future applications could arise if the state sought to enhance its energy savings tracking; strengthen opt-out (self-direct) customer obligations; and/or would allow for trade or exchange of energy savings credits, including potential provision of energy savings from third parties to regulated entities to help them more cost-effectively meet their obligations while broadening the scope of energy efficiency investment and implementation.

While utility ratepayer-funded energy efficiency under the CIP is critical to Minnesota's energy policy, there are large amounts of energy savings occurring through projects and activities beyond the purview of utilities. As in many states, such activities and the energy savings they deliver and can potentially deliver are unevenly quantified and tracked. Acknowledgement and tracking of such energy savings (and their environmental benefits) would improve recognition of energy efficiency programs' and policies' contributions to energy and environmental policy objectives, and can enhance state energy, air quality, and other planning.

This Roadmap outlines broad approaches for using NEER to enhance tracking of state and local lead-by-example energy efficiency programs and building standards, publicly funded or incentivized programs, voluntary energy efficiency initiatives, and corporate energy and sustainability objectives.

Further, NEER-registered energy savings can be translated into avoided criteria air pollutant and greenhouse gas emissions which can support air quality planning, management, and compliance needs; emission allowance trading programs; and state and local climate and resilience targets.

NEER offers Minnesota a tool to support multiple energy objectives.

NATIONAL ENERGY EFFICIENCY REGISTRY (NEER): OREGON ROADMAP

Abstract

The NEER is a web-based platform that will help states document energy efficiency achievements to help meet their energy and environmental goals. Serving as a means to register and track energy savings and, as desired, enabling trading of instruments representing energy savings (and related environmental attributes), the NEER can support both voluntary energy efficiency initiatives and compliance with mandatory energy savings goals. This Roadmap provides an overview of major opportunities for applying NEER across states generally and for NEER Project Team states based on each state's circumstances. The Roadmap is meant to illuminate paths that states can consider for adopting NEER as a tool to support state energy objectives.

This document is the Oregon state-specific section of the NEER Roadmap.

October 2017

Disclaimer

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NEER Roadmap

This document constitutes the Oregon state-specific portion of the National Energy Efficiency Registry (NEER) Roadmap.

Oregon NEER Roadmap

Context and Landscape

Oregon has a long and successful history of energy conservation and planning that is pursued through multiple policies, programs, and activities. These include electricity and natural gas utility and ratepayer-funded programs, building energy codes, state facility standards and targets, public agency and school programs, targeted tax credits, and voluntary programs. There are also local programs and policies, administered through city and county government.

Oregon's major investor-owned electric utilities, Portland General Electric and PacifiCorp, are required to consider energy efficiency in their integrated resource plans (IRPs) and pursue all cost-effective energy efficiency and conservation. Consumer-owned electric utilities (cooperatives and public power) and the Bonneville Power Administration (BPA) also emphasize acquisition of cost-effective energy efficiency resources in their plans. The Northwest Power and Conservation Council (NPCC, or the Council) has linked with it the Regional Technical Forum that develops highly-regarded energy efficiency evaluation, measurement, and verification (EM&V) resources, including a regional Technical Reference Manual (TRM).

Further, energy efficiency plays a prominent role in the plans of the NPCC and BPA, which serve Oregon, Washington, Idaho, and Montana. As a regional collaboration under the NPCC, these states contribute to the Council's power planning process. The Council's current 7th Power Plan emphasizes energy efficiency as a least-cost power resource. With this large regional planning framework, Oregon's energy efficiency and conservation context, options, and opportunities can be considered in a regional context.

Oregon's version of an energy efficiency resource standard (EERS) established energy savings targets equivalent to 1.4% of electric sales from 2014 through 2019, and natural gas savings targets over the same timeframe equivalent to 0.7% of forecasted sales.[1] The Energy Trust of Oregon administers energy efficiency and renewable energy programs for the two major investor-owned electric utilities, covering about 70% of Oregon customers, funded by a Public Purpose Charge (3% of revenue) placed on those utilities' bills plus Supplemental Conservation funding tied to additional conservation opportunities identified in the utility IRPs. The Supplemental Funding is also provided by the three natural gas utilities in Oregon, in varying amounts based on their respective natural gas IRPs. About 30% of electric customers are served by consumer-owned utilities (COUs) that provide energy efficiency programs directly and through BPA-funded programs. Some BPA, Energy Trust of Oregon, and consumer-owned utility funding also supports energy efficiency initiatives (for both electricity and natural gas) of the Northwest Energy Efficiency Alliance (NEEA). NEEA's regional emphasis is on market transformation for energy efficiency products and practices.

As a least-cost resource, energy efficiency can help Oregon meet state greenhouse gas (GHG) emission reduction goals, metropolitan GHG targets, and local climate action plan objectives. The state is also

[1] American Council for an Energy-Efficient Economy, Energy Efficiency Resource Standards, http://database.aceee.org/state/energy-efficiency-resource-standards

subject to air quality requirements under the federal Clean Air Act, including National Ambient Air Quality Standards (NAAQS) and the Regional Haze Program, where energy efficiency may play a role in helping achieve compliance.

NEER Application & Stakeholder Outreach

NEER has potential to help Oregon address state energy and environmental objectives by supporting enhanced quantification, qualification, and tracking of energy savings achieved through energy efficiency activities. While utility-associated programs, including those implemented by the Energy Trust of Oregon, provided by COUs, and supported by BPA, are central to Oregon's and regional energy efficiency efforts and broader energy strategy, it is important to recognize that unreported energy efficiency investments occur outside of utility ratepayer-funded programs. Often discussions and analyses of energy efficiency focus mainly on such utility programs, while undercounting contributions and opportunities afforded by non-utility actors. NEER can offer standardization and broader accounting of these achievements, which may be of most value when used as a regional tool. It also offers the opportunity to bind together multi-project/multi-location savings into one verifiable asset that could generate new value outside of the direct savings realized by the end-user.

This Roadmap document illustrates several pathways for NEER application in Oregon and its region, both within and outside the context of its utility-led programs.

NEER Stakeholder Meeting

Participants in a NEER Roadmapping Workshop hosted by the Oregon Department of Energy (ODOE) on August 15, 2017, included representatives of BPA, Energy Trust of Oregon, the association of rural cooperative utilities, a community college facilities manager, an energy services company (ESCO), the regional food processors association, Oregon Department of Environmental Quality (DEQ), Oregon Building Codes Division (BCD), NPCC, the Pacific Northwest National Laboratory, and others, including state energy agency staff from Washington, Idaho, and Montana.

Participants largely agreed that Oregon's utility customer-funded energy efficiency programs have a well-established system for evaluating, tracking, and crediting eligible energy savings. These include established Public Utility Commission (PUC) review and approval processes and well-regardedEM&V and TRM resources. They suggested that most of NEER's opportunity would lie in quantifying and validating energy savings occurring outside of the current utility- and Energy Trust of Oregon-overseen programs. The State Energy Office participants could also see an opportunity for aggregating the accounting of these activities, where ratepayer funds are limited to their specific entity/utility. These could include building energy codes, "beyond-code" programs, energy savings performance contract (ESPC) projects, and self-funded or non-utility-funded energy efficiency projects and programs. Such would include industrial initiatives, public-sector upgrades, local policies (such as the City of Portland's benchmarking and disclosure policy), and low-income weatherization, among others.

It should be noted that Oregon has a large electric customer self-direct program, administered by ODOE and utilities.

Qualifying and quantifying self-directed energy efficiency activities

Large electric customers of the Pacific Power, Portland General Electric, and Emerald People's Utility District can be exempted from utility bill charges that fund utility energy efficiency programs. Those customers are required to spend an equivalent amount of money for self-directed projects. These

projects are subject to ODOE technical review and approval. Such projects reported 2,743,000 kWh savings in 2015.

If the state wishes, NEER could serve as a mechanism to validate self-funded program energy savings and account for energy projects not normally reported as part of the self-direct programs. NEER could also validate energy savings measures undertaken for corporate objectives and under voluntary federal, state, and local programs or to quantify energy savings achieved by non-utility-based incentive programs.

For this application, NEER could apply "Specific Compliance/Certification Program" (SCCP) QA/QC criteria, including for EM&V, in accord with ODOE requirements.

Potential future utility energy waste reduction applications

Future policy development could provide NEER the opportunity to complement or supplement utility consumer-funded programs beyond the self-direct program application described above. Oregon and other states in the region could consider broadening the scope of eligible energy efficiency projects and implementers to allow third-party energy efficiency providers to offer energy savings credits to help meet state targets.

NEER could facilitate accounting of energy savings across state lines in the NPCC region and perhaps exchange between renewable energy and energy efficiency credits. Broadening the scope of energy efficiency projects and participants, and allowing intra- and interstate trade of credits, could lower compliance costs by allowing more cost-effective projects and providers to bid energy savings into a compliance market. NEER would validate the credibility and creditability of energy savings provided and would also guard against double counting of savings.

Under this scenario, the state (or states, if interstate exchange is allowed) would establish in NEER QA/QC requirements (including measure or project eligibility and EM&V) that registered energy savings would have to meet. They would designate NEER as a platform for registration and exchange of third party-delivered energy savings that could be purchased by regulated entities to help meet their energy savings obligations. ODOE and/or the PUC (and other states, if interstate trading is permitted) would oversee NEER's performance as an adjunct platform for inclusion of third-party-delivered energy savings and as a credit trading platform. Those agencies, the NPCC, BPA, and individual utilities could query NEER for reports to support analysis and planning as needed.

In short, there appears to be some opportunity for NEER to aggregate and track savings of existing utility-consumer-funded energy efficiency program systems in Oregon. There may be some complementary roles with respect to energy savings outside of those programs, including validating large customer self-funded project savings. Expanding policies and programs to include third-party energy efficiency energy savings and renewable credit trading is a possibility too.

Tracking building and facility energy efficiency performance

NEER can be a suitable tool for tracking energy efficiency project and program savings that occur outside of utility-based programs.[2] Across the United States, large numbers of buildings and facilities are being

[2] Building energy efficiency programs and standards and ESPCs can also include water conservation and savings as objectives as well as other resource and environmental aspects. NEER is initially focused on energy savings but

built to "above code" standards of energy efficiency while many existing buildings undergo retro-commissioning, upgrades, and renovations to achieve greater energy efficiency. States, localities, and other institutions (e.g., schools, universities, and hospitals) also use the ESPC mechanism to improve energy performance.

These new and existing building and facility energy efficiency improvements may be undertaken under a variety of policies and programs, among them:

- State or local lead-by-example standards or targets applicable to certain public sector or publicly-supported buildings and facilities (e.g., State Energy Efficient Design [SEED] Program, Energy Efficient Schools Program).
- State or local requirements applicable to certain non-public-sector buildings (e.g., Portland energy reporting requirements).
- Publicly financed (e.g., low-income weatherization and Low-Income Housing Tax Credit (LIHTC)-financed) and state or locally incentivized programs.
- Voluntary programs (e.g., Better Buildings and Better Plants Challenges, corporate programs).

The exact pathway for applying NEER to these different program types can vary but the basic approach is similar. The program's administrator can designate NEER as the platform for registering, recording, and tracking energy savings. It would define QA/QC requirements for the programs. These can include NEER "basic" (a self-certification without independent verification of savings), NEER "enhanced" (more rigorous measurement and verification [M&V] with independent verification), or customized ("SCCP") criteria for the program.

Many state and local policies and programs, such as ODOE's SEED program, Portland's benchmarking ordinance, and voluntary programs use Energy Use Intensity (EUI) as a primary building energy metric. EUI is a calculated value of annual energy use per square foot (kBtu/SF/Yr). EUI is generated by entering monthly consumption data (commonly from utility bills) as kilowatt-hours (kWh) of electricity and therms of natural gas or Btus of other fuels. EPA's ENERGY STAR Portfolio Manager is now considered the standard data collection and reporting platform.

Changes in energy use (normalized for weather but which may also be adjusted for changed occupancy and usage) against a baseline can be used to determine progress (or lack thereof) toward meeting energy performance targets. Energy savings can be derived by comparing that usage with a pre-upgrade baseline in existing buildings or a modeled baseline (building code or common practice) for new construction (with appropriate weather or other adjustments). Numerous standard M&V approaches are available to validate energy savings.

While EUI is an important metric for broadly understanding building energy performance, measured electricity and fuel savings provides specific and useful data that can support state and local energy planning, energy resilience and assurance objectives, and air quality goals. NEER could be used to enhance the detailed quantification and credibility of savings to support these other objectives. It is important to distinguish when and how a broad metric like EUI is appropriate and when other measurements are needed – for example, EUI would not fully capture energy savings from exterior

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could also be configured to include onsite renewable energy, water conservation, and perhaps other performance aspects.

lighting upgrades, improvements to wastewater treatment facilities. or industrial process energy efficiency advances.

In any of these types of programs, NEER can serve as a platform for recording and tracking energy savings. The following use cases illustrate of general approaches for applying the NEER but can be adapted to wider sets of program designs and circumstances.

State or local lead-by-example program: new construction

In this example, a state or locality could have an "above code" target or incentive for buildings, requiring design and construction to meet higher levels of energy performance than would be realized from meeting the current building energy code or common building design. Energy use of buildings built "above code" is compared with predicted energy use a building built to meet existing building code. ODOE's SEED program, requires new or major renovation buildings to meet approximately 20% above that which would be achieve with current code. These modeled savings are then verified post-construction

NEER could provide a reporting platform to capture these achieved savings. Measuring and tracking energy use and savings as compared to standard design, construction, and operation would indicate the impact of the "above code" policy. Energy savings tracking could help improve the program's efficacy, point to operations and maintenance (O&M) energy efficiency opportunities, provide data on cost as well as physical energy unit savings useful for both fiscal and energy planning purposes, and support analyses of air quality and other environmental benefits.

In this case, the state or local jurisdiction would create an account in NEER and establish a level of QA/QC (including M&V requirements) that meets its needs, ranging from a self-reporting under NEER "basic" to a more rigorous validation under NEER "enhanced" that may be useful to meet regulatory requirements, such as air quality compliance. The jurisdiction could also establish customized QA/QC criteria—NEER's "SCCP" option.

Authorized building or facility representatives would report energy project savings into NEER. NEER would validate that the savings were documented in accord with QA/QC requirements. Such savings would be recorded in an asset output log. The jurisdiction can then easily retrieve data for analysis, public reporting, and other purposes. Energy saving data can also be translated into avoided emissions of criteria air pollutants and/or carbon dioxide using a variety of tools and emission factors for purposes of air quality management and any greenhouse gas objectives that may exist.

State or local lead-by-example: existing facility upgrades

In this example, a state or locality may have a policy to encourage or require energy efficiency upgrades. The jurisdiction may directly procure upgrades from contractors or may use the ESPC mechanism through an ESCO.

As above, the jurisdiction would establish a NEER account and use the appropriate QA/QC criteria. In using NEER as a registration and tracking platform, the Administrator and reporting entity would clarify who "claims" the energy savings, e.g., the contractor/ESCO, the jurisdiction or agency that paid for or

owns the project.[3] Similarly, if portions of projects are incentivized by utilities, these parties would also clarify and agree to any claims to energy savings.[4]

Energy savings would be determined in accordance with the Administrator's QA/QC requirements, again ranging from a self-certification under NEER "basic" to having independent verification under NEER "enhanced" with tailoring possible to the jurisdictions requirements. Numerous standard M&V approaches comporting with the International Performance Measurement and Verification Protocol (IPMVP) are available based on bill analysis, sampled measurement and monitoring, modeling, and other approaches.[5] While NEER does not determine M&V requirements for particular programs, it would affirm that QA/QC requirements, such as for M&V, are met for registered energy savings. For upgrades undertaken through an ESPC, typically the ESCO performs M&V to document that it has met savings guarantees. Programs may also already have established M&V requirements for projects/reporting which could be incorporated into a SCCP, e.g., M&V methodology for ESPCs working with state agencies.

Also, as above, a jurisdiction using NEER can readily access data from NEER's asset output log to track energy savings for analysis, public release, and other purposes. Such data can be fed into broader state energy planning and policy and avoided emissions estimated for air quality management and sustainability policy purposes.

Voluntary reporting for building improvements or facility renovations

A growing number of companies and organizations have made adopted energy, sustainability, and community goals and objectives. There is also continued interest and commitment to implementing energy efficiency and conservation, renewable energy, and other energy measures at their own facilities. They can also encourage or even require energy and environmental management standards in their operations, supply chain, and contracts with other services and partners. NEER can support these and it can also open the opportunity for the buying and selling of energy savings instruments in a voluntary market.

Companies performing energy efficiency in their own facilities could opt to use NEER privately to register and track energy savings. The process would be broadly similar to the state and local lead-by-example scenarios, but with companies creating NEER accounts, establishing QA/QC requirements, and then registering applicable energy savings with NEER. The NEER could offer an additional measure of credibility to corporate energy savings claims. Such companies could also use the NEER platform as they participate in voluntary initiatives and challenges such as Better Buildings Challenges. A significant advantage of NEER as a centralized platform is that voluntary self-reporting would not have to be capped or specific to any program or requirement. The ability for NEER to be program- or incentive-

[3] In some states and policy scenarios, energy savings credits may be traded like renewable energy certificates are traded to meet regulatory requirements, claim financial incentives, or earn revenues in voluntary markets.
[4] For example, a utility may claim some or all energy savings for measures it incentivized.
[5] IPMVP available via the Efficiency Valuation Organization https://evo-world.org/en/. The IPMVP structure is used by in M&V protocols developed for the Federal Energy Management Program (FEMP), PJM Interconnection, ISO-New England, and others. The U.S. Department of Energy's Uniform Methods Project and various state and utility technical reference manuals build off the IPMVP.

neutral will be helpful for large organizations and companies that may be engage in many projects and programs, across many locations and campuses.

A company seeking to encourage or require energy efficiency improvements in its supply chain could specify use of NEER to register energy savings from supplier firms.[6] In that case, the company would establish QA/QC requirements with NEER and ask suppliers to establish NEER accounts and submit their energy savings for registration and reporting.

The broadest scenario would be for a wide private energy efficiency market using NEER as a platform. A company may wish to support energy efficiency efforts outside of its corporate boundaries either as a direct part of its sustainability and social responsibility policies or possibly to offset energy efficiency or renewable energy performance shortfalls in its own facilities. This may also support their participation in community-wide goals and support for private-public partnerships. In another scenario, companies and organizations may use NEER for benchmarking or competition-style programs in which they can compare performance among other similar entities/buildings/companies and recognize achievements.

Companies may wish to purchase energy savings certificates from, for example, low-income weatherization programs or energy efficiency projects in economically disadvantaged communities, to serve social responsibility goals while also supporting sustainability objectives. In such cases, companies, nongovernmental organizations, agencies, and localities wishing to buy and sell energy savings credits would each have NEER accounts to allow the processing of transactions and exchange of instruments.

Emissions and air quality applications

By reducing the need for electricity generation and onsite fuel consumption, energy efficiency mitigates adverse environmental impacts, including emissions of air pollutants and their health effects.[7] Air quality regulators can consider energy efficiency at different levels for varied purposes under different regulatory programs, ranging from broad planning and projection purposes to formalized crediting of energy efficiency for enforceable regulatory purposes. Further, avoided carbon dioxide (CO_2)and other greenhouse gases can contribute to state, local, and private climate and resilience policy targets and goals.

The EPA has outlined pathways for incorporating energy efficiency and renewable energy into National Ambient Air Quality Standards (NAAQS) State Implementation Plans (SIPs) in an "EE/RE Roadmap Manual" that builds on existing formal guidance.[8] There are some precedents for including energy

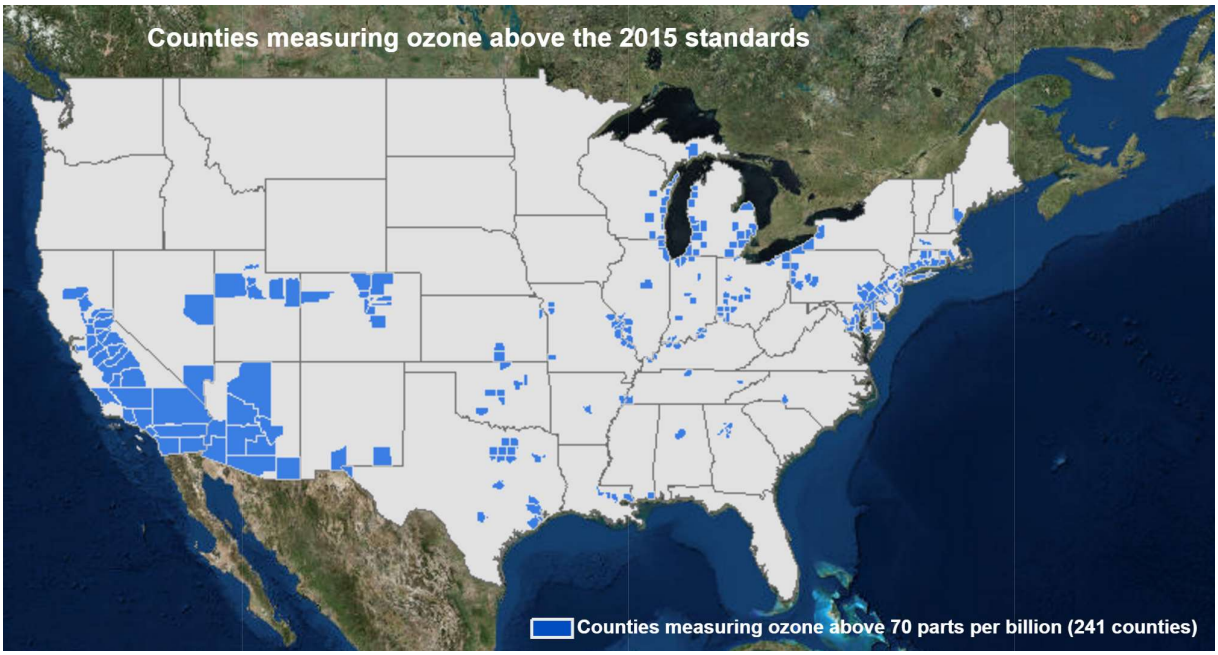
[6] Precedents include companies using supply chain relationships to encourage or require suppliers to adopt the ISO 9001 Quality Management System standard and ISO 14001 Environmental Management System standard. There may be similar initiative concerning the emerging ISO 50001 Energy Management Standard.

[7] NASEO Energy Efficiency Pathway Templates offer a discussion of energy efficiency as an emissions reduction tool, including for Clean Air Act planning and compliance purposes, and serve as a template states can use to facilitate discussions with air quality managers. The templates and related resources are available at http://naseo.org/ee-pathways.

[8] U.S. EPA, 2012, "Roadmap for Incorporating Energy Efficiency/Renewable Energy Policies and Programs into State and Tribal Implementation Plans," https://www.epa.gov/energy-efficiency-and-renewable-energy-sips-and-tips

efficiency formally in NAAQS SIPs.[9] An analogous SIP process under the Regional Haze Program may also be amenable to including energy efficiency. Figures OR-1. and OR-2. indicate counties measuring ozone at levels above the 2015 ozone NAAQS and "Class I Areas" under the Regional Haze Program, respectively. Oregon does not have any counties anticipated to be designated as nonattainment under the 2015 ozone standard. There are NAAQS "maintenance areas" in Oregon where SIPs are intended to assure that the areas stay in attainment although Oregon DEQ notes that electric generating units (and, hence, electricity consumption) are not major concerns for these areas. However, DEQ notes that electric generating units are pertinent in addressing Regional Haze Program requirements to help protect visibility in the Columbia Gorge.

Figure OR-1. Counties measuring ozone above the 2015 standards



Source: U.S. EPA

[9] For example, the Texas Commission on Environmental Quality included NOx reductions from building codes as well as local government and utility energy efficiency programs in a 2005 Dallas-Ft. Worth area SIP revision. See https://www.tceq.texas.gov/airquality/stationary-rules/nox/eere.html

Figure OR-2. Mandatory Class I Areas (under Regional Haze Program)

Source: U.S. EPA

Energy savings assessed and quantified by NEER can be translated into avoided criteria pollutant emissions from the power sector by using such tools as EPA's eGRID and AVERT,[10] or using dispatch or other models tailored to a particular state or region. Emissions impacts of reduced onsite natural gas or other fuel use can be derived using published emission factors (e.g., EPA AP-42),[11] equipment specifications, or other means.

Air quality agencies could also use NEER-registered energy savings and its corresponding avoided emissions for projection and planning purposes. They can use such energy savings to support and validate inclusion of energy efficiency in SIPs.[12]

Finally, NEER can support state and local greenhouse gas objectives and policies, such as Oregon's greenhouse gas reduction goals and the work of the Oregon Global Warming Commission in assessing and tracking relevant emissions and their abatement, and in developing plans for future action. NEER could also be useful for tracking progress toward local and regional climate and resilience plans. NEER-registered savings from utility-supported programs, lead-by-example state and local programs, private

[10] U.S. EPA, Emissions & Generation Resource Integrated Database (eGRID) https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid and AVoided Emissions and generation Tool (AVERT) https://www.epa.gov/statelocalenergy/avoided-emissions-and-generation-tool-avert

[11] U.S. EPA, AP-42: Compilation of Air Emission Factors, https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emission-factors

[12] Not directly relevant to Oregon, but NEER could also support pollutant allowance trading, such as for nitrogen oxides (NOx) under the Cross-States Air Pollution Rule, applicable to many states in the eastern part of the United States. Under such programs, states could allocate "set-aside" allowance or provide other means for energy efficiency and renewable energy provider participation in emission trading markets.

voluntary NEER-registered savings, efficiency finance mechanisms, and other sources (e.g., low-income weatherization, building energy codes) could be tallied by air quality agencies or other authorities to track CO_2 (and potentially other greenhouse gas) emission impacts.

Conclusion

The State of Oregon partnered in the NEER project to help develop and explore opportunities for applying NEER in support of state energy and environmental policy objectives. Oregon is integrated into a regional electric power and energy system under the planning purview of the Northwest Power and Conservation Council, with the BPA as a major regional power generator, serving Oregon, Washington, Idaho, and Montana. Therefore, electricity, energy, and associated environmental and climate planning should be considered in a regional context.

Utility-associated energy efficiency is pursued in Oregon through a relatively complex system involving BPA, individual investor-owned and consumer-owned electric and natural gas utilities, the Energy Trust of Oregon, and NEEA. The existing utility-associated energy efficiency program has well-established means for recording, tracking and attributing energy savings. This suggests limited short-term opportunities for NEER under existing utility energy efficiency programs. However, several complementary or supplemental applications could arise, including validation of self-directed energy efficiency projects and, if the state (or multiple states) wished, to expand the system's scope to allow third-party provided energy savings to bid into energy savings markets and even to allow interstate trading of energy savings credits.

While utility consumer-funded energy efficiency is critical to Oregon and regional energy policy, there is a lack of aggregated accounting for energy savings occurring through utility and self-initiated projects and activities. As in many states, such activities and the energy savings they deliver and can potentially deliver are unevenly quantified and tracked. There also remains a funding and interest gap for thorough M&V of project savings where not required by contract or for program participation. Acknowledgement and tracking of such energy savings (and their environmental benefits) would improve recognition of energy efficiency programs' and policies' contributions to energy and environmental policy objectives, and can enhance state energy, air quality, and other planning.

This Roadmap outlines broad approaches for NEER to enhance tracking of state and local lead-by-example energy efficiency programs and building standards, publicly funded or incentivized programs, voluntary energy efficiency initiatives, and corporate energy and sustainability objectives.

Further, NEER-registered energy savings can be translated into avoided criteria air pollutant and greenhouse gas emissions that can support air quality planning, management, and compliance needs; emission allowance trading programs; and state and local climate and resilience targets. NEER offers Oregon and the region a tool to support multiple energy objectives.

NATIONAL ENERGY EFFICIENCY REGISTRY (NEER): PENNSYLVANIA ROADMAP

Abstract

The NEER is a web-based platform that will help states document energy efficiency achievements to help meet their energy and environmental goals. Serving as a means to register and track energy savings and, as desired, enabling trading of instruments representing energy savings (and related environmental attributes), the NEER can support both voluntary energy efficiency initiatives and compliance with mandatory energy savings goals. This Roadmap provides an overview of major opportunities for applying NEER across states generally and for NEER Project Team states based on each state's circumstances. The Roadmap is meant to illuminate paths that states can consider for adopting NEER as a tool to support state energy objectives.

This document is the Pennsylvania state-specific section of the NEER Roadmap.

October 2017

Disclaimer

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NEER Project Team and Acknowledgments

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NEER Roadmap

This document constitutes the Pennsylvania state-specific portion of the National Energy Efficiency Registry (NEER) Roadmap.

Pennsylvania NEER Roadmap

The Commonwealth of Pennsylvania pursues energy efficiency through multiple policies and programs. These include electricity and natural gas utility programs (through Act 129 as well as eligibility under the Alternative Energy Portfolio Standard [AEPS]); building energy codes; state, public-sector, and institutional programs and requirements (e.g., Pennsylvania Sustainable Energy Finance [PennSEF] program), energy standards for public buildings; loans and other financial support for energy efficiency and renewable energy; and voluntary programs serving the private and public sectors. The state is also subject to air quality requirements under the federal Clean Air Act, including National Ambient Air Quality Standards (NAAQS), the Cross-State Air Pollution Rule (CSAPR), and Regional Haze Program, where energy efficiency can play a significant role in helping achieve compliance. Further, pursuant to the Pennsylvania Climate Change Act, the state issued a Climate Change Action Plan last updated in 2015 that focused on options and recommendations—many energy efficiency focused—for reducing greenhouse gas emissions.

NEER has the potential to help Pennsylvania address state energy and environmental objectives by supporting enhanced quantification, qualification, and tracking of energy savings achieved through energy efficiency and conservation activities. While Act 129 utility-associated programs are central to Pennsylvania's energy efficiency approach, it is important to recognize that large portions of energy efficiency investments and implementation occur outside of utility ratepayer-funded programs. Often discussions and analyses of energy efficiency focus largely or solely on such utility programs while underappreciating contributions and opportunities afforded by non-utility actors.

This Roadmap document illustrates several pathways for NEER's application in Pennsylvania, both within and outside the context of its utility-led programs.

Utility-related programs

Act 129, established under the Utility Energy Efficiency Act of 2008, is Pennsylvania's customer-funded electric utility program that supports energy efficiency and energy conservation measures. It is supplemented by the AEPS, established under Act 213, the Alternative Energy Portfolio Standards Act of 2004, which includes demand-side management (DSM) as a "Tier II" energy source alongside several categories of renewable and non-renewable supply resources.

Act 129 requires Pennsylvania's major electric distribution companies (EDCs) with over 100,000 customers to develop energy efficiency and conservation plans to incentivize energy efficiency. The program is currently in Phase III (June 1, 2016 through May 31, 2021), with a 5-year cumulative target of achieving 5,710,487 MWh in electricity consumption savings. EDC obligations range from 2.6% to 5.0% cumulative savings, averaging about 3.7%. The average translates to about 0.77% annual incremental savings through 2020 and average demand savings of 425 MW. Pennsylvania's program was not designed to have "opt-out" or "self-direct" provisions for large industrial customers.

The Act 129 program has a well-established system for evaluating, tracking, and crediting eligible energy savings, including Public Utility Commission (PUC) review and approval, a contracted State-Wide

Evaluator (SWE) team, a technical reference manual (TRM), and processes for developing and approving evaluation, measurement, and verification (EM&V) protocols for custom energy efficiency measures.

Participants in a NEER Roadmapping Workshop hosted by the Pennsylvania Department of Environmental Protection on August 25, 2017, including representatives of EDCs, the Energy Association of Pennsylvania, the SWE team, natural gas utilities, the PUC, and PJM, agreed that the current system for tracking and crediting Act 129-related energy savings as well as voluntary natural gas utility energy efficiency programs, including pertinent EM&V, is well-established and performs well. They were concerned with avoiding any additional, redundant, and burdensome reporting processes. However, they saw opportunity for NEER to help quantify and track energy savings occurring beyond Act 129 programs that could complement and supplement Act 129 and that could extend energy efficiency implementation to meet broader goals.

Participants suggested that NEER could be useful for quantifying and validating such non-Act 129 programs as low-income weatherization and related programs and for tracking energy efficiency market transformation that in some cases may have been initiated by Act 129 programs (e.g., rebates and "buy downs" for energy efficient equipment) but have since expanded. Participants also expressed interest in the possibility of having Act 129-related savings data fed into NEER to support broader energy efficiency tracking as well as potential use in prospective interstate or multistate energy savings crediting and trading.

The participants were also keen to have coordination between NEER and Act 129 to avoid double counting of savings. For example, a project's energy savings reported under a city's local energy efficiency program and claimed by an EDC for Act 129 compliance should not be double counted.

It is possible that future policy evolution could provide NEER opportunities to complement or supplement Act 129 programs, as discussed above. Somewhat speculatively, the Commonwealth could consider broadening the scope of eligible energy efficiency projects and implementers to allow third-part energy efficiency providers to offer energy savings credits to EDCs to help them meet their Act 129 obligations. This could reduce Act 129 compliance costs by allowing a broader palette of projects and providers to bid energy savings into a compliance market.

Under this scenario, the state would establish QA/QC requirements in NEER (including measure or project eligibility and EM&V) that registered energy savings would have to meet (presumably comporting with Act 129 standards) and designate NEER as a platform for registration and exchange of third party-delivered energy savings that EDCs could purchase to help meet their energy savings obligations. The PUC would oversee NEER's performance as an Act 129 adjunct platform and would query it for reporting and analysis as needed.

As noted, the Commonwealth also includes energy efficiency ("DSM") as an eligible Tier II resource under its AEPS. The AEPS requires 18% of the electricity supplied by Pennsylvania EDCs and Electric Generation Suppliers (EGSs) to come from eligible alternative energy by 2021; 8% from Tier I sources (most renewable generation categories, fuel cell generation, and coal-bed methane, with a small portion [0.5%] reserved for photovoltaic systems) and 10% from Tier II sources that include, in addition to DSM, waste coal, distributed generation, large-scale hydro, waste-to-energy, integrated gasification combined cycle from coal, and wood pulping and manufacturing). The AEPS uses the existing PJM Generation Attribute Tracking System (GATS) as its platform for creation and tracking of Alternative Energy Credits

(AEC) with each credit representing 1 MWh of qualifying generation (or DSM). AECs are valid for three years, must be sourced from qualifying generation (or DSM) within Pennsylvania or in the PJM Interconnection region, and can be sold or transferred.[1] Thus, the AEPS has an established system to qualify, register, trade, and track AECs, suggesting little direct role for NEER under the current AEPS. In principle, energy savings meeting AEPS QA/QC standards (eligibility, EM&V, etc.) registered under NEER could be recognized by and entered into the AEPS, but that is speculative. In practice, the AEPS Tier II is currently dominated by qualified electric generation sources, leaving little to no market for DSM participation.

In short, there appears to be little direct opportunity for NEER to serve Act 129 or AEPS needs but there may be some complementary roles with respect to energy savings outside of those programs. And again, while utility ratepayer-funded energy efficiency is very important and central to Pennsylvania's energy efficiency and broader energy strategies, large amounts of energy savings are provided outside of the utility-supervised program scope and still larger amounts remain achievable.

Tracking building and facility energy efficiency performance

NEER can be a suitable tool for tracking energy efficiency project and program savings occurring outside of utility-based programs.[2] Across the United States, large numbers of building and facilities are being built to "above code" standards of energy efficiency while many existing buildings undergo retrocommissioning, upgrades, and renovations to achieve greater energy efficiency.

These new and existing building and facility energy efficiency improvements may be undertaken under a variety of policies and programs, among them:

- State or local lead-by-example standards or targets applicable to certain public sector or publicly-supported buildings and facilities (e.g., public building energy standards, PennSEF program, ESPCs).
- State or local requirements applicable to certain non-public-sector buildings (e.g., Philadelphia and Pittsburgh benchmarking and disclosure requirements).
- Publicly financed (e.g., low-income weatherization and Low-Income Housing Tax Credit (LIHTC)-financed) and state or locally incentivized programs.
- Voluntary programs (e.g., Pittsburgh 2030 District, Better Buildings and Better Plants Challenges, ENERGYSTAR, LEED (Leadership in Energy and Environmental Design), corporate programs).

The exact pathway for applying NEER to these different program types can vary but the basic approach is similar. The program's administrator can designate NEER as the platform for registering, recording, and tracking energy savings. It would define QA/QC requirements for the programs. These can include NEER "basic" (a self-certification without independent verification of savings), NEER "enhanced" (more rigorous measurement and verification [M&V] with independent verification), or customized ("SCCP") criteria for the program.

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[1] This discussion of AEPS features derives from content at http://www.pennaeps.com/aboutaeps/

[2] Building energy efficiency programs and standards and ESPCs can also include water conservation and savings as objectives as well as other resource and environmental aspects. NEER is initially focused on energy savings but could also be configured to include onsite renewable energy, water conservation, and perhaps other performance aspects.

Many state and local policies, such as Philadelphia and Pittsburgh's local benchmarking and disclosure programs, and many voluntary programs use "energy use intensity" (EUI), measured as British thermal units (Btu) per square foot, as their main metric. EUI is typically derived by entering energy use data into ENERGY STAR Portfolio Manager, in which the resulting EUI is also weather normalized. Changes in EUI (which may also be adjusted for changed occupancy and usage) are used to determine progress (or lack of progress) toward meeting energy performance targets and goals.

For programs that use Portfolio Manager and the EUI metric, energy billing data entered into Portfolio Manager can be used first to provide energy use as kilowatt-hours (kWh) of electricity and Btu or therms of natural gas (and other fuels) used. Energy savings can be derived by comparing that usage with a pre-upgrade baseline in existing buildings or a modeled baseline (building energy code or common practice) for new construction (with appropriate weather or other adjustments). Numerous standard measurement and verification (M&V) approaches are available to validate energy savings.

NEER can support programs and objectives that use EUI as a metric. However, while EUI is an important metric of building energy efficiency, physical units of electricity and fuel savings provides other useful data that can support state and local energy planning, energy resilience and assurance objectives, and air quality goals. For example, distinguishing electricity from natural gas savings is important for understanding energy savings effects on emissions, electric grid planning, and natural gas infrastructure adequacy. NEER could be used to enhance the quantification and credibility of savings to support these other objectives.

Other energy efficiency programs do not rely on EUI metrics. In some cases, EUI is inappropriate, such as for exterior lighting upgrades, wastewater treatment facilities, and industrial processes. Also, ESPCs are typically subject to M&V reporting requirements in which the ESCO must show energy savings achieved and whether those savings meet its contractually guaranteed levels.

In any of these types of programs, NEER can serve as a platform for recording and tracking energy savings. The following use cases illustrate some general approaches for applying NEER which can be adapted to wider sets of program designs and circumstances.

State or local lead-by-example program: new construction

In this example, a state or locality could have an "above code" energy standard for public-sector buildings, requiring design and construction to meet higher levels of energy performance than would be realized from meeting the mandated building energy code or common building design practice. Energy use of new buildings built under the "above code" policy would be compared with energy use that would be modeled to have occurred if the building had been built to meet existing building energy code or common practice.

Measuring and tracking energy use and savings as compared to standard design, construction, and operation would indicate if the "above code" policy is succeeding. It could help improve the program's efficacy, point to operations and maintenance (O&M) energy efficiency opportunities, provide data on cost as well as physical energy unit savings useful for both fiscal and energy planning purposes, and support analyses of air quality and other environmental impacts.

In this case, the state or local jurisdiction would create an account in NEER and establish a level of QA/QC (including M&V requirements) that meets its needs, ranging from a self-reporting under NEER

"basic" to a more rigorous validation of energy savings under NEER "enhanced" that may be useful for regulatory purposes, such as for possible air quality compliance. The jurisdiction could also establish customized QA/QC criteria—NEER's "SCCP" option.

Applicable building or facility operators and agencies would compare actual energy use with modeled energy use (and apply any required normalization for weather and usage) to derive energy savings. These savings would be submitted to NEER, which would validate that they were documented in accord with QA/QC requirements. Such savings would be recorded in an asset output log. The data could be easily retrieved by the jurisdiction for analysis, public reporting, and other purposes. Registered energy savings data can also be translated into avoided emissions of criteria air pollutants and/or carbon dioxide by air quality regulators, the State Energy Office, local jurisdiction, or others using a variety of tools and emission factors for purposes of air quality management and any greenhouse gas objectives that may exist.

State or local lead-by-example: existing facility upgrades

In this example, a state or locality may have a policy to encourage or require energy efficiency upgrades. The jurisdiction may directly procure upgrades from contractors or may use the ESPC mechanism through an ESCO. The PennSEF program, which includes some Pennsylvania Treasury Department funding, supports ESPC guaranteed savings approaches for Pennsylvania municipalities, universities, schools, and hospitals (referred to as the "MUSH" sector).

As above, the jurisdiction would establish a NEER account and appropriate QA/QC criteria. In using NEER as a registration and tracking platform, the jurisdiction should clarify by contract who can claim the rights to energy savings, the contractor/ESCO or the jurisdiction or agency that owns the project.[3] Similarly, if portions of projects are incentivized by utilities, the parties should clarify utility claims to energy savings.[4]

Energy savings would be determined in accordance with the jurisdiction's QA/QC requirements, again ranging from a self-certification under NEER "basic" to having independent verification under NEER "enhanced" with tailoring possible to meet the jurisdiction's requirements. Numerous standard M&V approaches comporting with the International Performance Measurement and Verification Protocol (IPMVP) are available based on bill analysis, sampled measurement and monitoring, modeling, and other approaches.[5] While NEER does not determine M&V requirements for particular programs, it would affirm that QA/QC requirements, such as for M&V, are met for registered energy savings. For upgrades undertaken through an ESPC, the ESCO typically performs M&V to document that it has met their savings guarantees.

Also, as above, a jurisdiction using NEER can readily access data from NEER's asset output log to track energy savings for analysis, public release, and other purposes. Such data can be fed into broader state

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[3] In some states and policy scenarios, energy savings credits may be traded like renewable energy certificates are traded to meet regulatory requirements, claim financial incentives, or earn revenues in voluntary markets.

[4] For example, a utility may claim some or all energy savings for measures it incentivized.

[5] IPMVP available via the Efficiency Valuation Organization https://evo-world.org/en/. The IPMVP structure is used in M&V protocols developed for the Federal Energy Management Program (FEMP), PJM Interconnection, ISO-New England, and others. The U.S. Department of Energy's Uniform Methods Project and various state and utility technical reference manuals build off the IPMVP.

energy planning and policy and avoided emissions estimated for air quality management and sustainability policy purposes.

Voluntary building or facility upgrades

A growing number of companies have adopted energy and sustainability goals as part of their corporate objectives. Companies can implement energy efficiency, renewable energy, and other measures at their own facilities. They can also encourage or even require energy and environmental management system standards in their supply chain. Examples include the ISO (International Organization for Standardization) 14001 Environmental Management System and 50001 Energy Management System standards. Examples include the ISO (International Organization for Standardization) 14001 Environmental Management System and 50001 Energy Management System standards. NEER can support these and it can also open the opportunity for the buying and selling of energy savings instruments in a voluntary market.

Companies performing energy efficiency in their own facilities could opt to use NEER privately to register and track energy savings. The process would be broadly similar to the state and local lead-by-example scenarios, but with companies creating NEER accounts, establishing QA/QC requirements, and then registering applicable energy savings with NEER. NEER could offer an additional measure of credibility to corporate energy savings claims. Such companies could also use the NEER platform as they participate in voluntary initiatives and challenges such as 2030 Districts, Better Buildings, EnergyStar and green building certifications like LEED (Leadership in Energy and Environmental Design) and Green Globes.

A company seeking to encourage or require energy efficiency improvements in its supply chain could specify use of NEER to register energy savings from supplier firms.[6] In that case, the company would establish QA/QC requirements with NEER and ask suppliers to establish NEER accounts and submit their energy savings for registration and reporting.

The broadest scenario would be for a wide private energy efficiency market using NEER as a platform. A company may wish to support energy efficiency efforts outside of its corporate boundaries either as a direct part of its sustainability and social responsibility policies or possibly to offset energy savings or renewable energy performance shortfalls in its own facilities. Such a company may wish to purchase energy savings certificates from, for example, low-income weatherization programs or energy efficiency projects in economically disadvantaged communities, to serve social responsibility goals while also supporting sustainability objectives. In such cases, companies, nongovernmental organizations, agencies, and localities wishing to buy and sell energy savings credits would each have NEER accounts to allow the processing of the transaction and exchange of instruments.

Emissions and air quality applications

By reducing the need for electricity generation and onsite fuel consumption, energy efficiency mitigates adverse environmental impacts, including emissions of air pollutants and their health effects.[7] Air quality

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[6] Precedents include companies using supply chain relationships to encourage or require suppliers to adopt the ISO 9001 Quality Management System standard and ISO 14001 Environmental Management System standard. There may be similar initiative concerning the emerging ISO 50001 Energy Management System standard.

[7] NASEO Energy Efficiency Pathway Templates offer a discussion of energy efficiency as an emissions reduction tool, including for Clean Air Act planning and compliance purposes, and serve as a template states can use to

regulators can consider energy efficiency at different levels for varied purposes under different regulatory programs, ranging from broad planning and projection purposes to formalized crediting of energy efficiency for enforceable regulatory purposes. Further, avoided carbon dioxide (CO_2) and other greenhouse gases can contribute to state, local, and private climate and resilience policy targets and goals.

The EPA has outlined pathways for incorporating energy efficiency and renewable energy into National Ambient Air Quality Standards (NAAQS) State Implementation Plans (SIPs) in an "EE/RE Roadmap Manual" that builds on existing formal guidance.[8] There are precedents for including energy efficiency formally in NAAQS SIPs.[9] An analogous SIP process under the Regional Haze Program may also be amenable to including energy efficiency. Figure PA-1. indicates counties measuring ozone at levels above the 2015 ozone NAAQS. However, more recent data may affect EPA's determination of attainment status of counties. Figure PA-2. shows "Class I Areas" under the Regional Haze Program. Note pertinent Pennsylvania counties. Also, while Pennsylvania has no Class I Areas within its boundaries, the Regional Haze Program requires states to coordinate regionally to abate visibility impairment to other states' Class I Areas.

Pennsylvania is also subject to the Cross-State Air Pollution Rule (CSAPR) for fine particles (sulfur dioxide [SO_2] and annual nitrogen oxides [NOx]) and CSAPR Update ozone (ozone season NOx). Some states have "set aside" modest numbers of NOx allowances for allocation to EE/RE projects under previous NOx budget trading programs.[10] Under a NOx allowance set-aside program, a state could issue allowances for qualifying energy efficiency (and renewable energy) projects. Such allowances could be sold to earn a bit of revenue supporting energy efficiency (or renewable energy) or could be retired to reduce allowable tonnage of emissions and show progress toward NAAQS compliance.

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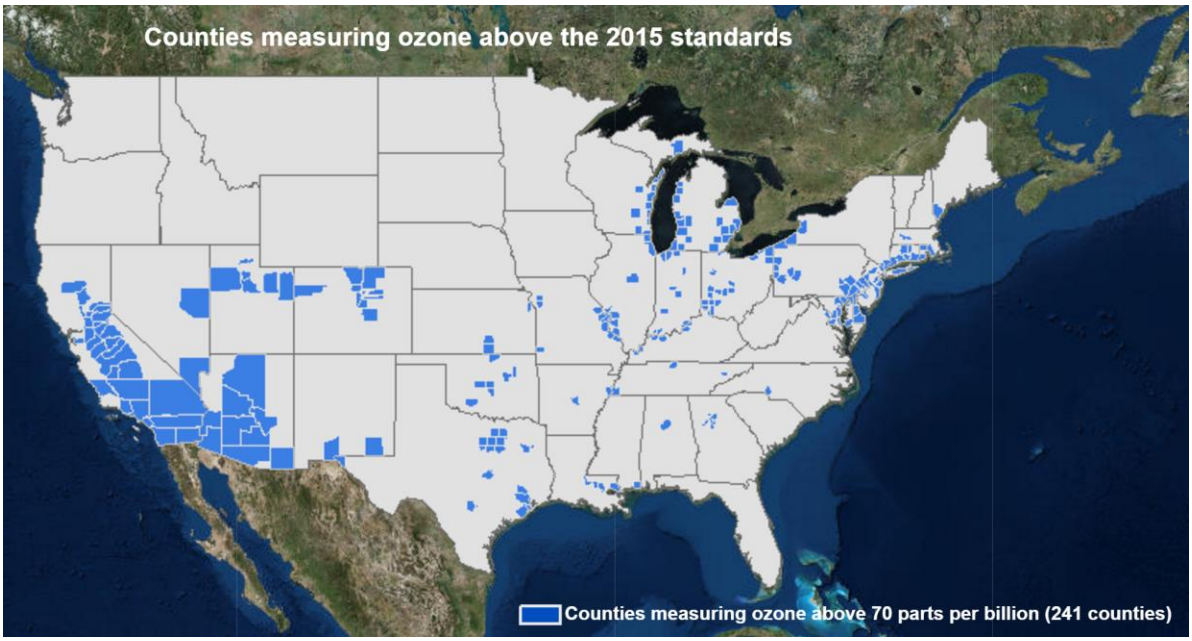
facilitate discussions with air quality managers. The templates and related resources are available at http://naseo.org/ee-pathways.

[8] U.S. EPA, 2012, "Roadmap for Incorporating Energy Efficiency/Renewable Energy Policies and Programs into State and Tribal Implementation Plans," https://www.epa.gov/energy-efficiency-and-renewable-energy-sips-and-tips

[9] For example, the Texas Commission on Environmental Quality included NOx reductions from building energy codes as well as local government and utility energy efficiency programs in a 2005 Dallas-Ft. Worth area SIP revision. See https://www.tceq.texas.gov/airquality/stationary-rules/nox/eere.html

[10] U.S. EPA, 2006, "State Clean Energy-Environment Technical Forum Roundtable on State NOx Allowance EE/RE Set-Aside Programs, June 6, 2006, Call Summary." https://www.epa.gov/sites/production/files/2016-03/documents/summary_paper_nox_allowance_6-6-2006.pdf.

Figure PA-1. Counties measuring ozone above the 2015 standards



Source: U.S. EPA

Figure PA-2. Mandatory Class I Areas (under Regional Haze Program)

Source: U.S. EPA

Energy savings assessed and quantified by NEER can be translated into avoided criteria pollutant emissions from the power sector by using such tools as EPA's eGRID and AVERT,[11] PJM emission factors, or using dispatch or other models tailored to a particular state or EDC service territory. Emissions impacts of reduced onsite natural gas or other fuel use can be derived using published emission factors (e.g., EPA AP-42),[12] equipment specifications, or other means.

Air quality agencies can use NEER-registered energy savings and their concomitant avoided emissions for projection and planning purposes. They can use such energy savings to support and validate inclusion of energy efficiency in SIPs. A state opting to offer "EE/RE set-aside" allowances for NOx or other tradable emissions could use NEER-registered savings as a basis for set-aside allowance distribution.

In the case of set-aside allowance applications, energy efficiency project owners or other savings claimants (such as an ESCO or other energy service provide) would create NEER accounts. They would show project eligibility, document energy savings in accord with M&V and QA/QC standards that the air quality agency may require, and attest to have rights to project energy savings. The state could require NEER vetting of savings as a basis for awarding set-aside emission allowances.

Finally, NEER can support state and local greenhouse gas objectives, such as those that may be adopted from recommendations made in the Commonwealth's 2015 update of its Climate Change Action Plan, under executive or legislative authority, or local initiatives (e.g., nine Pennsylvania localities indicated support for the Paris Agreement on climate and Philadelphia and Pittsburgh have adopted climate plans and objectives). NEER-registered savings from utility-supported programs, state and local lead-by-example programs, private voluntary efforts, efficiency finance mechanisms, and other sources (e.g., low-income weatherization, building energy codes) could be tallied by air quality agencies or other authorities to track CO_2 (and potentially other greenhouse gas) emission impacts.

Conclusion

The Commonwealth of Pennsylvania partnered with the NEER project team to help develop and explore opportunities for applying NEER in support of state energy and environmental policy objectives. The existing Act 129 utility-based energy efficiency and conservation program has well-established means for recording, tracking and attributing energy reductions to relevant EDCs. Also, the AEPS, which includes DSM among other eligible energy resources, utilizes the existing PJM Generation Attribute Tracking System (GATS) as its platform for creating and tracking Alternative Energy Credits.

This suggests very limited NEER opportunities under the existing Act 129 and AEPS systems. However, several complementary or supplemental applications could arise if the state sought to expand Act 129 scope to allow third-party provided energy savings to be sold to EDCs to help them more cost-effectively meet their obligations while broadening the scope of energy efficiency investment and implementation.

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[11] U.S. EPA, Emissions & Generation Resource Integrated Database (eGRID) https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid and AVoided Emissions and generation Tool (AVERT) https://www.epa.gov/statelocalenergy/avoided-emissions-and-generation-tool-avert

[12] U.S. EPA, AP-42: Compilation of Air Emission Factors, https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emission-factors

Pennsylvania stakeholders opined that NEER use for savings not included in Act 129 programs would provide more useful applications.

While utility ratepayer-funded energy efficiency under Act 129 is critical to Pennsylvania's energy policy, there are large amounts of energy savings occurring through projects and activities beyond the purview of utilities. As in many states, such activities and the energy savings they deliver and can potentially deliver are unevenly quantified and tracked. Acknowledgement and tracking of such energy savings (and their environmental benefits) would improve recognition of energy efficiency programs' and policies' contributions to energy and environmental policy objectives, and can enhance state energy, air quality, and other planning.

This Roadmap outlines broad approaches for using NEER to enhance tracking of state and local lead-by-example energy efficiency programs and building standards, publicly funded or incentivized programs, voluntary energy efficiency initiatives, and corporate energy and sustainability objectives.

Further, NEER-validated energy savings can be translated into avoided criteria air pollutant and greenhouse gas emissions which can support air quality planning, management, and compliance needs; emission allowance trading programs; and state and local climate and resilience targets.

NEER offers Pennsylvania a tool to support multiple energy objectives.

NATIONAL ENERGY EFFICIENCY REGISTRY (NEER): TENNESSEE ROADMAP

Abstract

The NEER is a web-based platform that will help states document energy efficiency achievements to help meet their energy and environmental goals. Serving as a means to register and track energy savings and, as desired, enabling trading of instruments representing energy savings (and related environmental attributes), the NEER can support both voluntary energy efficiency initiatives and compliance with mandatory energy savings goals. This Roadmap provides an overview of major opportunities for applying NEER across states generally and for NEER project partner states based on each state's circumstances. The Roadmap is meant to illuminate paths that states can consider for adopting NEER as a tool to support state energy objectives.

This document is the Tennessee state-specific section of the NEER Roadmap.

October 2017

Disclaimer

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NEER Project Team and Acknowledgments

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NEER Roadmap

This document constitutes the Tennessee state-specific portion of the National Energy Efficiency Registry (NEER) Roadmap.

Tennessee NEER Roadmap

The State of Tennessee has several approaches to pursuing energy efficiency and has significant additional opportunities. The state does not have an energy efficiency resource standard (EERS) or similar requirements for electric and natural gas utilities, but there are demand-side management (DSM) energy efficiency programs (e.g., rebates, loans, and technical assistance) offered directly by the Tennessee Valley Authority (TVA) and in partnership with its local power companies. Public sector energy efficiency programs include state building performance (e.g., high performance building requirements) and ENERGY STAR procurement policies, financial support (e.g., Energy Efficient Schools Initiative loans and grants), and energy savings performance contracting (ESPC). Commercial building energy codes apply to new construction and major building renovations, and the majority of jurisdictions has adopted residential building energy codes or follows those adopted by the state.[1] In addition, there are local and private sector energy efficiency programs and initiatives (e.g., Empower Chattanooga). The state is subject to air quality requirements under the federal Clean Air Act, including National Ambient Air Quality Standards (NAAQS), the Cross-State Air Pollution Rule (CSAPR) and the Regional Haze Program, where if needed in the future energy efficiency could play a role in helping achieve compliance.

NEER has the most immediate potential to help Tennessee to address state energy and environmental objectives by supporting enhanced quantification, qualification, and tracking of energy savings achieved through energy efficiency activities. In looking to energy efficiency opportunities in Tennessee, it is important to recognize large potential for both utility and non-utility associated programs and investment. Often, discussions and analyses of energy efficiency focus largely or solely on utility customer-funded programs while underappreciating contributions and opportunities afforded by non-utility actors.

This Roadmap document illustrates several pathways for NEER's application in Tennessee.

Tracking building and facility energy efficiency performance

NEER can be a suitable tool for tracking energy efficiency project and program savings occurring outside of utility-based programs.[2] Across the United States, large numbers of buildings and facilities are being built to "above code" standards of energy efficiency while many undergo retrocommissioning, upgrades, and renovations to achieve greater energy efficiency.

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[1] Since Tennessee is a "home rule" state, significant variation exists in codes adoption and enforcement at the local level. Under Tennessee statute, all local jurisdictions must adopt a residential energy code that is within seven years of the currently adopted State energy code but may also opt out of adoption with a two-thirds majority vote of the local governing body.

[2] Building energy efficiency programs and standards and ESPCs can also include water conservation and savings as objectives as well as other resource and environmental aspects. NEER is initially focused on energy savings but could also be configured to include onsite renewable energy, water conservation, and perhaps other performance aspects.

These new and existing building and facility energy efficiency improvements may be implemented under a variety of policies and programs, among them:

- State or local lead-by-example programs for certain public sector or publicly-supported buildings and facilities (e.g., Energy Efficient Schools Initiative, EmPower TN strategy, State High Performance Building Requirements, and local ESPCs).
- Publicly financed (e.g., State Energy Program, Weatherization Assistance Program, Low-Income Housing Tax Credit (LIHTC), Clean Water State Revolving Fund, Community Development Block Grant Program) and state supported programs (e.g., Tennessee Energy Efficiency Loan Program).
- Voluntary programs (e.g., Better Buildings and Better Plants Challenges, ENERGYSTAR, Leadership in Energy and Environmental Design (LEED), corporate programs).

The exact pathway for applying NEER to these different program types can vary, but the basic approach is similar. The program's administrator can designate NEER as the platform for registering, recording, and tracking energy savings. It would define QA/QC requirements for the programs. These can include NEER "basic" (a self-certification without independent verification of savings), NEER "enhanced" (more rigorous measurement and verification [M&V] with independent verification), or customized ("SCCP") criteria for the program.

Many state and local policies across the United States, such as local benchmarking and disclosure programs and voluntary programs use "energy use intensity" (EUI), measured as British thermal units (Btu) per square foot, as their main metric. EUI is typically derived by entering energy use data into ENERGY STAR Portfolio Manager, in which the resulting EUI is also weather normalized. Changes in EUI (which may also be adjusted for changed occupancy and usage) are used to determine progress (or lack of progress) toward meeting energy performance targets.

For programs that use Portfolio Manager and the EUI metric, energy billing data entered into Portfolio Manager can be used first to provide energy use as kilowatt-hours (kWh) of electricity and Btu or therms of natural gas (and other fuels) used. Energy savings can be derived by comparing that usage with a pre-upgrade baseline in existing buildings or a modeled baseline (building energy code or common practice) for new construction (with appropriate weather or other adjustments). Numerous standard M&V approaches are available to validate energy savings.

NEER can support programs and objectives that use EUI as a metric. However, while EUI is an important metric of building energy efficiency, physical units of electricity and fuel savings provides other useful data that can support state and local energy planning, energy resilience and assurance objectives, and air quality goals. For example, distinguishing electricity from natural gas savings is important for understanding energy savings effects on emissions, electric grid planning, and natural gas infrastructure adequacy. NEER could be used to enhance the quantification and credibility of savings to support these other objectives.

Other energy efficiency programs do not rely on EUI metrics. In some cases, EUI is inappropriate, such as for exterior lighting upgrades, wastewater treatment facilities, and industrial processes. Also, ESPCs are typically subject to M&V reporting requirements in which the ESCO must show energy savings achieved and whether those savings meet contractually guaranteed levels.

In any of these types of programs, NEER can serve as a platform for recording and tracking energy savings. The following use cases illustrate some general approaches for applying NEER but can be adapted to wider sets of program designs and circumstances.

State or local lead-by-example program: new construction

In this example, a state or locality could have an "above code" energy standard for public-sector buildings, requiring design and construction to meet higher levels of energy performance than would be realized from meeting the building energy code or common building design practice.[3] Energy use of new buildings built under the "above code" policy would be compared with energy use that would be modeled to have occurred if the building had been built to meet existing building energy code or common practice.

Measuring and tracking energy use and savings as compared to standard design, construction, and operation would indicate if the "above code" policy is succeeding. It could help improve the program's efficacy, point to operations and maintenance (O&M) energy efficiency opportunities, provide data on cost as well as physical energy unit savings useful for both fiscal and energy planning purposes, and support analyses of air quality and other environmental impacts.

In this case, the state or local jurisdiction would create an account in NEER and establish a level of QA/QC (including M&V requirements) that meets its needs, ranging from a self-reporting under NEER "basic" to a more rigorous validation of energy savings under NEER "enhanced" that may be useful for regulatory purposes, such as for possible air quality compliance. The jurisdiction could also establish customized QA/QC criteria—NEER's "SCCP" option.

Applicable building or facility operators and agencies would compare actual energy use with modeled energy use (and apply any required normalization for weather and usage) to derive energy savings. These savings would be submitted to NEER, which would validate that they were documented in accord with QA/QC requirements. Such savings would be recorded in an asset output log. The data could be easily retrieved by the jurisdiction for analysis, public reporting, and other purposes. Registered energy savings data can also be translated into avoided emissions of criteria air pollutants and/or carbon dioxide by air quality regulators, the State Energy Office, local jurisdiction, or others using a variety of tools and emission factors for purposes of air quality management and any greenhouse gas objectives that may exist.

State or local lead-by-example: existing facility upgrades

In this example, a state or locality may have a policy to encourage or require energy efficiency upgrades. The jurisdiction may directly procure upgrades from contractors or may use the ESPC mechanism through an ESCO.

As above, the jurisdiction would establish a NEER account and appropriate QA/QC criteria. In using NEER as a registration and tracking platform, the jurisdiction should clarify by contract who can claim the rights to energy savings, the contractor/ESCO or the jurisdiction or agency that owns the project.[4]

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[4] In some states and policy scenarios, energy savings credits may be traded like renewable energy certificates are traded to meet regulatory requirements, claim financial incentives, or earn revenues in voluntary markets.

Similarly, if portions of projects are incentivized by utilities, the parties should clarify utility claims to energy savings.[5]

Energy savings would be determined in accordance with the jurisdiction's QA/QC requirements, again ranging from a self-certification under NEER "basic" to having independent verification under NEER "enhanced" with tailoring possible to meet the jurisdiction's requirements. Numerous standard M&V approaches comporting with the International Performance Measurement and Verification Protocol (IPMVP) are available based on bill analysis, sampled measurement and monitoring, modeling, and other approaches.[6] While NEER does not determine M&V requirements for particular programs, it would affirm that QA/QC requirements, such as for M&V, are met for registered energy savings. For upgrades undertaken through an ESPC, the ESCO typically performs M&V to document that it has met their savings guarantees.

Also, as above, a jurisdiction using NEER can readily access data from NEER's asset output log to track energy savings for analysis, public release, and other purposes. Such data can be fed into broader state energy planning and policy, and avoided emissions can be estimated for air quality management and sustainability policy purposes.

Voluntary building or facility upgrades

A growing number of companies have adopted energy and sustainability goals as part of their corporate objectives. Companies can implement energy efficiency, renewable energy, and other measures at their own facilities. They can also encourage or even require energy and environmental management system standards in their supply chain. Examples include the ISO (International Organization for Standardization) 14001 Environmental Management System and 50001 Energy Management System standards. NEER can support these, and it can also open the opportunity for the buying and selling of energy savings instruments in a voluntary market.

Companies performing energy efficiency in their own facilities could opt to use NEER privately to register and track energy savings. The process would be broadly similar to the state and local lead-by-example scenarios, but with companies creating NEER accounts, establishing QA/QC requirements, and then registering applicable energy savings with NEER. NEER could offer an additional measure of credibility to corporate energy savings claims. Such companies could also use the NEER platform as they participate in voluntary initiatives and challenges such as 2030 Districts, Better Buildings or Better Plants Challenge, ENERGYSTAR, and green building certifications like LEED (Leadership in Energy and Environmental Design) and Green Globes.

A company seeking to encourage or require energy efficiency improvements in its supply chain could specify use of NEER to register energy savings from supplier firms.[7] In that case, the company would

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[5] For example, a utility may claim some or all energy savings for measures it incentivized.

[6] IPMVP available via the Efficiency Valuation Organization https://evo-world.org/en/. The IPMVP structure is used in M&V protocols developed for the Federal Energy Management Program (FEMP), PJM Interconnection, ISO-New England, and others. The U.S. Department of Energy's Uniform Methods Project and various state and utility technical reference manuals build off the IPMVP.

[7] Precedents include companies using supply chain relationships to encourage or require suppliers to adopt the ISO 9001 Quality Management System standard and ISO 14001 Environmental Management System standard. There may be similar initiative concerning the emerging ISO 50001 Energy Management System standard.

establish QA/QC requirements with NEER and ask suppliers to establish NEER accounts and submit their energy savings for registration and reporting.

The broadest scenario would be for a wide private energy efficiency market using NEER as a platform. A company may wish to support energy efficiency efforts outside of its corporate boundaries either as a direct part of its sustainability and social responsibility policies or possibly to offset energy savings or renewable energy performance shortfalls in its own facilities. Such a company may wish to purchase energy savings certificates from, for example, low-income weatherization programs or energy efficiency projects in economically disadvantaged communities, to serve social responsibility goals while also supporting sustainability objectives. In such cases, companies, nongovernmental organizations, agencies, and localities wishing to buy and sell energy savings credits would each have NEER accounts to allow the processing of the transaction and exchange of instruments.

Emissions and air quality applications

By reducing the need for electricity generation and onsite fuel consumption, energy efficiency mitigates adverse environmental impacts, including emissions of air pollutants and their health effects.[8] Air quality regulators can consider energy efficiency at different levels for varied purposes under different regulatory programs, ranging from broad planning and projection purposes to formalized crediting of energy efficiency for enforceable regulatory purposes. Further, avoided carbon dioxide (CO_2) and other greenhouse gases can contribute to state, local, and private climate and resilience policy targets and goals.

The EPA has outlined pathways for incorporating energy efficiency and renewable energy into National Ambient Air Quality Standards (NAAQS) State Implementation Plans (SIPs) in an "EE/RE Roadmap Manual" that builds on existing formal guidance.[9] There are precedents for including energy efficiency formally in NAAQS SIPs.[10] The Tennessee Department of Environment and Conservation has determined, based on 2016 design values, that the entire state will be in attainment with the 2015 ozone NAAQS. An analogous SIP process under the Regional Haze Program may also be amenable to including energy efficiency. Figure TN-1. shows "Class I Areas" under the Regional Haze Program.[11] Also, the Regional Haze Program requires states to coordinate regionally to abate visibility impairment to other states' Class I Areas.

Tennessee is also subject to the Cross-State Air Pollution Rule (CSAPR) for fine particles (sulfur dioxide [SO_2] and annual nitrogen oxides [NOx]) and CSAPR Update ozone (ozone season NOx). Some states have "set aside" modest numbers of NOx allowances for allocation to EE/RE projects under previous

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[8] NASEO Energy Efficiency Pathway Templates offer a discussion of energy efficiency as an emissions reduction tool, including for Clean Air Act planning and compliance purposes, and serve as a template states can use to facilitate discussions with air quality managers. The templates and related resources are available at http://naseo.org/ee-pathways.

[9] U.S. EPA, 2012, "Roadmap for Incorporating Energy Efficiency/Renewable Energy Policies and Programs into State and Tribal Implementation Plans," https://www.epa.gov/energy-efficiency-and-renewable-energy-sips-and-tips

[10] For example, the Texas Commission on Environmental Quality included NOx reductions from building energy codes as well as local government and utility energy efficiency programs in a 2005 Dallas-Ft. Worth area SIP revision. See https://www.tceq.texas.gov/airquality/stationary-rules/nox/eere.html

[11] The Tennessee Department of Environment and Conservation recommended to the EPA that all Tennessee counties be designated as attaining the 2015 ozone standard based on the 3-year design values for 2013-2015 and 2014-2016. Some parts of the state are designated as "maintenance" areas under earlier ozone standards.

NOx budget trading programs.[12] Under a NOx allowance set-aside program, a state could issue allowances for qualifying energy efficiency (and renewable energy) projects. Such allowances could be sold to earn a bit of revenue supporting energy efficiency/waste reduction (or renewable energy) or could be retired to reduce allowable tonnage of emissions and show progress toward NAAQS compliance. While Tennessee currently does not have an immediate need to utilize energy efficiency for compliance with regulatory requirements, there may be opportunities to do so in the future.

Figure TN-1. Mandatory Class I Areas (under Regional Haze Program)

Source: U.S. EPA

Energy savings assessed and quantified by NEER can be translated into avoided criteria pollutant emissions from the power sector by using such tools as EPA's eGRID and AVERT,[13] or using dispatch or other models tailored to a particular state or utility service territory. Emissions impacts of reduced onsite natural gas or other fuel use can be derived using published emission factors (e.g., EPA AP-42),[14] equipment specifications, or other means.

Air quality agencies can use NEER-registered energy savings and their concomitant avoided emissions for projection and planning purposes. They can use such energy savings to support and validate

[12] U.S. EPA, 2006, "State Clean Energy-Environment Technical Forum Roundtable on State NOx Allowance EE/RE Set-Aside Programs, June 6, 2006, Call Summary." https://www.epa.gov/sites/production/files/2016-03/documents/summary_paper_nox_allowance_6-6-2006.pdf.

[13] U.S. EPA, Emissions & Generation Resource Integrated Database (eGRID) https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid and AVoided Emissions and generation Tool (AVERT) https://www.epa.gov/statelocalenergy/avoided-emissions-and-generation-tool-avert

[14] U.S. EPA, AP-42: Compilation of Air Emission Factors, https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emission-factors

inclusion of energy efficiency in SIPs. A state opting to offer "EE/RE set-aside" allowances for NOx or other tradable emissions could use NEER-registered savings as a basis for set-aside allowance distribution.

In the case of set-aside allowance applications, energy efficiency project owners or other savings claimants (such as an ESCO or other energy service provide) would create NEER accounts. They would show project eligibility, document energy savings in accord with M&V and QA/QC standards that the air quality agency may require, and attest to have rights to project energy savings. The state could require NEER registration of energy savings as a basis for awarding set-aside emission allowances.

Finally, NEER can support state and local greenhouse gas objectives where they exist (e.g., several Tennessee cities are part of the U.S. Conference of Mayors Climate Protection Agreement). NEER-registered savings from utility-supported programs, lead-by-example state and local programs, private voluntary NEER-registered savings, efficiency finance mechanisms, and other sources (e.g., low-income weatherization, building energy codes) could be tallied by air quality agencies or other authorities to track CO_2 (and potentially other greenhouse gas) emission impacts if that is desired.

Conclusion

The State of Tennessee partnered in the NEER project to help develop and explore opportunities for applying NEER in support of state energy and environmental policy objectives. Energy savings occurring through projects and activities beyond the purview of utilities are unevenly quantified and tracked. Acknowledgement and tracking of such energy savings (and their environmental benefits) would further recognition of energy efficiency programs' and policies' contributions to energy and environmental policy objectives, and can enhance state energy, air quality, and other planning. For example, NEER could help validate non-utility funded energy efficiency as a grid resource, as well as inform TVA's integrated resource planning by providing a more accurate picture of the implementation of non-utility funded energy efficiency projects across the state.

NEER offers Tennessee a tool to support multiple energy objectives. This Roadmap outlines broad approaches for using NEER to enhance tracking of state and local lead-by-example energy efficiency programs and building standards, publicly funded or incentivized programs, voluntary energy efficiency initiatives, and corporate energy and sustainability objectives. Further, energy savings, which NEER would validate as being documented in accord with QA/QC requirements, can be translated into avoided criteria air pollutant and greenhouse gas emissions which can support air quality planning, management, and compliance needs; emission allowance trading programs; and state and local resilience targets.