ENERGY EFFICIENCY PATHWAY TEMPLATE:

Minnesota State Building Performance Standard: Sustainable Buildings 2030 Energy Standard

Abstract

Energy efficiency (EE) programs can deliver air pollutant emission avoidance and reduction. Energy Efficiency Pathway Templates provide a format for summarizing EE program features and opportunities that can be shared with state environmental regulators for consideration in air quality planning. These templates can promote dialogue among State Energy Offices, environmental agencies and other pertinent bodies on potential roles for EE as air pollution management approaches. This template describes the Minnesota Sustainable Buildings 2030 Energy Standard.

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Disclaimer

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Introduction

Energy Efficiency Benefits

Energy efficiency policies and programs are delivering growing benefits that save consumers money. They reduce or defer needs for costly electricity generation, transmission, and distribution investments, and can support energy security and reliability through reduced stresses to energy supply infrastructure. Further, 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.

For example, in 2014 U.S. electric utility energy efficiency programs reported saving about 26,000 gigawatt-hours (GWh) of electricity, equivalent to nearly 20 million tons of carbon dioxide (CO_2) emissions.[1] Such utility programs cost an average of 4.6¢ per kilowatt-hour (kWh), significantly less than average retail electricity price of 10.44¢ per kWh.[2, 3] As another example, the U.S. Department of Energy (DOE) estimated that in 2012 building energy codes saved American consumers $5 billion and 40,000 GWh of electricity, while avoiding nearly 40 million short tons of CO_2.[4] Lawrence Berkeley National Laboratory (LBNL) estimated that energy savings performance contract (ESPC) projects delivered by the energy service company (ESCO) industry delivered about 34,000 GWh of electricity savings and about 224 trillion British thermal units (Btu) of total energy savings (about 1% of total commercial building consumption) in 2012.[5] Other efforts, such as low-income weatherization, state "lead-by-example" policies, local-led building efficiency programs, industrial energy efficiency, and combined heat and power (CHP) programs also contribute to energy efficiency at various scales.

At an individual state level, Xcel Energy's efficiency programs in Minnesota avoided the need for 2,500 MW of new power plants since 1992 while preventing over 11,000 tons of nitrogen oxides (NOx).[6] Maryland's energy efficiency and renewable energy programs provide about 0.60 parts per billion reduction in ambient ozone levels.[7] Texas has included building energy codes, local government measures, and utility energy efficiency programs in its National Ambient Air Quality Standards (NAAQS)

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[1] Consortium for Energy Efficiency, 2016, "2015 State of the Efficiency Program Industry: Budgets, Expenditures, and Impacts." Savings are gross incremental savings; emissions avoided based on EPA eGRID.

[2] Hoffman, Ian M., Gregory Rybka, Greg Leventis, Charles A. Goldman. Lisa Schwatrz, Megan Billingsley, and Steven Schiller, 2015, "The Total Cost of Saving Electricity through Utility Customer-Funded Energy Efficiency Programs: Estimates at the National, Sector and Program Level," Lawrence Berkeley National Laboratory, http://emp.lbl.gov/sites/all/files/total-cost-of-saved-energy.pdf.

[3] U.S. EIA, State Electricity Profiles, United States Electricity Profile 2014, Table 1. 2014 Summary statistics (United States), http://www.eia.gov/electricity/state/unitedstates/.

[4] U.S. Department of Energy, 2014, "Building Energy Codes Program: National Benefits Assessment, 1992-2040," http://www.energycodes.gov/building-energy-codes-program-national-benefits-assessment-1992-2040-0 . Monetary savings are net present value and emissions avoided includes both electricity and non-electricity savings.

[5] Carvallo, Juan Pablo, Peter H. Larsen, and Charles A. Goldman, 2015, "Estimating Customer Electricity and Fuel Savings from projects installed by the U.S. ESCO Industry," Energy Efficiency, vol. 8, pp. 1251-1261. Information from abstract at https://emp.lbl.gov/publications/estimating-customer-electricity-and

[6] Xcel Energy, 2013, "Partnering for a Better Future," cited in State and Local Energy Efficiency (SEE) Action Network, "Guide for States: Energy Efficiency as a Least-Cost Strategy to Reduce Greenhouse Gases and Air Pollution, and Meet Energy Needs in the Power Sector," p. 12. https://www4.eere.energy.gov/seeaction/eepathways

[7] Aburn, T., 2013, "Building Energy Efficiency and Renewable Energy into the Clean Air Act Planning Process." Presentation at the ACEEE Market Transformation Conference, Washington, D.C., March 24-26, 2013.

State Implementation Plans (SIPs) for ozone.[8, 9] Furthermore, DOE projects that adoption and compliance with the latest model building energy codes (2015 International Energy Conservation Code (IECC) and ASHRAE Standard 90.1-2013) by 2017 would save Florida almost 5 million MWh of electricity and 20 trillion Btu total energy in 2030 along with concomitant avoided emissions.[10]

Status of Energy Efficiency for Air Quality Compliance

While air emission benefits of energy efficiency have been recognized for years, they have been included explicitly in state air quality management plans and strategies only infrequently. This is because air quality regulators are often unfamiliar with energy efficiency programs and their ability to achieve savings that translate into avoided emissions.[11] Air quality regulators may be unversed in methods used to reliably project and measure energy savings and their emissions impacts. And there can be concerns about the costs and complexity of rigorous evaluation, measurement, and verification (EM&V) when formal regulatory credit is sought under certain Clean Air Act programs. Perhaps because of these reasons, thus far only a few state air regulatory agencies have taken advantage of the guidance and tools that the Environmental Protection Agency (EPA) provides to help states to include savings from energy efficiency in air quality planning.

EPA has signaled support for states to include energy efficiency as an air quality management strategy for NAAQS and other purposes. It has offered "*… to help[] state air quality planners calculate the emissions benefits of EE/RE [energy efficiency/renewable energy] policies and programs so that these emission reductions can be incorporated in Clean Air Act plans….*"[12] As noted previously, there is precedent for recognizing and crediting NOx reductions from energy efficiency in NAAQS SIPs. Also, a few states have "set aside" modest numbers of NOx allowances for allocation to EE/RE projects under certain Clean Air Act programs.[13] EPA provides a roadmap for incorporating EE/RE into NAAQS SIPs.[14] The agency also pointed to energy efficiency as a key means to address CO_2 and greenhouse gas

[8] 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

[9] The Texas A&M University Energy Systems Laboratory provides analytic support to the Texas Emissions Reduction Program (TERP), including quantification of emissions reduced by energy efficiency and renewable energy programs. It can serve as an exemplar for other states. See http://esl.tamu.edu/terp/.

[10] U.S. Department of Energy, 2015, "Achieving Energy Savings and Emission Reductions from Building Energy Codes: A Primer for State Planning." https://www.energycodes.gov/sites/default/files/documents/Codes_Energy_Savings_State_Primer.pdf

[11] An exception to this is that air quality agencies are familiar with transportation control measures used to reduce emissions from cars, trucks, and other mobile sources. The EPA and state agencies employ recognized models to estimate emission impacts from transportation measures. There is a good analogy between transportation and end-use energy efficiency.

[12] https://www.epa.gov/statelocalclimate/avoided-emissions-and-generation-tool-avert.

[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, 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.

concerns.[15, 16] However, federal and state air quality regulators' are often unfamiliar with energy efficiency and how it can reliably prevent and reduce emissions, and EPA guidance remains imprecise. The hope is that this energy efficiency pathway template along with other efforts will strengthen the opportunity for including energy efficiency in air quality management.

The scope of EPA rules and standards, coupled with the agency's increased recognition of energy efficiency as a clean air resource, creates an opportunity for states to tap into energy efficiency as a frequently least-cost compliance option that offers multiple co-benefits. Recent and prospective EPA actions that provide energy efficiency-related compliance opportunities include revision of various NAAQS, new criteria and hazardous air pollutant standards for power plants and other sources, and the upcoming second implementation period for the Regional Haze Rule. Concerns about CO_2 and other greenhouse gases, including state-level standards and targets, are also pertinent.[17] By reducing the amount of electricity needed to be generated as well as onsite heating fuel use, energy efficiency acts directly to avoid or reduce pollution.

Options for Quantification and Rigor

It is important to note that air quality regulators can consider energy efficiency at different levels for varied purposes under different regulatory programs. One distinction is between considering energy efficiency for broad planning and projection purposes as compared with formalized crediting of energy efficiency for enforceable regulatory purposes.

Broad quantification can be useful for air quality regulators to project likely impacts of programs to help achieve long-term emission and air quality objectives. Avoided energy use reduces emissions irrespective of whether formalized credit is given or whether savings can be ascribed to individual measures or projects. Air regulators can project the combined impacts of multiple programs and apply conservative discount factors to assure that, in aggregate, broad emissions goals can be met even if a particular program may underperform relative to its projection. Periodic program impact evaluations let energy officials and air quality regulators see if savings and emissions avoidance progress is "on track" and provide opportunities to adjust plans if warranted.

Formal regulatory crediting often requires more rigorous EM&V and can include considerations of legal enforceability—who is "on the hook" if required reductions are not achieved. As discussed below, EPA identifies several pathways for including energy efficiency in NAAQS SIPs. Formal crediting may involve attribution of energy savings and avoided emissions to individual program or project implementers for issuance of compliance instruments such as tradable NOx allowances or emissions offsets in nonattainment areas. Formal crediting could also play a role under state, regional, or other greenhouse gas programs.

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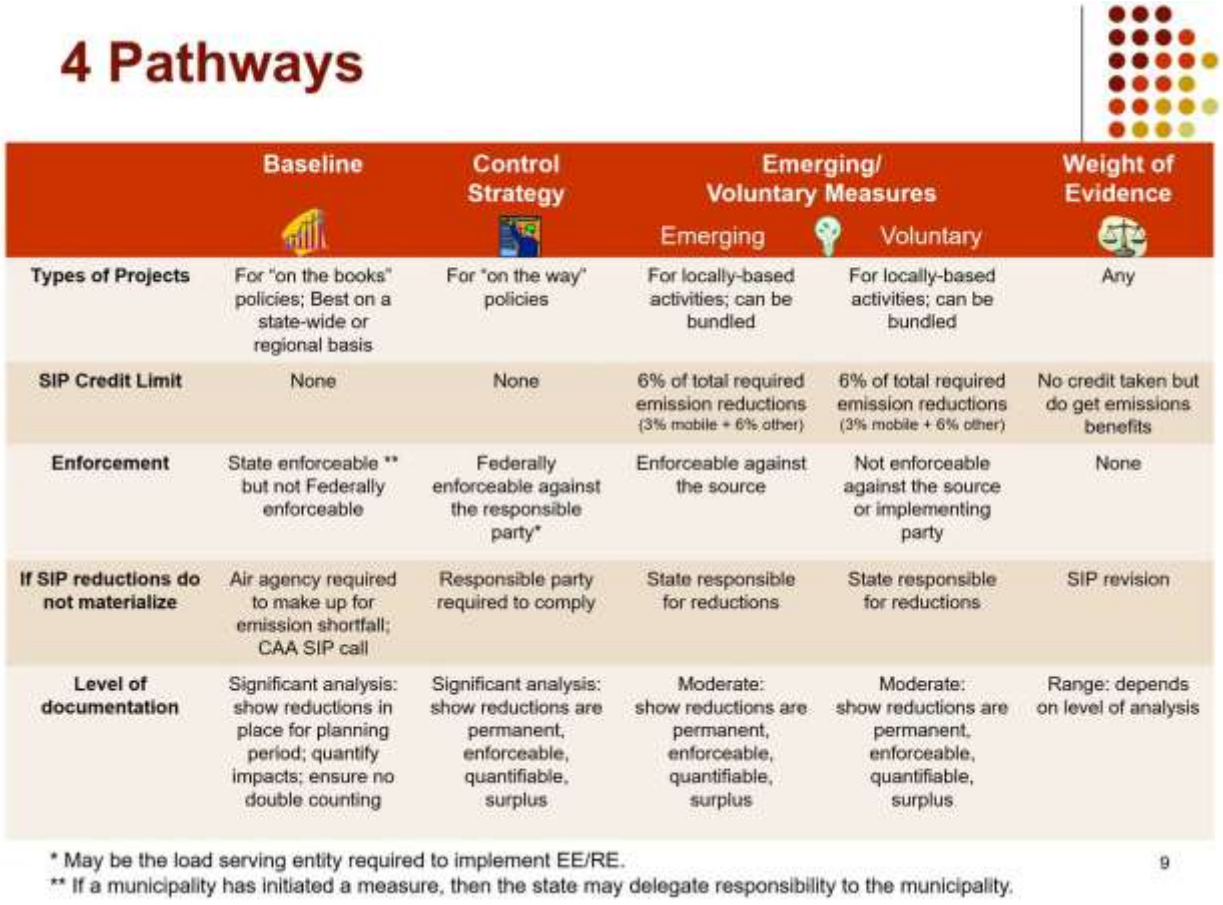
[15] U.S. EPA had included energy efficiency as a major option for compliance with the Clean Power Plan, a rule under a U.S. Supreme Court stay pending litigation at the time of this writing; U.S. EPA, "Fact Sheet: Energy Efficiency in the Clean Power Plan" (https://www.epa.gov/cleanpowerplan/fact-sheet-energy-efficiency-clean-power-plan) provides a summary.

[16] U.S. Environmental Protection Agency, 2016, "Energy Efficiency and Evaluation, Measurement and Verification in State Plans" (https://www.epa.gov/sites/production/files/2016-01/documents/ee_and_emv_in_the_cpp_1-14-16_-_final_508.pdf).

[17] Some states have CO_2 and greenhouse gas goals and standards. As noted, the EPA Clean Power Plan rule is under a judicial stay pending resolution of litigation.

For NAAQS SIP purposes, EPA's EE/RE Roadmap Manual outlines four pathways; three of these offer EPA-recognized formal quantified crediting and the fourth ("weight-of-evidence") offers a less formal recognition of air quality benefit.[18] Figure 1 summarizes the four pathways for incorporating EE/RE for NAAQS SIP purposes outlined in its EE/RE Roadmap Manual.[19] Table 1 provides more detail about the projects, characteristics of policies, and programs suitable for each pathway.[20]

Figure 1. Pathways for Incorporating EE/RE in NAAQS SIPs



[18] 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

[19] Angie Shatas, 2014, "Energy Efficiency (EE) & Renewable Energy (RE) in SIPs – EPA's Roadmap and a Tour of Several States," National Air Quality Conference (February 12, 2014), slide 9. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=4&cad=rja&uact=8&ved=0ahUKEwiGrtb_urDPAhWJyT4KHbDFAnQQFggsMAM&url=https%3A%2F%2Fwww3.epa.gov%2Fairnow%2F2014conference%2FCommunications%2FWednesday%2FShatas_final.pptx&usg=AFQjCNHTlSnqs4u9aJn9-uc9pw44scLQbA&sig2=LpXOMA86FdAhIdkvzwdWIA&bvm=bv.134052249,bs.2,d.dmo

[20] U.S. EPA, 2012, "Roadmap for Incorporating Energy Efficiency/Renewable Energy Policies and Programs into State and Tribal Implementation Plans," fig. 7, p. 30. https://www.epa.gov/sites/production/files/2016-05/documents/eeremanual_0.pdf

Table 1. Characteristics of Policies and Programs Suitable for Each NAAQS SIP Pathway

Baseline Emission Pathway
• EE/RE policies that are "on the books," have not been accounted for elsewhere in the SIP, and are not emerging and/or voluntary programs • Can be state enforceable but is not federally enforceable • Revisions could be required through a Clean Air Act SIP call if reductions from the EE/RE policy are needed to attain the NAAQS and policy is not implemented as assumed in baseline projections • Electric generating unit (EGU) baseline projections are best done on a coordinated, regional basis • When available, agencies can utilize EPA's EGU baseline projections or develop their own projections model or approach • EGU baseline projections using energy models or similar methods reflect EGU operations as a whole system
Control Strategy Pathway
• "On the way" policies and programs that are not emerging and/or voluntary programs and that will produce emissions benefits in the planning timeframe of the SIP/TIP {Tribal Implementation Plan] • EE/RE policies and programs for which the state, tribal, or local agency wishes to seek SIP credit • Once approved into the SIP, federally enforceable (enforceable against an air pollution source or implementing party) • State, tribal, and local agencies will have emission reductions from a control strategy to help them attain the NAAQS • Documentation is needed to demonstrate that the EE/RE policy and/or program is permanent, enforceable, quantifiable, and surplus
Emerging/Voluntary Measures Pathway
• Good option for locally-based EE/RE activities • Voluntary EE/RE policies and programs that are not enforceable against an air pollution source or implementing party • Emerging EE/RE policies and programs for which it is difficult to quantify emission impacts • EE/RE policies and programs for which state, tribal, or local agency wishes to seek SIP credit • Emerging/voluntary measures can be "bundled" in a single SIP submission and considered as a whole • EPA will propose to approve through the SIP rulemaking process SIP/TOP credit up to six percent for EE/RE policies and programs, or more, if they can make a clear convincing case
Weight of Evidence Pathway
• EE/RE policies and programs for which state, tribal, or local agency does not wish to seek SIP credit and for which quantification of the air quality impacts of the emissions reduction is unavailable or infeasible • Can include unspecified emission reductions from any policy or program in weight of evidence that may impact a nonattainment area

States seeking formal crediting and inclusion of energy efficiency programs in SIPs are urged to consult closely with their EPA Regional Offices to understand detailed expectations and requirements for SIP-eligibility of programs and measures.

Tools & Resources to Assist with Quantifying Savings

Various freely available tools can be useful for developing energy and air quality savings estimates that might enable broad programmatic quantification or can lead to formal regulatory crediting for energy efficiency. Using these tools, energy savings can be projected *ex ante* or quantified *ex post*, based on broadly accepted evaluation, measurement, and verification (EM&V) protocols. Once energy savings are quantified they can be translated into avoided emissions.

The State and Local Energy Efficiency Action Network published *A Guide for States: Energy Efficiency as a Least-Cost Strategy to Reduce Greenhouse Gases and Air Pollution, and Meet Energy Needs in the Power Sector* (2016), which presents case studies of successful regional, state, and local approaches to energy efficiency with sources for more information, resources to understand the range of expected savings from energy efficiency, and common protocols for documenting savings. Appendix A in the guide provides a synopsis of energy efficiency and emission reduction planning tools for states.

Among the tools available, this template cites the ones summarized below. In addition, electric power dispatch models and other tools may also be applicable.

- **eGRID.** If electricity savings data are available, the EPA Emissions and Generation Resource Integrated Database (eGRID) provides regional average and average non-baseload emission factors for electric power-sector CO_2, NOx, sulfur dioxide (SO_2), methane, and nitrous oxide emissions.[21]
- **AVERT.** The EPA AVoided Emissions geneRation Tool (AVERT) allows for more detailed analyses of avoided emissions on a regional basis.[22] The AVERT tool allows entry of energy savings data on temporal scales from annual to hourly, which, if temporal savings data are available, can provide more precise emission impact estimates and can support air quality management focused on seasonal ozone levels.
- **ACEEE SUPR.** The State and Utility Pollution Reduction (SUPR) calculator provides a screening-level estimate of some of the costs and benefits of various policies and technologies that could help a state meet its air quality goals. [23] The tool allows the user to select up to nine energy efficiency policies. The results provide users with an idea of the magnitude of the costs and the impacts of selected options on energy use and air pollution (CO_2, NOx, and SO_2 emissions).
- The **Energy Efficient Codes Coalition Clean Power Plan Energy Code Emissions Calculator** offers conservative projections of the impact of building energy codes based on default and user-

[21] See https://www.epa.gov/energy/egrid
[22] See https://www.epa.gov/statelocalclimate/avoided-emissions-and-generation-tool-avert
[23] See http://aceee.org/research-report/e1601

specified scenarios to provide emission avoidance projections of CO_2, NOx, and SO_2 as well as several other criteria pollutants and greenhouse gases.[24]

Energy Efficiency for Supporting Greenhouse Gas Goals

At the time of this writing, the CPP is under a stay issued by the U.S. Supreme Court, pending litigation. While disposition of the CPP is currently uncertain, this section may be useful for considering energy efficiency's potential role under state-level greenhouse gas policies and objectives as well as under local, regional, and voluntary initiatives.

Nineteen states have adopted state greenhouse gas emission targets.[25] Nine Northeastern and Mid-Atlantic state members of the Regional Greenhouse Gas Initiative (RGGI) cap power sector CO_2 emissions.[26] California is mandating greenhouse gas reductions from its power sector and other sources.[27] These and other states considering greenhouse gas standards or targets can find energy efficiency to be a cost-effective approach for meeting greenhouse gas objectives while simultaneously delivering other economic, energy, and environmental benefits.

As with criteria air pollutants, energy efficiency programs can reduce CO_2 emissions from both electric power generation and from onsite fuel use. Both broad quantification for high level planning and more detailed quantification for formal regulatory crediting can be useful.

The EPA CPP had included options for states to follow either rate- or mass-based compliance approaches, which may be useful for state-level consideration.[28] Under the rate-based approach, a state's utility-scale electric generating units (EGUs) would on average need to meet a target emissions rate denominated in pounds of CO_2 emitted per MWh generated. The CPP would allow qualified and verified electricity savings (as well as low- and non-emitting generation) to earn emission rate credits (ERCs) that could be bought by electric generating units (EGUs) to help meet targets.

Under the mass-based approach, the state would have a total tonnage goal for its EGUs' emissions. Similar to the mechanism used by the RGGI states, EGUs would need to hold allowances (one for each ton of CO_2) to cover their emissions. Such allowances could be traded to help EGUs lower compliance costs. Under a mass-based system, energy efficiency would reduce power demand and, thus, emissions, so helping with compliance. Energy efficiency programs could be "complementary" to the emission allowance system (i.e., not directly involved in allowance issuance and trading) or a state could opt for an allowance distribution approach that further encourages cleaner power options, such as by allotting some allowances for low or non-carbon generation as well as for energy efficiency. Under this option,

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[24] http://energyefficientcodes.com/energy-codes-make-sense-with-or-without-the-clean-power-plan/

[25] Center for Climate and Energy Solutions, Greenhouse Gas Emissions Targets, https://www.c2es.org/us-states-regions/policy-maps/emissions-targets

[26] Regional Greenhouse Gas Initiative https://www.rggi.org/

[27] Assembly Bill 32 Overview https://www.arb.ca.gov/cc/ab32/ab32.htm

[28] U.S. EPA, Clean Power Plan for Existing Plant, https://www.epa.gov/cleanpowerplan/clean-power-plan-existing-power-plants; also see U.S. EPA, "Fact Sheet: Energy Efficiency in the Clean Power Plan" https://www.epa.gov/cleanpowerplan/fact-sheet-energy-efficiency-clean-power-plan for more on energy efficiency considerations and the State Plan Decision Tree https://www.epa.gov/sites/production/files/2015-08/documents/flow_chart_v6_aug5.pdf

quantification of energy efficiency could be used as a basis for allocating allowances to energy efficiency project owners or providers.

Template Purpose and Use

The purpose of this template is to be a tool to help states recognize options and opportunities for energy efficiency programs to contribute to air quality management and compliance. It is organized around a series of questions about a specific energy efficiency pathway, which can help illuminate the potential and likelihood for particular programs and policies to help prevent air pollution.

This template is designed for State Energy Offices (SEOs), in collaboration with other relevant agencies and organizations, to fill in. They could use the completed template in discussions with their air quality agencies on opportunities for the energy efficiency pathway described in the template to be considered in air quality planning and management. Air quality regulators may have differing needs depending on a state's context, such as NAAQS attainment status, regional haze requirements, state greenhouse gas goals, and other matters. However, this template can serve as a starting point.

The template highlights specific actions a state can take to achieve, quantify, and verify savings from energy efficiency efforts, and identify gaps that may need to be filled, to give confidence to air quality regulators that a particular pathway can deliver reliable energy savings and emissions avoidance. The actions and guidelines outlined in the template can be helpful for broad projections and planning or for formal regulatory purposes. As noted previously, broadly quantified projections are useful for air quality regulators to project likely impacts of programs to help achieve long-term emission and air quality objectives while more rigorous quantification and EM&V may be needed for formal crediting in SIPs or for issuance and trading of emissions credits and allowances (e.g., NOx Trading Program).

Some gaps that impede consideration of energy efficiency programs for air quality management may be bridgeable with existing data, tools, and technical assistance resources. Other gaps may be addressed through programmatic changes, such as implementing certain EM&V and related quantification practices or enhancing program and project reporting and tracking processes. Still others may illuminate the need for new or enhanced data, tools, and other resources to assure confidence in savings.

States can work with the National Association of State Energy Officials (NASEO), U.S. DOE, EPA, and others to identify gap-filling resources or, if those are lacking, inform the need for research, tool development, and technical assistance.

Next Steps: State Building Performance Lead-by-Example

Ideally, the SEO should partner with air quality regulators early to discuss each agency's areas of responsibility, topics of mutual interest, and collaborative opportunities, including recognizing energy efficiency benefits. The SEO should complete the template and have a dialogue with its air quality regulatory agency to familiarize the agency with building energy performance standards as an air quality management and compliance strategy and to familiarize the SEO with air regulatory requirements. The SEO and air quality regulators should bring in other pertinent agencies and stakeholders as appropriate.

The agencies should discuss available data and tools showing past and projected future savings from building energy performance standards. They should identify any information gaps or concerns that air quality regulators may have about the reliability of building energy performance standards as an

emissions avoidance tool. The state can consult with NASEO as well as with the U.S. DOE and EPA to help identify options for filling such gaps.

The state air quality agency, in partnership with the SEO, should also consult with the pertinent EPA Regional Office if formal inclusion and crediting in SIPs is sought to understand EPA expectations and requirements.

Energy Efficiency Pathway: State Building Performance Lead-by-Example

Note: Red, italicized text provides instructions to complete the template. Blue text describes the template fields that need to be completed. Black text represents model or example responses, as they might be filled in by a state.

Summary: Minnesota Sustainable Buildings 2030 Energy Standard

Following completion of sections 1-5, provide a high-level summary in the final column of this table. The first two columns can be drawn from the February 2016 State and Local Energy Efficiency Action Network document Guide for States: Energy Efficiency as a Least-Cost Strategy to Reduce Greenhouse Gases and Air Pollution and Meet Energy Needs in the Power Sector.

Key Issues	General Summary[29]	State-Specific Summary
FEASIBILITY: Can state building performance standards help achieve GHG and criteria air pollutant reductions in the required time frame?	• Yes. They reduce the amount of electricity generated and fossil fuel consumed at EGUs. Also, they can lower onsite combustion emissions from furnaces, boilers, and water heaters. Decreased energy demand yields emissions reductions.	**Section 1** New and renovated state-owned and state-bonded buildings and facilities must meet the Sustainable Building 2030 (SB2030) Energy Standard that phases in stepped reductions in allowable carbon-based fuel use from 60% reduction for 2010 (as compared to 2003) to 100% reduction for 2030.
APPROACH: How can a state achieve energy savings from state building performance standards?	• Authorize a state building performance program. • Designate and support a lead organization or agency to establish pertinent guidelines, standards, and other requirements, and provide technical tools and support. • Designate and support a lead organization or agency to administer the program and track compliance and progress. • Establish energy performance standards for applicable state or state-supported buildings. • Provide education, training, and technical assistance to state and state-supported building owners and operators	**Section 1** SB2030 was enacted by statute in 2008. It requires state-bonded projects starting design August 1, 2009 or later to meet standards that reduce carbon-intensity of energy use compared to average existing 2003 buildings. SB2030 Energy Standard requires 60% reduction in 2010; 70% in 2015; 80% in 2020; 90% in 2025; and 100% in 2030. Education, training, tools, and technical assistance are provided to designers, engineers, and building operators.

[29] State and Local Energy Efficiency Action Network. February 2016. *Guide for States: Energy Efficiency as a Least-Cost Strategy to Reduce Greenhouse Gases and Air Pollution and Meet Energy Needs in the Power Sector*

	and to architects, engineers, and builders. • Evaluate and track performance and compliance, including energy savings and avoided emissions.	Benchmarking and evaluation are part of implementation, as is an annual report to the legislature.
IMPACT: What energy savings and emission reductions can state building performance standards programs achieve, and are the savings permanent?	• Energy savings will be a function of the stringency of the adopted energy standard relative to current building energy code or typical practice. • Savings will also be a function of construction and renovation rates as older, less efficient buildings are replaced or renovated and new facilities are built to higher efficiency standards. • Resulting emission reductions vary with the amount and timing of energy savings and EGU emission profiles. Values can be determined with simple estimates or detailed modeling. • New and renovated building stock tend to be long lived.	**Section 2** SB2030 phases in more stringent carbon reduction targets every five years with a goal of 100% carbon reductions for buildings entering design stage in 2030. A Commerce 2015 report predicts that 78 building projects implemented to that point will save 490,000 MMBtu/year and 53,000 tons of CO_2-equivalent. Most SB2030 projects have not operated long enough to determine actual energy use and savings yet.
RELIABILITY: How are the impacts of state building energy performance programs documented?	• Actual energy use should be collected, normalized, and evaluated against the building energy standard as well as against building energy code or typical construction to derive verified savings. • Verified electricity savings can be translated into avoided emissions using eGRID, AVERT, or dispatch modeling; standard emissions factors can be used to calculate avoided emissions from reduced onsite fuel use by furnaces, boilers, water heaters, and other combustion equipment, or from savings of purchased steam or chilled water from a district energy system.	**Section 3** After project construction is completed, actual energy data are collected. The data are entered into a benchmarking tool for normalization. The results are then entered into the SB 2030 Program tracking tool so that the proposed and actual building energy use intensity (EIU) can be compared. The tracking tool produces an SB Sustainable Building Energy Label showing designed and actual energy performance.

RESPONSIBILITY: Who is responsible for administering and implementing state building performance programs, and what are the best practices?	• A lead state agency typically is responsible for administering the program. • Education, training, and technical assistance should be provided to architects, builders, and facility owners and operators. • Actual building/facility performance should be monitored, tracked, and reported to allow comparison with expected energy savings and assess efficacy of the standard.	**Section 4** State agencies and owners of state-bonded buildings are required to design and build new and substantially renovated buildings to the SB2030 Energy Standard and to provide annual updates of building performance including actual energy use. The Departments of Commerce (houses State Energy Office) and Administration have oversight responsibility for SB2030. Commerce supports technical assistance, analysis, and reporting. The Center for Sustainable Building Research (CSBR) at University of Minnesota is the designated lead for developing standards, technical support, and implementation. CSBR provides evaluations and assesses cost-effectiveness of the program. The utility ratepayer program provides funding support and utilities can be credited for savings through project incentives.
COST: What is the cost structure of state building performance standards program, and how much do they cost?	• State agencies or others subject to the building performance standard must build to the standard, so they absorb the costs of doing so. • Often building energy standards more stringent than building energy code will provide energy savings that pay for any incremental design and construction costs; costs can be comparable to that of typical construction; at higher stringency levels there can be net additional costs depending on stringency, energy prices, and other factors.	**Section 5** State agencies and state-bonded facility owners bear costs of meeting the SB2030 Energy Standard. Commerce reported in 2015 that average SB2030 construction costs were within 3% of average non-SB2030 construction costs. Projects are anticipated to deliver net savings considering energy use reductions. About $1 million per year of CIP (utility ratepayer funding) supports CSBR, Commerce, and Department of Administration in

	• The lead state agency or organization role can be funded by state general fund, energy supplier fee, fee-for-service arrangement, or utility ratepayer charges (public benefit fees).	administering SB2030 and providing education, training, tools, case study database, benchmarking, evaluation, and other pertinent activities.

Summary of Findings

If your state partners would like a text summary of findings, it can be placed here or at the end of the document. This can be a helpful way to offer conclusions after completing all worksheets.

Minnesota is implementing a state lead-by-example building energy performance standard program. SB2030 standards will require increasing reductions of energy-related CO_2 emissions from new and major renovated state-bonded buildings and facilities with a goal for the 2030 standard to be net-zero carbon emissions. Energy efficiency is the major route for compliance with likely increased renewable energy contributions needed as the program progresses.

The Departments of Commerce and of Administration are lead state agencies with purview over the program. Commerce, which includes the State Energy Office, also administers other energy programs and oversees the state's utility ratepayer-funded Conservation Improvement Program, which provides funding for SB2030 implementation. CSBR is designated as a program lead to establish the SB2030 Energy Standards, in collaboration with Commerce; provide training, education, and technical assistance; verify performance and compliance; and implement other aspects of SB2030.

State-bonded facility owners bear any costs of designing and building to the SB2030 Energy Standard, though early studies indicate construction costs comparable to that of non-SB2030 construction. Also, the program is designed not to compel building owners to undertake non-cost-effective upgrades. However, as SB2030 carbon reduction requirements become more stringent over time, there may be a need to examine other compliance approaches.

State-bonded facilities are subject to SB2030 and will be required to report performance subject to CSBR verification. SB2030 is still relatively new so there are relatively few data based on actual measurement of energy savings but the early data show significant energy and energy cost savings being achieved. As performance data are collected they will allow CSBR to more thoroughly assess programmatic impacts as well as individual project performance and conformity with the SB2030 Energy Standard.

The state has not yet projected future aggregate energy or emission impacts. If scenarios of future construction and major renovation of state-bonded facilities can be developed, energy and emission impacts of SB2030 can be projected. There is also consideration of extending SB2030 requirements to state-licensed and certain public buildings. Potentially the SB2030 could be extended to local public buildings, used as a voluntary "beyond code" standard, adopted by localities as "stretch code," or even eventually be incorporated into the state's building code.

While the fate of the EPA CPP is uncertain, its draft CPP EM&V guidance may be useful. There is a section on "project based measurement and verification" suitable for individual building and project energy savings M&V. The draft guidance also has a section on M&V of savings for building energy codes

that can be applicable because in some respects the SB2030 building performance standard resembles building energy codes. The EM&V guidance discusses modeling and indirect estimation approaches for evaluating building energy code savings, an approach that could be applicable to SB2030. These approaches can confirm building energy standard-related savings and be used to confirm efficacy of building energy standards as an energy efficiency and emission avoidance strategy, whether for criteria air pollutants or for state CO_2 and greenhouse gas goals. EPA has previously recognized energy efficiency as a NOx emission reduction measure in a SIP for the ozone NAAQS.[30]

State lead-by-example building energy standards offer good potential for recognition and inclusion in state energy planning and in air quality management and planning.

State Building Performance Lead-by-Example Pathway Description

Provide a brief description of the energy efficiency pathway and the state's program(s) for implementing it. Succinctly describe how energy savings are achieved; for some approaches, such text may be derived from the SEE Action Guide for States.[31]

Building performance policies for buildings owned, leased, funded, or licensed by public agencies offer an important means for states to achieve energy cost savings and reduced environmental impact and to "lead-by-example" to encourage improved energy and environmental performance of private sector buildings.

State and local governments across the United States own or lease 16 billion square feet of building space. Energy costs for these buildings can account for as much as 10 percent of a typical government's annual budget.[32] State building performance policies reduce energy use and costs for new and existing state-owned buildings and, in some jurisdictions, state-leased and state-bonded or funded buildings. States can set mandatory energy savings targets for new and existing buildings. They can require energy benchmarking and disclosure, conduct energy audits, and require periodic retro-commissioning as well. Further, states can require new or substantially renovated buildings to meet standards that are more stringent than general building energy codes, such as "stretch codes" or nationally recognized standards like ENERGY STAR and LEED certification.

Minnesota's Sustainable Buildings 2030 (SB 2030) is a state lead-by-example program to advance energy efficiency and reduce energy-related GHG emissions for state-owned and state-bonded facilities. The program is based on the national Architecture 2030 challenge of designing and constructing new buildings and major renovations to meet increasing levels of fossil fuel reductions with a carbon neutrality objective as a 2030 design standard.

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[30] See https://www.tceq.texas.gov/airquality/stationary-rules/nox/eere.html; the Texas A&M University Energy Systems Laboratory provides analytic support, including quantification of energy savings and emissions avoidance, see http://esl.tamu.edu/terp/.

[31] State and Local Energy Efficiency Action Network. February 2016. *Guide for States: Energy Efficiency as a Least-Cost Strategy to Reduce Greenhouse Gases and Air Pollution and Meet Energy Needs in the Power Sector*

[32] U.S. Environmental Protection Agency (EPA) (2009). "State Lead by Example Guide: Strategies, Resources, and Action Steps for State Programs." Prepared by Joanna Pratt and Joe Donahue, Stratus Consulting, Inc. cited in ibid.

Section 1: State Lead-by-Example Standard and Implementation (Feasibility and Approach)

Succinctly describe what activities are required to implement this pathway to achieve energy savings; the SEE Action Network Guide for States[33] can be a helpful resource. Then complete the worksheet tables with state-specific information.

The state enacted a statute requiring state-bonded buildings to meet standards that reduce carbon-intensity reductions relative to average comparable buildings in a base year (here 2003). It established percentage reduction goals phased in 5-year increments.

The state assigned oversight responsibilities to the Department of Commerce (houses the State Energy Office) and Department of Administration. It also designated an academic center (Center for Sustainable Building Research at the University of Minnesota) as a lead for developing standards, technical support, and implementation. Statute also authorized budget to these entities via the state's existing ratepayer-funded Conservation Improvement Program to support administration and oversight, implementation, technical assistance, and reporting. Further, utilities can be credited under the state's energy efficiency resource standard for energy savings provided by project incentives.

The state provides education, training, tools, and technical assistance to designers, engineers, and building operators. The program requires benchmarking, evaluations, and reporting by project/building owners as well as Commerce's annual reporting to the legislature.

Section 1 State Worksheet: Building Performance Standard

What is the state's lead-by-example standard?

State-bonded buildings are required to meet the SB2030 Energy Standard in force at the time of the project's design. The standard is revised every five years with the intent of delivering greater carbon reduction (and energy savings) with each iteration leading to 100% energy-related carbon emissions reduction in the 2030 standard. For new buildings, relative to typical buildings in existence in 2003, the SB2030 Energy Standard targets for reductions in energy-related carbon emissions are:

- 2010: 60%
- 2015: 70%
- 2020: 80%
- 2025: 90%
- 2030: 100%

Meeting the SB2030 Energy Standard saves energy and, thus, avoids energy-related emissions relative to building to state building energy code standards.

SB2030 is designed to avoid requiring state-bonded projects to perform upgrades that are not cost-effective.[34] The SB2030 program includes benchmarking and ongoing annual energy monitoring and

[33] State and Local Energy Efficiency Action Network. February 2016. *Guide for States: Energy Efficiency as a Least-Cost Strategy to Reduce Greenhouse Gases and Air Pollution and Meet Energy Needs in the Power Sector*

[34] Projects and activities are construed as cost-effective if they deliver net benefits to the consumer or society. Minnesota Department of Commerce, 2015, "Conservation Applied Research and Development (CARD), Clean Energy Resource Teams (CERT), and Sustainable Buildings 2030 (SB2030), 2015 Report," p. 17.

reporting requirements. Guidance, training, and technical assistance extend from design and construction stages through occupancy and operations. A case studies database is also maintained to provide public information on SB2030 projects, including design and building performance "scorecards" and SB2030 compliance status. The SB2030 scorecards sometimes include water, waste, and indoor environment scores as well as energy and carbon parameters.
Are related activities occurring or contemplated that can contribute additional savings? There are proposals to extend the SB2030 requirements to state-licensed buildings (includes certain healthcare facilities, nursing and supervised living, and correctional facilities) and other public buildings. There are also proposals for the SB2030 Energy Standard as a voluntary "above-code" standard and for local option "stretch codes." These would require legislative or administrative actions.

Section 1 State Worksheet: Building Performance Standard – Follow Up Items

Information gaps and questions that arise can be entered for consideration and follow up attention.

Information gaps:
Critical questions to answer:
Other:

Section 2: Energy Savings and Emissions Reductions (Impact)

Succinctly describe how energy savings and emission reductions are achieved through this pathway; the SEE Action Guide for States[35] can be a helpful resource. Then complete the worksheet tables with state-specific information.

Compliance with the SB2030 Energy Standard will decrease carbon-intensity of energy use relative to average buildings and buildings meeting the statewide building energy codes. It will have the effect of reducing other pollutant emissions. Emissions avoidance will accrue from reduced electricity and onsite fuel (e.g., natural gas) consumption (as well as reduced purchased steam or chilled water for building served by district energy systems) relative to constructing to meet the state building energy code.

Once energy savings are quantified, they can be translated into avoided emissions. As discussed previously under "Options for Quantification and Rigor" and "Tools and Resources to Assist with Quantifying Savings," there are a variety of tools and approaches for doing this. Such tools as eGRID and AVERT can translate electricity savings into estimated emissions avoidance. The ACEEE SUPR tool can project electricity savings and avoided emissions for selected energy efficiency program types.

For onsite combustion of natural gas and other fuels for space and water heating and industrial processes, there are established emissions factors from the EPA[36] as well as industry, manufacturer, and other sources to allow calculation of pollution avoidance.

For example, if the difference in annual electricity use between an SB2030 compliant building and an equivalent building built to the general building energy code is estimated then CSBR, Commerce, or the Minnesota Pollution Control Agency could take those MWh savings and multiply it by the relevant eGRID non-baseload average emissions factor to provide estimated avoidance of CO_2, NOx, and SO_2. The MWh savings entered into the AVERT tool can provide a more precise estimate based on historic marginal emissions rates. If monthly, daily, or up to hourly savings data are entered in AVERT, more precise and temporally relevant avoided emissions (such as for considering ozone season impacts) can result. Likewise, natural gas savings in therms or Btus provided by M&V reports can be translated using standard emission factors.

Avoided emissions can be broadly estimated and projected for broad air quality management planning purposes even if no formalized "credit" under air quality rules is sought. Or more rigorous quantification may provide emissions reductions that can be formally credited under SIPs, state emission goals, or other programs. State air quality regulators should consult EPA on requirements for formalized recognition and crediting under Clean Air Act regulations.

While currently beyond the focus of this template, states could consider energy savings benefits to water resources (water savings, water quality), avoided waste, land, and other resource impacts. Indeed, SB2030 includes benchmarking and reporting that results in a "scorecard" for each project that addresses water consumption, stormwater, construction waste, and indoor environment factors.

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[35] State and Local Energy Efficiency Action Network. February 2016. *Guide for States: Energy Efficiency as a Least-Cost Strategy to Reduce Greenhouse Gases and Air Pollution and Meet Energy Needs in the Power Sector*

[36] U.S. EPA, AP-42: Compilation of Air Pollution Emission Factors. https://www3.epa.gov/otaq/ap42.htm

Section 2 State worksheet: Energy Savings and Emissions Reductions

Does the state have energy savings goals related to this pathway?

SB2030 Energy Standard goals are for energy savings resulting in percentage reductions of energy-related CO_2 emissions relative to 2003 buildings. Those percentages were indicated previously.

There are no state-wide aggregate numerical energy savings goals under SB2030. Savings to be gained from the program will depend on the rate and time of construction and major renovation of state-bonded building subject to the SB2030 Energy Standard.

Expansion of SB2030 applicability to state-licensed buildings (certain building subject to state approvals) is under consideration but is not now in effect.

Are there consequences of not meeting the targets?

N/A

What are historical energy savings?

The Department of Commerce reports the following verified savings as compared to meeting building energy code:[37]

- 2013 Report: 40 projects saved $3.25 million (250,000 MMBtu) per year in energy for operations.
- 2014 Report: 66 projects saved $5.24 million (327,000 MMBtu) per year in energy for operations.
- 2015 Report: estimates that 78 buildings will save $7.04 million (490,000 MMBtu) per year.

Data separating electricity savings from natural gas or other onsite fuel use have not been published.

What future energy & emission savings estimates have been produced and using what assumptions?

The state has not projected future aggregate energy savings or emissions impacts from SB2030 based on any scenarios of future state-bonded building construction activity nor for potential future expansion of SB2030 to a broader set of buildings (e.g., state-licensed and public buildings).

Are other environmental impacts estimated?

The SB2030 Energy Standard is based on achieving carbon-based energy use reductions. The current and planned future required reductions (relative to typical 2003 performance) for individual buildings or facilities is presented above.

Commerce's 2015 Reports estimates that the 490,000 MMBtu savings from 78 projects avoided 53,000 tons of CO_2-equivalent.

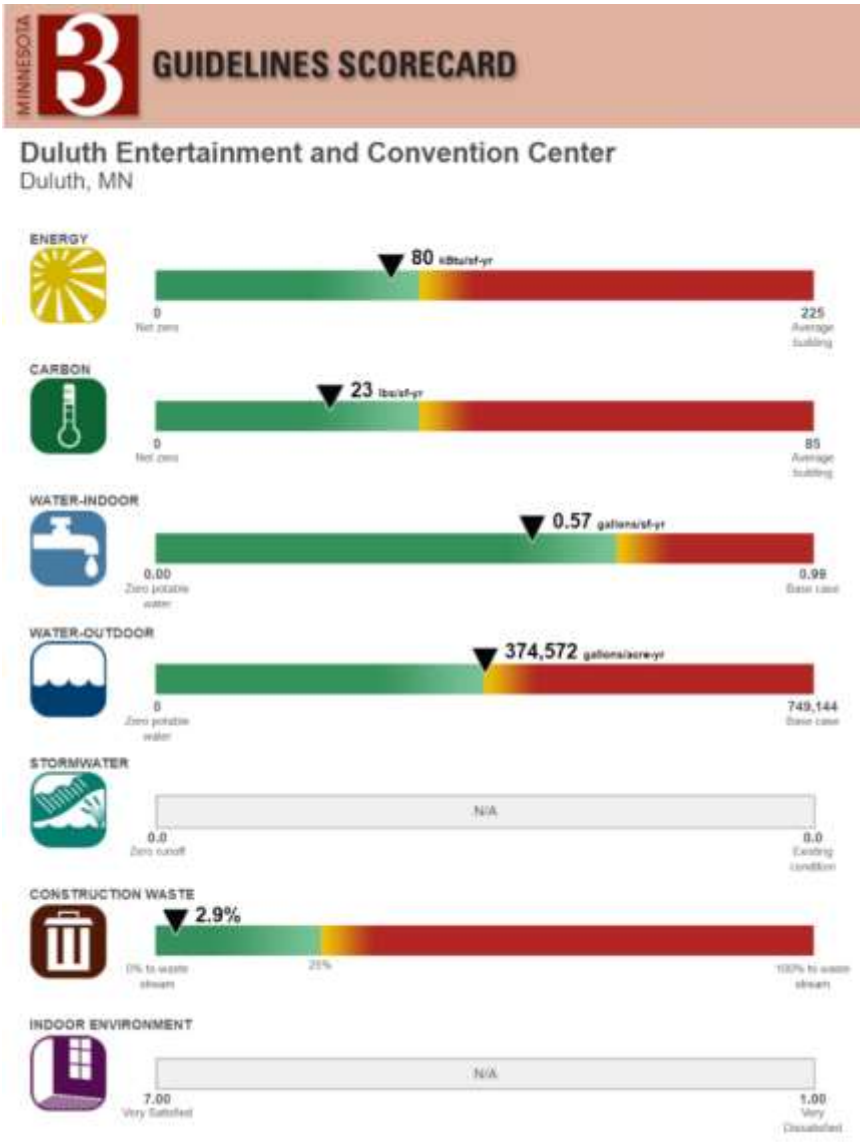
Breakdown of savings into electricity and direct onsite fuel use (such as natural gas) would allow estimation of avoided emissions of CO_2 and criteria pollutants.

[37] Minnesota Department of Commerce, 2015, "Conservation Applied Research and Development (CARD), Clean Energy Resource Teams (CERT), and Sustainable Buildings 2030 (SB2030), 2015 Report," p. 17.

Are other non-energy benefits estimated?

While energy and CO_2 are the main foci for SB2030, other non-energy benefits can also be assessed. CSBR develops "scorecards" for individual projects that provide projected as-designed and, when available, actual measured performance for energy use intensity (EUI), carbon intensity of energy use, and several water, waste, and indoor environment metrics. CSBR posts scorecards, individual project information, and SB2030 compliance status on a Case Studies Database. [38] Figure 2 shows the scorecard for the Duluth Entertainment and Convention Center.

Figure 2. Example Scorecard for a Facility Subject to SB2030



[38] http://casestudies.b3mn.org/Projects?ViewMode=TableView

Tip: If electricity savings data are available, the EPA Emissions and Generation Resource Integrated Database (eGRID) provides regional average and average non-baseload emission factors for electric power-sector CO_2, NOx, SO_2, methane, and nitrous oxide emissions.[39] The EPA AVoided Emissions geneRation Tool (AVERT) allows for more detailed analyses of avoided emissions on a regional basis.[40] The AVERT tool allows entry of energy savings data on temporal scales from annual to hourly, which, if temporal savings data are available, can provide more precise emission impact estimates and can support air quality management focused on seasonal ozone levels.

[39] See https://www.epa.gov/energy/egrid

[40] See https://www.epa.gov/statelocalclimate/avoided-emissions-and-generation-tool-avert

Section 2 State Worksheet: Energy Savings and Emissions Reductions Estimates – Follow Up Items

Information gaps:
Currently, SB2030 data related to projected and verified energy savings for projects and the full program do not separate electricity from natural gas and other onsite fuel use and savings. Separate data on electricity and onsite fuel savings will be needed to consider SB2030 for air quality management and planning purposes.

Critical questions to answer:
Can separate electricity and natural gas or other onsite fuel use and savings be ***projected*** for each project subject to SB2030 and for the program?

Can separate electricity and natural gas or other onsite fuel use and savings be ***collected*** and ***reported*** for each project subject to SB2030 and for the program?

Can scenarios (low, medium, and high) of future SB2030-applicable construction and renovation activity be developed along with projected energy and emissions savings?

Other:

Section 3: Approach to Energy Savings and Emissions Reductions Documentation (Reliability)

Succinctly describe how energy savings and emissions reduction values are determined for this pathway; the SEE Action Guide[41] can be a helpful resource. Then complete the worksheet tables with state-specific information.

For projection purposes, designed and modeled energy performance (based on the SB2030 Energy Standard in this case) can be compared with an established baseline performance based on building energy code or average or typical practices during a base year or period.

Actual energy performance is reported and compared against the state's building energy standard (SB2030 Energy Standard in this case) to which the building was designed to assess compliance with the standard. This also provides information to compare energy use against minimum building energy codes or other baseline building performance to assess energy savings.

States can implement broader state or public building energy monitoring and management programs that can track energy use and savings across a fleet of buildings and facilities (whether subject to the SB2030 Energy Standard or not, and for evaluation of savings from other programs, projects, and initiatives, such as energy efficiency upgrades of existing buildings and behaviorally-based energy efficiency initiatives).

Differentiating between electricity and onsite fuels (such as natural gas), as well as other energy inputs (such as steam or chilled water supplied to the building or facility by a district energy system) allows translation of energy use and savings into emissions impacts. As previously noted, EPA tools such as eGRID and AVERT can be used to estimate electric grid emission impacts. Emissions impacts from onsite fuel, as well as purchased steam or chilled water from district energy systems, can be calculated based on published emissions factors, equipment specifications, and other data sources. .

Section 3 State Worksheet: Approach to Estimation and EM&V

Are energy savings (electricity and other fuels) regularly estimated or measured? Yes. Buildings subject to the SB2030 Energy Standard are required to undergo benchmarking and report actual energy use. CSBR will compare reported performance with as-designed projected use and the reductions required under the SB2030 Energy Standard in force at the time of project design.
Is there currently an evaluation, monitoring, and verification (EM&V) process to confirm energy savings estimates? SB2030 requires reporting and verification of energy usage. CSBR is responsible for tracking such data to verify performance and compliance with the SB2030 Energy Standard applicable for each project. CSBR will post annual performance data via its Case Studies Database.
Are additional efforts needed to verify energy savings? Separation of electricity from natural gas or other onsite fuel savings would needed if savings are to be used for air quality crediting purposes.

[41] State and Local Energy Efficiency Action Network. February 2016. *Guide for States: Energy Efficiency as a Least-Cost Strategy to Reduce Greenhouse Gases and Air Pollution and Meet Energy Needs in the Power Sector*

To what extent can energy and emissions estimates be relied upon for planning and decision making? (e.g., general estimate of benefits, verified and attributed, other) Currently required reporting and verification of energy use and savings once buildings begin operating may be sufficient to support validation and crediting of savings. Future projections of energy savings and emission avoidance can be made for individual projects entering design stage or in the process of design and construction based on the SB2030 Energy Standard. The state does not currently project future construction that will be subject to SB2030, whether of state-bonded projects or potential expansion of requirements to additional construction categories (e.g., state-licensed building, locality public building, local "stretch code") so future projections for the full program are not yet developed.

Section 3 State Worksheet: Approach to Estimation and EM&V – Follow Up Items

Information gaps and questions that arise can be entered for consideration and follow up attention.

Information gaps:
Critical questions to answer:
Other:

TIP *Tip: For various Clean Air Act programs, the state can disaggregate electricity from non-electricity consumption using utility, National Laboratory, or Energy Information Administration data as may be available.*

TIP *Tip (Codes): EPA published draft EM&V Guidance for demand-side energy efficiency under the Clean Power Plan in 2015 that may still be useful in the absence of a CPP for supporting other state energy and emission objectives. The document discusses EM&V of building energy code programs which are analogous to state building performance standards. It also offers guidance on "project based M&V" for M&V of individual project savings which is also applicable to state lead-by-example building performance standards. The IPMVP, FEMP M&V Guidance, ASHRAE Guideline 12-2002, and U.S. DOE Uniform Methods Project are recognized as best practice guidelines and protocols and well-established deemed savings databases and Technical Reference Manuals can also be used.*

Section 4: Policy Implementation (Responsibility)

Succinctly describe who in the state is responsible for implementing the pathway and ensuring energy savings are achieved; the SEE Action Guide[42] can be a helpful resource. Then complete the worksheet tables with state-specific information.

State-bonded building owners and operators are responsible for meeting SB2030 Energy Standards for new and major renovation building construction.

The Departments of Commerce and Administration have programmatic responsibilities to oversee, track, and report on SB2030 compliance and impacts. CSBR is charged with developing the SB2030 standards. CSBR and Commerce develop and offer training and education, technical assistance, tool kits and other resources, and have responsibilities related to tracking, verifying savings and compliance, reporting, and other matters.

Section 4 State Worksheet: Implementation

What legal authority governs (statute, regulation, executive order, other) this pathway? Minnesota Statute 216B.241 Subdivision 9 was enacted in 2008 to create the Minnesota Sustainable Building 2030 standards.[43]
Who is responsible for achieving savings? What happens if they are not achieved? The owners of projects subject to SB2030 are responsible to assure that the project is designed and built to meet the SB2030 standard. The Departments of Commerce (which houses the State Energy Office) and Administration have oversight responsibilities for SB2030. The law designated the Center for Sustainable Building Research (CSBR) at the University of Minnesota as the lead to develop the program. CSBR, in cooperation with Commerce, was charged to "establish cost-effective energy-efficient performance standards for new and substantially reconstructed commercial, industrial, and institutional buildings that can significantly reduce carbon dioxide emissions by lowering energy usage in new and substantially reconstructed buildings."[44] The statute requires state-bonded buildings entering the schematic design stage after August 1, 2009 to meet the SB2030 Energy Standard. Minnesota Statute 216B.241 also requires utilities to develop and implement programs to help building owners energy savings objectives through design assistance, incentives, and verification activities. Utility ratepayer funding through Minnesota's Conservation Improvement Program (CIP) financially supports administrative and technical activities of SB2030.
Who monitors and verifies savings? SB2030 requires reporting and verification of energy usage. Project owners are responsible for reporting building energy performance. CSBR is responsible for tracking such data to verify

[42] State and Local Energy Efficiency Action Network. February 2016. *Guide for States: Energy Efficiency as a Least-Cost Strategy to Reduce Greenhouse Gases and Air Pollution and Meet Energy Needs in the Power Sector*

[43] Minnesota Statutes 216B.241 Subd. 9, https://www.revisor.mn.gov/statutes/?id=216B.241

[44] Minnesota Department of Commerce, 2015, "Conservation Applied Research and Development (CARD), Clean Energy Resource Teams (CERT), and Sustainable Buildings 2030 (SB2030), 2015 Report," p. 16.

performance and compliance with the SB2030 Energy Standard applicable for each project. CSBR will post annual performance data via its Case Studies Database.
What more is needed to monitor and verify savings? Separation of electricity from natural gas or other onsite fuel consumption and savings would be useful for energy planning and utility energy efficiency crediting (where utilities provide incentives) , and would be required for consideration of the program for air quality management and planning purposes.

Section 4 State Worksheet: Implementation -- Follow Up Items

Information gaps and questions that arise can be entered for consideration and follow up attention.

Information gaps:
Critical questions to answer:
Other:

Section 5: Costs and Funding Mechanisms

Succinctly describe how what costs are needed to implement this pathway and where funding comes from – or could come from. The SEE Action Guide for States[45] can be a helpful resource. Then complete the worksheet tables with state-specific information.

Costs and benefits of designing and building to the SB2030 standard accrue to project owners. Project owners also bear certain costs of benchmarking and reporting to the state. State legislation authorizes funding from the state's utility-ratepayer-funded energy efficiency program (Conservation Improvement Program-CIP) to support guideline development, benchmarking, verification, technical assistance, and administrative costs of the program.

Section 5 State Worksheet: Costs and Funding Mechanisms

How are implementation costs funded? Project owners bear the costs to design and build to the SB2030 Energy Standard and to comply with any reporting requirement. In some cases, there may be utility incentive funding available to support project design and incent energy efficiency measures. The Department of Commerce reports that building to the current SB2030 Energy standard is within 3% of typical building construction costs but notes that new strategies will be needed as progressively more stringent standards approach net-zero carbon in 2030.[46] The SB2030 process is designed not to require state-bonded projects to undertake upgrades that are not cost-effective (defined as offering net benefit to consumers or society). Energy efficiency requirements can be adjusted in cases of projects that cannot meet the SB2030 Energy Standard cost-effectively.
How have costs / funding varied over time? Total SB2030 program costs through December 2014 amounted to $3.3 million. Statute authorizes CIP funding for SB2030; up to $500,000 per year to contract CSBR in support of SB2030 and up to $500,000 for Commerce and the Department of Administration to support facility energy efficiency guidelines, benchmarking, and verification.[47]
How certain is future funding? As noted, project owners cover the costs of meeting the SB2030 standard. Also as noted, SB2030 requirements are designed not to require non-cost-effective upgrades. Funding for oversight and support of SB 2030 by Departments of Commerce and Administration and of CSBR is subject to legislative appropriation and has been stable.
What funding would be needed to fully implement the pathway and document energy savings?

[45] State and Local Energy Efficiency Action Network. February 2016. *Guide for States: Energy Efficiency as a Least-Cost Strategy to Reduce Greenhouse Gases and Air Pollution and Meet Energy Needs in the Power Sector*

[46] Ibid. p. 18. These figures appear to include performance from state-required SB2030 building projects and a number of projects that have voluntarily opted to conform to SB2030.

[47] Minnesota Statutes 216B.241 Subd. 1e and 1f, https://www.revisor.mn.gov/statutes/?id=216B.241

Project owners incorporate the costs of meeting SB2030 in their construction and renovation; they also absorb benchmarking and reporting costs. As noted, Commerce. Administration, and CSBR require continued funding to develop new SB2030 Energy Standards, provide administration and oversight of the program, and provide education, training, tools, and technical assistance needed to assure program implementation and success.

Section 5 State Worksheet: Cost and Funding -- Follow Up Items

Information gaps and questions that arise can be entered for consideration and follow up attention.

Information gaps:
Critical questions to answer:
Other:

Next Steps: Minnesota Sustainable Buildings 2030

CSBR and Commerce should continue efforts to better quantify and track SB2030 energy savings and avoided emissions. Energy savings should distinguish electricity savings from that of onsite fuels such as natural gas as well as any applicable district energy system savings. This will be important for estimating emissions impacts and for applicability as an air quality regulatory compliance approach. For example, some Clean Air Act rules can only "count" electricity system related energy savings (or renewable power generation) whereas consideration for National Ambient Air Quality Standards (NAAQS) purposes could consider both avoided fossil fuel electric power generation and reduced onsite combustion.

Projections of future SB2030 energy savings and avoided emissions should be developed using several scenarios of future state-bonded building projects and, potentially, of expansion of the program to state-licensed and public building sectors.

Commerce and CSBR should continue their interactions with the Minnesota Pollution Control Agency (MPCA) on energy efficiency as an opportunity and strategy for pollution reduction.

The agencies should discuss available data and tools showing past and projected savings. They should identify any information gaps or concerns that air regulators may have about SB2030 as an emissions avoidance tool. The state can consult with NASEO as well as with the U.S. DOE and EPA to help identify options for filling such gaps.

Appendix: Minnesota Sustainable Buildings 2030 Energy Standard

To include any relevant Helpful Resources, Detailed Calculations, Additional Questions

Helpful Resources

Buildings, Benchmarks & Beyond: Tools and Programs for Sustainable Buildings in Minnesota, http://www.b3mn.org/

- B3 Sustainable Building 2030 Energy Standard, http://www.b3mn.org/2030energystandard/
- B3 Guidelines Version 2.2 (formerly the Minnesota Sustainable Building Guidelines), http://www.b3mn.org/guidelines/
- Energy Efficient Operations Manual, http://www.b3mn.org/operations/
- Buildings, Benchmarls & Beyond Case Studies Database, http://casestudies.b3mn.org/

Minnesota Department of Commerce, 2015, "Conservation Applied Research and Development (CARD), Clean Energy Resource Teams (CERT), and Sustainable Buildings 2030 (SB2030), 2015 Report."

National Association of Clean Air Agencies, "Implementing EPA's Clean Power Plan: Model State Plans." http://www.4cleanair.org/sites/default/files/Documents/5_30_2016_NACAA_State_Models_FINAL.pdf

State and Local Energy Efficiency (SEE) Action Network, "Guide for States: Energy Efficiency as a Least-Cost Strategy to Reduce Greenhouse Gases and Air Pollution, and Meet Energy Needs in the Power Sector." https://www4.eere.energy.gov/seeaction/eepathways

U.S. Department of Energy, State and Local Solution Center, http://energy.gov/eere/slsc/state-and-local-solution-center

U.S. Environmental Protection Agency, AVoided Emssions and geneRation Tool (AVERT), https://www.epa.gov/statelocalclimate/avoided-emissions-and-generation-tool-avert

U.S. Environmental Protection Agency, Emissions and Generation Resource Integrated Database (eGRID), https://www.epa.gov/energy/egrid

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