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Introduction

The Public Service Commission of Wisconsin (Commission), as part of its contract with The Cadmus Group (Cadmus) as Focus on Energy's (Focus) independent third-party evaluator, has approved an energy efficiency potential study to inform planning and decision-making for Quadrennial Planning Process IV of Focus.[1]

The potential study officially kicked off in May 2020 with a virtual stakeholder meeting where Commission and Cadmus staff presented background information on Quadrennial Planning, the study's timeline and objectives, a summary of a similar study completed in 2017 to inform Quadrennial Planning Process III, and anticipated opportunities for stakeholder involvement. Three additional stakeholder meetings were held over the remainder of 2020, covering topics including study methodology and terminology, data collection, sector segmentation, energy efficiency measures to be analyzed, and modeling scenarios, among other topics.

The purpose of this document is to address frequently asked questions that have emerged through the stakeholder engagement effort thus far. Furthermore, this document will note specific instances where stakeholder input has shaped the study's approach.

What is the purpose of the study?

The primary objective of the study is to assess Focus' energy efficiency savings potential from 2023 through 2034. Results from the study provide foundational information to the Commission and stakeholders in assessing the appropriate goals, priorities, and measurable targets for the 2023-2026 quadrennium of Focus.

Savings potential estimates produced by the study are not intended to translate directly into program potential savings. Rather, these estimates are an indicator of available savings potential under various policy and funding conditions. Though the study is intended to provide insights into which measures Focus could offer in the future, the study is limited in its ability to fully account for a host of exogenous factors impacting the ability of the program to deliver savings, including program implementation barriers and future market or policy changes.

What is technical potential?

Technical potential represents the theoretical *maximum commercially available* savings opportunities.

[1] The Potential Study is a component of Cadmus' Focus on Energy 2019-2023 evaluation contract approved in the Commission's Final Decision of June 26, 2019. (PSC REF#: 370599.)

Technical potential assumes all technically feasible energy efficiency measures commercially available at the time of the study will be implemented, regardless of their costs or of any market barriers. This theoretical upper bound of available energy efficiency potential is estimated after accounting for technical constraints, such as the number of buildings and the percentage of buildings that can accommodate specific measures. For energy efficiency resources, technical potential can be divided into three distinct classes:

- Retrofit opportunities in existing buildings
- Equipment replacements in existing buildings
- New construction

Customers can implement the first class, which exists in current building stock, at any point in the planning horizon. Examples of retrofit measures, which reduce the consumption of end-use equipment without modifying or replacing that equipment, include insulation, faucet aerators, and lighting controls. On the other hand, the potential model assumes that end-use equipment turnover rates and new construction rates dictate the timing of the other two classes. Furnaces and heat pumps are examples of measures in these categories.

What is economic potential?

Economic potential represents all theoretical savings opportunities that are also *cost-effective* to implement now.

Economic potential represents a subset of technical potential and consists only of measures meeting the cost-effectiveness criteria, set by the Modified Total Resource Cost (MTRC), approved by the Commission for use as Focus' primary cost-effectiveness test. For each energy efficiency measure, the study structures the benefit/cost test as the ratio of net present values for the measure's benefits and costs, using the benefit and cost inputs approved by the Commission for the 2019-2022 quadrennial period. Only measures with a benefit/cost ratio of 1.0 or greater are deemed cost-effective.

The study also considers scenarios of cost-effectiveness thresholds in estimating economic potential.

What is optimized potential?

Optimized potential represents all theoretical cost-effective savings opportunities that could realistically be achieved if program funding were not constrained.

Optimized potential represents the portion of economic potential that might be assumed reasonably attainable over the course of the planning horizon, given minimal implementation barriers to impede customer participation in Focus on Energy programs.[2] As measured in this study, optimized potential excludes the consideration of Focus funding constraints. As a result, optimized potential is an estimate of the cost-effective energy efficiency savings potential that could be realized when funding is not a limiting factor.

[2] Optimized potential was characterized as "maximum achievable potential" in the previous potential study.

Optimized potential is determined by applying an upper bound on the amount of long-term economic potential that will ultimately be adopted by consumers over the study period.[3] The approach places an upper limit on the amount of economic potential that is achievable, based on historic program accomplishments and impacts of codes and standards on the adoption of energy efficiency measures. To reflect adoption of different technologies over time, the study applies market adoption rates to energy efficiency measures. These rates of adoption, also known as ramp rates, reflect differing adoption patterns of technologies at different stages of market maturity.

Cadmus uses an upper bound of eighty-five percent cumulative adoption for most measures. In other words, at its highest level of market adoption, most measures would be adopted by 85 percent of end-use consumers. This upper limit is intended to capture the phenomenon that even when particular technologies have high levels of market maturity, some end users will still not adopt them due to a variety of factors which may include cost or personal tastes and preferences. For measures with minimum federal efficiency standards, Cadmus uses an upper-bound of ninety-five percent cumulative adoption.

To assign ramp rates to the study's measures, Cadmus and the Commission will engage stakeholders in the industry including market experts. Stakeholders will review ramp rate assignments and will be given the opportunity to provide input on the most appropriate ramp rates to be used to model optimized potential.

What is current policy potential?

Current policy potential is a subset of optimized potential, constrained by the current annual Focus budget and in consideration of the equitable balance of ratepayer funding, such as splits between fuels and customer classes. To estimate current policy potential, the study applies measure incentives based on current amounts, expressed as a percentage of incremental cost. Cadmus uses proxy incentives developed for non-program measures and emerging technologies. Optimized potential (see above) is scaled to current policy potential by applying the current Focus budget as a modeling constraint. Total budget amounts include both incentives and implementation and administrative costs, based on recent Focus experience.

The study also considers additional scenarios of funding between current policy and optimized potential.

What is the role of the potential study in the planning of Focus on Energy?

The potential study is the first step in a multi-year planning process for the next quadrennium of Focus. The potential study will be submitted in advance of the Commission's scope determinations for Quadrennial Planning Process IV. The findings and conclusions of the potential study may be considered when the Commission evaluates decision areas for Quadrennial Planning Process IV. The Commission will release a request for comments on the appropriate scope of the Quadrennial Planning Process IV in the fall of 2021. This request will

[3] A similar approach is used by the Northwest Power and Conservation Council, a regional energy planning organization in the Pacific Northwest region of the United States.

provide additional information and instructions for any stakeholder, including members of the public, wishing to provide formal written comments to the Commission.

The potential study is only one of many sources of information that should be considered when establishing the scope for Quadrennial Planning Process IV. Commission decisions and direction in past and current Quadrennial Planning Processes[4], Focus program data, industry research, considerations of environmental and energy policy goals (e.g., Gov. Evers Executive Order 38), and information from other relevant Commission dockets are examples of other important sources that may also play a role in establishing the scope of Quadrennium IV of Focus.

How does the study's cost/benefit screening assess the benefits of measures that save energy during times of peak load?

The potential study is limited in its ability to generate a detailed accounting of the costs and benefits of measures that save energy during times of peak load. The potential study calculates a measure's costs (incremental measure costs) and benefits (energy and demand savings) in accordance with the most current Focus Technical Reference Manual (TRM). Currently, Focus does not calculate costs and/or benefits for particular hours of the year. Reductions in electric demand are assumed to be spread evenly over the summer peak period, which is currently defined for Focus as non-holiday weekday afternoons from 1:00 p.m. to 4:00 p.m. in the months of June, July, and August. Research analyzing the appropriateness of this definition is ongoing. Focus on Energy does not apply a winter peak definition.

Emissions reductions associated with energy savings achieved by Focus are calculated using the U.S. Environmental Protection Agency's Avoided Emissions geneRation Tool (AVERT).[5] Focus does not currently utilize hourly load shapes in its calculation of energy savings; energy savings are evenly distributed throughout the year. The quantity of emissions displaced are therefore calculated by applying a constant emissions factor (tons of carbon/MWh of generation avoided) to the units of energy saved over the lifetime of the measure. This emissions factor is derived using historic hourly generation and emissions data for the AVERT regions in Wisconsin.

Historical policy decisions factor significantly into Focus' current approach to accounting for measure level costs and benefits during times of peak load. In past quadrennial planning processes, the Commission has elected to emphasize energy savings over demand savings.[6] As a result, programs and technologies offered by Focus have generally not targeted achieving demand savings and the investment of program resources into a comprehensive and detailed accounting of the costs and benefits of demand reductions has not aligned with Commission priorities.

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[4] For Commission decisions in past Quadrennial Planning Processes, please refer to: PSC REF#: 141173 (Quad I), PSC REF#: 215245 (Quad II), and PSC REF#: 343909 (Quad III).
[5] U.S. EPA Avoided Emissions and geneRation Tool (AVERT) https://www.epa.gov/statelocalenergy/avoided-emissions-and-generation-tool-avert
[6] Please see: PSC REF#: 343909; PSC REF#: 215245; and PSC REF#: 141173.

The 2017 Potential Study and other potential studies use the term "achievable potential." Why isn't this study also using that term?

The term achievable potential is commonly used in energy efficiency potential studies. However, the appropriateness of the term is often debated. Input received during the first and second stakeholder meetings for this potential study indicated a strong preference toward an alternative term. In particular, stakeholders noted that the term may inadvertently send a confusing message to readers of the potential study report by indicating that savings beyond what is depicted as "achievable" could not be attained when, in fact, savings typically identified as "achievable" are constrained by factors outside of the direct control of most energy efficiency programs. Stakeholders were supportive of terms that were more instructive to readers and less subject to misconceptions.

The Study Team worked with stakeholders to incorporate feedback into a revised set of terms for those savings representing subsets of economic potential. Replacing the terms "maximum achievable potential" and "business-as-usual achievable potential" are the terms optimized potential and current policy potential, respectively. Further explanation of those terms can be found above.

The approach to determine the maximum "achievable" potential has changed considerably compared to the approach used for the 2017 Potential Study. The 2017 Potential Study relied upon surveys where customers were asked their willingness to invest in and adopt energy efficiency measures if Focus on Energy subsidized the investment at different levels. Customer responses to those surveys informed the assumptions necessary to model savings potential. Stakeholders were critical of this approach, noting that research in behavioral science finds that adoption of technologies is more nuanced and not strictly based on finances.

The Study Team will work directly with stakeholders possessing specialized knowledge of energy efficiency markets and technologies in Wisconsin to formulate the assumptions necessary to model savings potential for the 2021 Potential Study. These stakeholders will assist the Study Team by reviewing ramp rate assignments for the study's measures and provide input on the most appropriate ramp rates to be used to model optimized potential. As noted above, the ramp rates determine the rate at which measures are adopted over time, leading to a maximum assumed total market penetration.

What scenarios will the potential study explore?

The potential study will explore a variety of scenarios designed to provide an understanding of the sensitivity of savings potential when certain Commission and external policy decisions are modified. The study design includes the following scenarios:

Scenarios Impacting Technical Potential

- Timing of the Energy Independence and Security Act (EISA) Backstop: This scenario estimates the sensitivity of an accelerated compliance requirement of the EISA backstop on technical potential estimates. The baseline scenario is the most likely compliance timing.

Scenarios Impacting Economic Potential

- Deferred Transmission and Distribution Costs: This scenario estimates the sensitivity of including deferred transmission and distribution costs in the calculation of economic potential.
- Carbon Values: This scenario estimates the sensitivity of economic potential to two alternate carbon values. The study explores the impacts of market and social carbon cost value. The baseline calculation of economic potential is based on a value of $15 per ton.
- Discount Rates: This scenario estimates the sensitivity of economic potential to two alternate discount rates. The study explores the impacts of a zero percent and five percent discount rate on economic potential. The baseline calculation of economic potential is based on a discount rate of two percent.
- Alternate Cost-Effectiveness Test: This scenario estimates the sensitivity of using two alternate cost-effectiveness tests when calculating economic potential. These alternate tests are the Societal Cost Test and the Utility Cost Test. The cost-effectiveness test used for the baseline estimate of economic potential is the MTRC.
- Measure Level Cost-Effectiveness Threshold: This scenario estimates the sensitivity of using two alternate cost-effectiveness thresholds when calculating economic potential. These tests alternate thresholds are 0.50 and 0.75. The measure-level cost-effectiveness test used for the baseline estimate of economic potential is 1.0.

Scenarios Impacting Optimized Potential

- Focus funding levels: This scenario estimates two funding level sensitivities in the calculation of optimized potential. These funding level scenarios are an increase of fifty and one hundred percent over current levels. This scenario affects the level of optimized potential estimated (the baseline scenario is current policy potential).

How are historical program data used to inform future measure adoption?

Cadmus relies on recent Focus historical program data to inform measure adoption ramp rates and percentage of complete measure installations. For measures included in Focus programs, Cadmus considers recent rates of adoption as starting points for ramp-rate adoption curves. For example, Cadmus develops annual market penetration estimates for some efficient equipment, such as appliances, from recent program installation data. Cadmus also relies on recent program data to estimate the percentage of possible measure installations that are completed including, for example, the number of homes with recently installed smart thermostats and other energy efficiency measures.

In consideration of feedback received during the stakeholder outreach process, the 2021 Potential Study will also rely on energy efficiency technology and market experts to inform how ramp rates are applied to specific measures when modeling future adoption trends. The purpose of this effort is to use a combination of historical

program data and forward-looking market expertise to formulate and apply rate adoption curves necessary for calculating energy efficiency savings potential.

Will the study include renewable energy measures' savings potential?

Yes. The Commission decided at its open meeting of February 11, 2021, to include an analysis of solar PV savings potential in the scope of the study.[7] The initial 2021 Potential Study scope and budget was modeled off the scope and budget of the 2017 Potential Study. That study's scope and budget did not allow for an analysis of renewable energy savings potential.

Based on input from stakeholders in the 2021 Potential Study scoping process, Commission staff submitted an agenda item for the Commission to consider amending the evaluator contract to increase the budget to accommodate a rooftop solar photovoltaic (PV) potential study. Solar PV projects represent more than ninety percent of the renewable energy measures currently incentivized by Focus.

How do the scenarios being modeled in the potential study factor into program design?

Focus on Energy operates on a four-year cycle, often referred to as quadrennial periods. The potential study looks at a longer time horizon (12 years) and can help the Administrator evolve the portfolio over time. However, there are other factors that tend to have a larger impact on shorter-term program design. Some of these include:

- Policy objectives set by the Public Service Commission such as emphasis on demand versus usage and emphasis on key markets, technologies or customer segments
- Implementer knowledge of markets, manufacturers, distributors, trade allies, customers
- Maturity of the market
- Supply chain dynamics
- Staffing levels
- Utility feedback
- Sustainability efforts from medium/large customers
- Savings targets and types: e.g., net lifecycle MMBTU or gross lifecycle kWh and therms

Further, the current funding levels and energy savings targets for Focus on Energy require an emphasis on lower-cost, faster-payback projects. There are plenty of cost-effective measure types that have savings potential, but that are simply *less* cost-effective than others and so are not prioritized.

[7] Commission open meeting minutes can be found at: https://apps.psc.wi.gov/APPS/eventscalendar/content/minute.aspx

How do the scenarios being modeled factor into Focus on Energy goal setting?

The potential study is one piece of a larger discussion on program goals. The funding-constrained scenarios modeled in the potential study provide a good estimate for energy savings expectations. However, the study does not model program potential, or the level of savings that could be achieved when real-world constraints are factored into program design and delivery. There are additional data points and information needed to set reasonable targets. Some of these items include:

- Budget allocations to specific interests: e.g., renewables and hard-to-reach customers
- Policy objectives set by the Commission such as the emphasis on strategies like market transformation versus resource acquisition or emphasis on demand versus usage
- Details outside the scope of the study: market barriers, supply chain dynamics, program maturity, and renewables
- Stakeholder feedback

A transparent process that allows stakeholders to understand how these additional items are considered and applied is essential. The broader Quadrennial Planning Process provides opportunities for these considerations.

Does the study account for the impact of local governments in the state that are developing and implementing plans to address climate change?

The potential study does not attempt to directly account for the specific climate change adaptation plans of local governments. Localized impacts to future energy consumption, deployment of distributed energy resources, and measures to manage energy loads are among the issues identified by stakeholders that may influence the future energy efficiency savings potential of Focus on Energy. The Study Team agrees that such initiatives may impact estimates of savings potential and encourages, to the extent practical, integrated efforts among the wide range of stakeholders occupying roles in these efforts.

How are emerging technologies incorporated into the study?

As energy efficiency technologies advance to meet the needs of evolving markets, policies, consumer demands, and a host of other factors, they progress through stages market maturity. Generally, as new technologies undergo testing and research to demonstrate their effectiveness, their potential for widespread application becomes more apparent and the inputs necessary for modeling their costs and savings in a potential study become more precise. Because emerging technologies have limited data available to calculate savings and costs, Cadmus relies on demonstration projects, U.S. Department of Energy research, and emerging technologies research to develop model inputs for these measures.

The potential study seeks to incorporate emerging technologies that are applicable for Wisconsin and are at or nearing cost-effective in order to inform future program design and delivery. Considering the uncertainty of emerging technologies and potential limits to their applicability, they tend to make up a small fraction of technical potential and typically do not contribute to economic potential given the generally high costs of the still immature technologies.

The potential study incorporates seven residential and eleven commercial emerging technologies. These emerging technologies were selected to be included based on a combination of Cadmus' experience in the field and input from experts in Wisconsin received as part of the study's stakeholder engagement process. The full list of potential study measures, including emerging technologies can be found in Excel spreadsheet format on the potential study website.