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Building Tune-Up Program Manual

For Commercial, School, and Government Facilities

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1.1 PROGRAM OVERVIEW

Focus on Energy, Wisconsin's statewide program for energy efficiency and renewable energy, offers assistance to Wisconsin customers' in their energy conservation efforts. Focus on Energy provides financial and technical support to customers of participating Wisconsin utilities for many energy-efficient technology and products available today.

Today's buildings have complex mechanical systems with hundreds if not thousands of components that must interact to provide heating, cooling, and lighting to occupied spaces. Building operators rely on advanced building automation systems to control these components and ensure proper operation. Maintaining these systems to ensure peak efficiency is a daunting task for building operators. Returning a system to peak performance requires significant time and expertise that most facility teams do not have. Focus on Energy's Building Tune-up Program (BTUP) helps building operators achieve peak efficiency by defining a process for achieving results and offsetting some, if not all, of the costs associated with this level of investigation. Since the BTUP focuses on operation and maintenance related Facility Improvement Measures (FIMs) simple payback periods tend to be shorter than 1.5 years. The BTUP does not preclude the facility owner, owner's representative, or facility representative (collectively, the Customer) from participating and receiving grants through any other Focus on Energy programs which may apply and are completed in addition to the building tune-up project.

The BTUP is designed to achieve natural gas, electric demand, and electric energy savings in commercial, school, and government facilities which may not meet the requirements of the Retrocommissioning Program. FIMs performed during a building tune-up project typically reduce energy consumption by optimizing existing facility system operation for present building demands. In many cases, occupant comfort improvements accompany the energy efficiency gains realized through building tune-up projects. Additionally, the nature of many building tune-up eligible FIMs requires that the customer and the operations and maintenance (O&M) staff are committed to achieving and maintaining the savings realized through the building tune-up project.

Customers may not submit applications for facilities which have received funding from Focus on Energy's Retrocommissioning Program within the last five years. This exclusion applies even if the prior retrocommissioning project was terminated after the planning phase for any reason. Further, customers may not simultaneously submit both building tune-up and retrocommissioning applications.

To receive a building tune-up incentive, customers must implement FIMs having a payback period shorter than 1.5 years (building tune-up qualifying FIMs) up to a cumulative total of \$10,000 or \$0.025 per square foot, whichever is greater. The customer will present a report with an itemized account of the proposed FIMs, their associated costs, energy savings calculations, type of saving, and payback period.

Focus on Energy may subsequently combine FIMs to comprise a set of FIMs having an appropriate payback period, cost, and energy savings total.

Upon successful completion of a building tune-up project, the customer is awarded a \$0.05/ft² incentive. Focus on Energy awards are referred to as incentives or grants interchangeably in this document. While Focus on Energy recognizes that a building tune-up is a best practice and can benefit most facilities, Focus on Energy is required to maintain a level of cost effectiveness per unit of energy savings and cannot accept all applicants or facilities.

Section 2 **Building Tune-Up Program Overview**

2.1 PROGRAM DESCRIPTION

A building tune-up comprises of a comprehensive assessment of facility equipment, control strategies, maintenance procedures, and operational practices that result in the identification of low cost and/or short payback period measures. Similar to the Retrocommissioning Program, the Building Tune-up Program involves evaluation of existing facility HVAC systems and components. The BTUP does not however require the extensive testing and diagnostics of the Retrocommissioning Program process, which makes the BTUP cost effective in facilities that do not meet the Retrocommissioning Program requirements. It is critical that both the customer and the trade ally understand and fulfill their respective responsibilities to maintain eligibility and successfully receive a grant.

2.2 CUSTOMER RESPONSIBILITIES

The customer is the recipient of the building tune-up incentive and as such MUST ensure that the project follows the guidelines and schedule specified by this manual. The customer should work with the trade ally and energy advisor to ensure that the application and supporting materials are properly completed particularly the application, utility billing history, request for additional facility information, the BTUP FIM checklist, and completion documentation.

The customer will use the FIM calculation program available with the application materials on the Focus on Energy Web site to document the building tune-up project. The FIM calculation program has components for entering proposed FIMs for Focus on Energy review as well as determining and summarizing costs and estimated energy savings post completion. The customer should ensure that the trade ally is recording progress through the building tune-up project in the FIM calculation program.

The customer must ensure that BTUP qualifying FIMs (up to a cumulative total of \$10,000 or \$0.025/ft², whichever is greater) are implemented within 90 days of BTUP acceptance. After the building tune-up project completion and within 6 months of BTUP acceptance, the customer must complete the appropriate portion of the FIM calculation

program and deliver accompanying invoices to Focus on Energy. Focus will award a \$0.05/ft² grant to the customer for successfully completed building tune-up projects.

2.3 APPLICANT PRESENTATION

A facility is considered for a building tune-up incentive when a 2011 BTUP incentive application is submitted to Focus on Energy. Customers may present their application for participation in several ways.

First, the customer may submit the application on their own volition to the appropriate contact listed in Section 3.5 of this manual if they are contemplating work which may qualify for a building tune-up incentive.

Second, an energy advisor may recommend the building tune-up incentive to a customer and work with the customer to complete application materials. The energy advisor can work with the customer to gather information and present the application, but cannot make the acceptance decision.

Third, a contractor or trade ally may recommend the building tune-up incentive and assist with the application process for their customer. It is important to note that Focus on Energy determines whether a project is accepted and whether an incentive is available. The trade ally may support the application with data or other information, but does not make the acceptance determination. Further, building tune-up incentives are issued to the customer and not the trade ally regardless of who completed the application and gathered supporting data. Therefore, the customer should understand the terms of the BTUP prior to application submittal and the customer should not agree to contract terms which guarantee BTUP funding. The trade ally may submit the completed application to the appropriate energy advisor or to the contact listed in Section 3.5 of this manual.

The customer will be contacted when a complete application has been received. Where appropriate, the customer should include a brief narrative to highlight special circumstances or project specifics which are not conveyed on the application but may involve BTUP qualifying FIMS.

2.4 APPLICATION REVIEW

Focus on Energy will mail the customer a request for additional facility information after a complete application is received. The customer or trade ally must survey and identify the relevant facility systems to complete and return the request for additional facility information. An energy advisor may be available to assist with this task.

Additionally, a one-year utility history indicating on- and off-peak electricity consumption (kWh/month), peak electricity demand (kW) and natural gas consumption (therms/month) on a monthly basis must accompany the request for additional facility information submittal where applicable. The customer may be asked to authorize a utility release waiver if the customer cannot deliver satisfactory utility billing history.

Focus on Energy will review the application, request for additional facility information, utility billing history, and other communications to determine whether the applicant facility is likely to benefit from sufficient BTUP qualifying FIMs to warrant a building tune-up incentive. Several factors are especially important in the review process.

First, the facility energy consumption profile will be compared to benchmark values for similar facilities where available. Particularly, the specific consumption of the applicant facility in kWh/ft² and therm/ft² is a fundamental metric which will be compared against similar facilities. It is less likely that a facility which has a low specific consumption will benefit from sufficient BTU qualifying FIMs to maintain the cost effectiveness of the BTUP. However, longer payback period measures may still be supported by other Focus on Energy incentives.

Second, the energy consumption reduction necessary to maintain the cost effectiveness of the BTUP will be determined. Implementation of BTUP qualifying FIMs generally reduces facility energy consumption between two and seven percent. Applications will be reviewed to ensure that the savings necessary to maintain program cost effectiveness do not exceed this range. However, investigation activity in most BTU projects results in identification of FIMs which reduce overall facility energy consumption by 10 percent or more (but may have payback periods exceeding 1.5 years). As always, the energy advisor and other Focus on Energy staff will work with the customer to present the project in the most compelling manner and will recommend alternative programs if the proposed project does not qualify for a building tune-up incentive.

Third, general facility condition will also be considered during the application review process. Facilities with significant maintenance deficiencies are not good candidates for building tune-up projects, as these should be addressed before application. A project may be excluded from the BTUP if the facility will be subject to significant capital improvements, renovation, demolition, or fundamental change in usage in the near future.

Other circumstances may also factor heavily on the final decision. Therefore, the customer or trade ally should provide convincing supporting information which was not conveyed in the application, utility billing history, or request for additional information.

If the facility is accepted into the BTUP, the customer will receive a grant agreement which must be completed and returned to Focus on Energy. The grant agreement will be presented at a kick-off meeting involving the customer, trade ally and Focus on Energy staff member. The customer is bound by the terms of the grant agreement and must complete the building tune-up project according to this manual in order to maintain grant eligibility.

The customer will be provided with a BTUP FIM checklist (the checklist) at the kick-off meeting. The customer must ensure that the trade ally completes the BTUP FIM checklist. Please see Section 2.5 of this manual for more information about the checklist. Customers are encouraged to implement the qualifying FIMs at their earliest convenience following this meeting.

2.5 TRADE ALLY RESPONSIBILITIES

The trade ally is typically responsible for the content of the documentation in the BTUP process and the customer must ensure that it is delivered to Focus on Energy in a timely manner. The trade ally has six main responsibilities, including:

1. The trade ally should ensure that information presented in the application is accurate.
2. The trade ally must ensure that the request for additional facility information is completed correctly. The completed request for additional facility information will be reviewed to ensure that the applicant facility has building systems which are likely to benefit from FIMs having payback periods shorter than 1.5 years. The customer or trade ally should identify and describe the systems which will benefit from operational FIMs in the request for additional facility information in brief narrative form.
3. The trade ally must attend the kick-off meeting.
4. The trade ally must investigate facility systems to complete and comply with the BTUP FIM checklist. The trade ally is likely to discover additional BTUP-qualifying FIMs as they complete the checklist. Investigative activities associated with completing the building tune-up checklist are also likely to give the trade ally a better understanding of the facility and insight into maximizing energy savings for a minimum cost. The trade ally must document these FIMs in the FIM calculation program and submit it to Focus on Energy staff for review.
5. The trade ally should collaborate with the customer and Focus on Energy staff to establish and follow a plan to implement the BTUP qualifying FIMs within 90 days of BTUP acceptance.
6. The trade ally must document the implemented measures in the FIM calculation program and provide accompanying invoices after building tune-up project completion to the customer. The customer **MUST** deliver these items to Focus on Energy within six months of BTUP acceptance.

Alternative calculation formats may be submitted as supporting documentation but the FIM calculation program **MUST** be completed and will be the only savings calculation document considered to determine that the minimum customer contribution of \$10,000 or \$0.025/ft² has been satisfied. Please contact your energy advisor if you encounter difficulties in completing this document.

2.6 FUNDING AND INCENTIVES

The BTUP incentive is \$0.05/ft² to the customer for BTUP projects completed according to the terms of this manual.

2.7 DELIVERABLES AND TIMELINE

Pre-Application Procedure

- Gather utility history (customer)
- Identify potential projects (customer and trade ally)
- Ensure routine maintenance is performed (customer and trade ally)

Application Process

- Submit: completed building tune-up incentive application and utility billing history to Focus on Energy (customer)
- Within 10 days, receive request for additional facility information (customer)
- Within 20 days, complete request for additional facility information (customer and trade ally)
- Submit request for additional information (customer)
- Within 30 days, kick-off meeting to discuss the building tune-up project (customer, trade ally and Focus on Energy)

Identify additional BTUP-qualifying FIMs

- Within 10 days of kick-off meeting, perform investigative activity and complete building tune-up FIM checklist (trade ally)
- Within 20 days of kick-off meeting, submit building tune-up FIM checklist (customer and trade ally)

Implement BTUP-qualifying FIMs

- Within 40 days of kick-off meeting, complete the proposed FIM component of the FIM calculation program and develop a BTUP-qualifying FIM implementation plan (customer and trade ally)
- Within 90 days of kick-off meeting, implement and verify BTUP-qualifying FIMs according to plan (trade ally)

Submit Completion Materials

- Within 180 days of kick-off meeting, complete the implemented FIM component of the FIM calculation program (trade ally and Focus on Energy)
- Within 180 days of kick-off meeting, submit invoices, the FIM calculation program and completion notice (customer)

Section 3 Building Tune-Up Program Qualifying Measures

3.1 COMMON BUILDING TUNE-UP PROGRAM MEASURES

The following sections provides an overview of FIM's which are likely to have payback periods shorter than 1.5 years and should be considered during a building tune-up project. These FIMS should be entered into:

3.2 RUNTIME REDUCTION

The most effective energy-efficiency improvement is to turn equipment off when it is not needed. All measures in this category address automated controls that turn off equipment when it is not needed to satisfy the current facilities requirements (CFRs). The trade ally must establish a plan to determine the settings of automated controls on systems with significant energy use, verify that critical systems are controlled properly, and identify runtime reduction opportunities. FIMs associated with runtime reduction fall into the following sub categories:

- Time of day scheduling – Some facility systems should be operated on fixed schedules. Possible FIM's include optimizing the occupied schedule for HVAC equipment, turning off ventilation to unoccupied spaces, optimizing lighting schedules, adding time control capability to DHW recirculation pumps, and implementing optimal start and stop strategies.
- Occupancy-based controls – Air in unoccupied spaces should not be conditioned in the same manner as it is during occupied periods. Sensors should be used to determine when spaces are occupied and air conditioning should be adjusted accordingly. Further energy savings may be realized from a time of day scheduling strategy as facility systems serving monitored spaces may be turned down or even off during unoccupied periods. Example FIM's including occupancy sensors for interior and exterior lighting, occupancy sensors for VAV control, vending machine misers, and smart power strips.
- Weather-based controls – Weather-based controls optimize facility system operation according to external weather conditions. External weather conditions may be measured with sensors or estimated from historical meteorological data. Example FIM's include heating/cooling outside air temperature, cut out controls, and start/stop dates for heating/cooling systems.
- Other sensor-based controls – Example FIM's include CO/CO₂ based garage ventilation controls, photocells for exterior lighting, day-lighting sensors for interior lighting, and exhaust-hood controls.

3.3 LOAD REDUCTION

CFRs can often be satisfied by operating existing facility systems at reduced settings or loads. Fan, chiller, and pump motors consume less electricity when operating at reduced loads. Heating systems can typically also be operated at reduced load

conditions and still satisfy CFRs. Measures associated with load reduction fall into the following sub categories:

- Steam systems – Steam systems are designed to generate and transfer large quantities of steams for air and water heating. Steam system load reduction is potentially a particularly cost-effective FIM because steam systems account for the majority of natural gas consumption. Example FIMs associated with steam system load reduction include pipe and fitting insulation, steam pressure reduction, increased rates of condensate return, and steam trap repair.
- Lighting systems – Many areas are over lit. Example FIMs including de-lamping, dimming control options, or redesign can be used to reduce lighting loads.
- Air/water distribution systems – Distribution systems are often overdesigned and provide pressures and flow rates exceeding the CFRs. Reducing pressure and flow rates has a large impact on energy consumption and is a cost-effective measure as long as the system is still capable of meeting the CFR. Example FIMs associated with distribution system load reduction include static pressure set point reduction, fan or pump speed reduction, and air sealing ductwork.
- Heating, cooling, and humidification systems – The CFR establishes the heating, cooling and humidification requirements of each space type in a facility. Standardizing an acceptable range of set points reduces overheating, overcooling, and excessive humidification or dehumidification. Modern BAS systems allow occupants to adjust thermostats within an acceptable range without overly taxing the system. Care should be taken with adjustments made to comfort set points to avoid increased use of auxiliary heating and cooling systems which negate savings. Example FIMs include hot/chilled water reset, static pressure reset, discharge air temperature reset, etc.
- Setback/setup controls create reduced load operation by lowering heating, cooling, ventilation, and/or humidity demands. Example FIMs include installing programmable thermostats, adjusting BAS unoccupied settings, implementing demand controlled ventilation, and kitchen-hood controls.

3.4 SYSTEM CALIBRATION

Complex systems can incur calibration or maintenance issues which go undetected because CFRs continue to be satisfied. However, an uncalibrated system may consume far more energy to produce the required output. Identifying calibration or undetected maintenance deficiencies can save energy while extending equipment life and improving performance. The BTUP recommends random sampling to test for calibration and maintenance issues without dramatically increasing study costs.

- Sensor calibration – Sensors require regular recalibration to correctly report monitored conditions. More complex sensors such as CO₂ or humidity sensors require more frequent recalibration than temperature, pressure, or flow sensors. Precision instruments should be used on a sample set of sensors to verify calibration at the source and at the BAS level. Sensors with the greatest impact on energy consumption, such as a discharge air temperature and sensors that control heating and cooling coil valves in an air-handling unit should be calibrated during the building tune-up project. Calibration and maintenance will reduce

overheating, overcooling, excess ventilation, simultaneous heating and cooling, and excess fan power.

- Airside testing and balancing – Testing and balancing (T&B) is required on all major air handlers that bring in outside air. Excess ventilation air consumes large amounts of energy and does not provide any benefit to occupants or the facility. Identifying and correcting these operational errors typically results in quick paybacks. T&B may be used to diagnose issues with units that are unable to perform as established in the CFR. FIMs associated with T&B include minimizing ventilation rates, correcting damper operation, adjusting impeller trim, reducing pump and fan flow, and installing variable frequency drives.
- Maintenance issues – One of the prerequisites for inclusion into the program is being free of major maintenance issues. The maintenance issues discussed in this section may not prevent the systems from operating; however they will affect energy efficiency. Maintenance deficiencies typically identified include chilled water, hot water or steam valve repair, damper repair, belt replacement, filter replacement, bearing repair, actuator repair, and controller replacement.
- Economizing – Economizers of different types may be applied to a wide variety of equipment. Generally, economizers use ambient conditions or recover waste energy to reduce heating or cooling requirements. Air handler economizers increase ventilation when spaces are in cooling mode and return air has a higher cooling load than outside air. Air handler economizers should have control strategies validated and operation verified through testing or trending. Economizers can sample temperature only (dry-bulb economizers) or temperature and humidity (enthalpy economizers) when comparing air streams. Enthalpy economizers can result in additional energy savings but have more frequent recalibration requirements. Additional economizing measures include free cooling, dry cooling, boiler stack economizers, and heat recovery from compressed air systems or data centers.

3.5 FOCUS ON ENERGY CONTACT INFORMATION

Commercial facility inquiries and applications can be directed to:

Focus on Energy Building Tune-Up
10535 N. Port Washington Rd., Suite 201
Port Washington, WI 53074
Phone: 888.598.4376
Fax: 262.284.4003
Email: commercialtuneup@focusonenergy.com

Schools and government facility inquiries and applications can be directed to:

Focus on Energy
2923 Marketplace Drive, Suite 108
Fitchburg, WI 53719
Phone: 888.947.4703
Fax: 608.467.1417
Email: sandgtuneup@focusonenergy.com

Additional information about the trade ally's role within the BTUP and relationship with the customer is provided below.

4.1 CONTRACTING WITH CUSTOMER

Only BTUP-approved trade allies may perform work in the BTUP. However, the customer may select the approved trade ally of his or her choice. Focus on Energy can provide a list of approved trade allies if the customer does not have a relationship with an approved trade ally upon application.

Contract terms and work scope in addition to core BTUP activities identified in this manual may be determined by the involved parties and are not governed by the BTUP or this manual. However, the approved trade ally must determine, implement, and verify BTUP-qualifying FIMs within 90 days of the kick-off meeting. The approved trade ally must also support the customer so that they can submit invoices, the FIM calculation program, and completion notice within 180 days of the kick-off meeting.

4.2 BUILDING TUNE-UP TRADE ALLY APPROVAL PROCESS

Approved trade allies in the Retrocommissioning program are pre-approved as approved trade allies in the BTUP. Trade allies who are not approved trade allies in the Retrocommissioning program can apply for approval by following the instructions on the BTUP application. Most trade allies will receive a tentative approval for the building tune-up project of that application. A final approval decision will typically be made based on the success of the trade ally's first building tune-up project.

Trade allies may be removed from the BTUP at Focus on Energy's discretion. Examples of activities that will lead to removal include, but are not limited to:

- Failing to determine, implement, and verify BTUP-qualifying FIMs up to the customer's contribution requirement within 90 days of the kick-off meeting.
- Failing to support the customer's efforts to submit invoices, the FIM calculation program, and completion notice within 180 days of the kick-off meeting.
- Incorrectly performing BTUP-qualifying FIM calculations
- Incorrectly completing the BTUP FIM checklist
- False representation or marketing of the BTUP

4.3 PROGRAM MARKETING AND CUSTOMER COMMUNICATION

Trade allies play a critical role in identifying viable opportunities for the BTUP incentives and facilitating the customer application process. Extreme care must be taken to avoid creating false customer expectations and dissatisfaction with the BTUP or Focus on Energy, especially in light of the selective nature of the BTUP process. Therefore, trade allies are encouraged to understand the entire suite of energy-efficiency program

options available from Focus on Energy to determine which program is best suited to a customer's particular needs.

4.4 PAYMENT FOR PROGRAM SERVICES

The customer, and only the customer, will receive incentives from Focus on Energy if this manual is followed. The customer should structure a contract which explicitly requires the trade ally to follow this manual.

4.5 ADDITIONAL CUSTOMER SERVICES

Focus on Energy recognizes that opportunities outside the scope of the BTUP may be identified during the BTUP process. Customers are free to pursue additional contracting with the trade ally to expand the work scope (e.g. identify capital improvements or other savings opportunities) and pay for all trade ally time and costs associated with these additional services. Addition of these services must not create an unnecessary delay in the performance of building tune-up services.