2024 Incentive Catalog

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Consumers Energy

Business Energy Efficiency Programs

Consumers Energy
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About these Programs

The Consumers Energy Business Energy Efficiency Programs are a comprehensive suite of energy efficiency programs created to assist commercial and industrial businesses improve their energy optimization, lower their energy use, and lower their cost of operation.

A wide variety of energy efficiency incentives are available to help business owners reduce the initial cost of identifying and implementing applicable energy efficiency measures, such as installing new energy-efficient equipment, implementing energy-efficient control strategies, and completing energy-focused audits in their facilities. An overview of the various program offerings is summarized below. The sections that follow provide detailed information on the actual incentives and specific program details related to each of the various offerings.

Application forms for all programs are available on the Consumers Energy website: **ConsumersEnergy.com/startsaving**. All applicants are urged to download and review the Policies and Procedures Manual, which can be found by clicking on the "Rebates" button on this website.

Prescriptive Incentives:

These incentives are available for implementing energy efficiency measures, such as installing new high-efficiency equipment or retrofitting existing equipment to improve energy efficiency, in categories such as Lighting/Electrical, Mechanical, Refrigeration and Building Envelope. Incentives are paid based on quantity, size, and/or the efficiency of the equipment. Incentives are provided for qualified equipment commonly installed in a retrofit or equipment replacement project. Full details of the requirements for each available incentive measure are included in this Catalog.

Custom Incentives:

These incentives are available to customers for less common or more complex energy saving measures installed in qualified retrofit and equipment replacement projects that are not eligible for a prescriptive incentive measure. Custom incentives are paid based on the first-year energy savings (kWh or Mcf). Applicants have the option to apply for a custom incentive for projects that involve an integrated solution with both prescriptive and custom incentives.

Custom incentives may be available for measures that result in a reduction in electric and/or natural gas energy use because of an improvement in system efficiency (i.e., a net decrease in energy use without a reduction in the level of service). The applicant must provide sufficient technical information, equipment performance data, operating assumptions, measurements, and calculations to support the energy savings estimates. The decision as to whether an improvement is eligible for a custom incentive is within the sole discretion of Consumers Energy.

Examples of custom projects include, but are not limited to, the following:

- Process (non-HVAC) improvements (productivity increase).
- Process (non-HVAC) waste heat recovery.
- Constant volume to variable volume water system conversion.
- Variable Speed or Variable Frequency control (VSD/VFD) of large motors (rated greater than 250 HP).
- Refrigeration compressor upgrades.
- Complex compressed air equipment or system improvements.
- Tank insulation.
- Injection molding machine DC to AC drive conversion.
- VSDs or VFDs on hydraulic equipment.

New Construction Program

The New Construction Program provides an array of electric and natural gas incentives for commercial and/or industrial customers who design and construct their facilities with energy-efficient equipment that exceeds standard building practices. Through early involvement in new construction and major renovation projects, the program team can assist in design decisions to impact the overall building energy efficiency. Program staff will provide an engineering review of projects that are currently in the design stages to identify financial incentive opportunities for customers and design teams.

The program works with design professionals to influence prospective building owners and developers to construct high-performance buildings that provide improved energy efficiency, systems performance, and comfort. Incentives can be pursued through either a Prescriptive/Custom Application or a LEED® Whole Building Design Application.

Incentive Options:

- Prescriptive/Custom Application.
  - » Customers can choose from an assortment of prescriptive measures with set incentives as well as apply for custom incentives.
  - » Incentives are available for the facility owner only, who may authorize payment of incentives to a third party.

LEED® Whole Building Design Application:

- Performance energy modeling analysis demonstrating significant improvement in the proposed building design compared to the program baseline standard.
- Incentives are available for the facility owner only, who may authorize payment of incentives to a third party.
- Must receive LEED® certification to be eligible for whole building incentive.

Eligibility:

- Projects must result in a permanent reduction in electrical (kWh) and/or natural gas (Mcf) energy use compared to baseline practices.
- Projects MUST be in the pre-construction/design phase when submitting the Pre-Notification Application.
- The following project types are classified as New Construction/Major Renovation:
  - » New building wherein no structure or site footprint presently exists.
  - » Addition or expansion of an existing building or site footprint.
  - » Major tenant improvements that change the use of the space.
  - » Projects that require added energy load.

Agricultural Program

The Agricultural Program assists Michigan farmers, growers, and producers by offering incentives for implementing energy efficiency measures and completing energy efficiency audits, including incentivizing the customer portion of an MSU/REAP energy audit payment for a USDA Tier II audit. The Consumers Energy Business Energy Efficiency team will review the results of the audit to provide guidance to the customer on applying for prescriptive or custom incentives.

Who can participate:

- Customers on a commercial rate code or a residential farm rate code.
- Customers installing measures at a full-time agricultural operation.

What we provide:

- Audit incentive for completion of an MSU/REAP USDA Tier II energy audit.
- Evaluation of audit results.
- Prescriptive or custom incentives through the Consumers Energy Business Energy Efficiency Programs.
- Details of the incentives are available in this Catalog and the Incentive Application.

Compressed Air Program

The Compressed Air Program is part of the Industrial Energy Program offering which is designed to provide special incentives to industrial customers with compressed air systems installed in their facilities. The program gives customers the opportunity to examine their system efficiency through Compressed Air Energy Audits, and provides them with financial incentives to implement energy efficiency improvements to their systems. A variety of prescriptive measures are available and customers who have projects that are not eligible for prescriptive measures can apply for custom incentives.

Details of the incentives are available in this Catalog and the Incentive Application form.

Retro-Commissioning Services

Retro-commissioning (RCx) saves energy and money by optimizing facility energy system operations to run in the most energy-efficient manner, primarily through control system (e.g. building automation system) enhancements that enable the system to react to weather and occupancy conditions in an energy-efficient manner. Facility improvement measures (FIMs) are identified for potential implementation through facility energy assessments and ENERGY STAR® Portfolio Manager® benchmarking, and incentives are available for implemented measures.

Details of the incentives for each of the programs is available in this Catalog and the applicable Incentive Application form.

Buy Michigan Bonus

Customers who use Michigan Made products in their energy-saving projects may be eligible for an additional 20% bonus incentive. An affidavit from the manufacturer attesting the product is at least 50% manufactured and assembled in the state of Michigan (exclusive of packaging) is required. Consumers Energy will verify the eligibility.

Business Instant Discount Program

The Business Instant Discount Program incentivizes distributors to mark down the retail price of select energy efficient products and equipment. In turn, commercial and industrial contractors/customers receive an instant discount when they purchase the product or equipment. This minimizes the need to fill out and send in an Incentive Application. The Business Instant Discount Program is available to all Consumers Energy business customers with an eligible commercial account number.

For more information, visit **ConsumersEnergy.com/instantdiscount**.

How to Apply

Customer Eligibility:

To participate in any Consumers Energy Business Energy Efficiency Programs, customers must be a commercial and/or industrial customer of Consumers Energy. Residential agricultural customers are eligible for agricultural measures.

Qualified energy efficiency measures must be implemented at facilities served by Consumers Energy and projects must result in an improvement in energy efficiency. Equipment must meet the specifications as explained in this Catalog and also set forth in the Incentive Application. For each site there must be at least one meter that is on an eligible rate schedule.

Effective Dates:

The Business Energy Efficiency Programs offers incentives for the 2024 program year until funds are exhausted or until Dec. 31, 2024, whichever comes first. All projects must be completed and Final Applications received no later than Nov. 30, 2024 to be eligible for the 2024 programs incentives.

Project Requirements:

The Business Energy Efficiency Programs have the following project requirements:

- Projects must involve a facility improvement that results in a permanent reduction in electrical and/or natural gas energy use (kWh and/or Mcf).
- Any energy efficiency measures implemented at a facility must be sustainable and provide 100% of the energy benefits, as stated in the Incentive Application, for a period of five years or the life of the product, whichever is less. If the customer ceases to be a delivery service customer of Consumers Energy or removes the equipment or systems at any time during the five-year period or the life of the product, the customer may be required to return a prorated amount of incentive funds to Consumers Energy.
- The Business Energy Efficiency Programs team reserves the right to inspect all projects to verify compliance with program rules and accuracy of project documentation. This may include pre- and/or post-inspections, data collection, and interviews. The customer must allow access to records and installation sites for a period of three years after receipt of an incentive payment.
- New construction/major renovation projects (see definition under "New Construction Program - Eligibility" on page 6 of this Catalog) MUST be in the pre-construction/design phase when submitting the Pre-Notification Application. Final project eligibility is at the discretion of Consumers Energy Business Energy Efficiency Programs personnel.

Project and equipment types that are **NOT** eligible for incentives include the following:

- Fuel switching (e.g. electric to natural gas or natural gas to electric)*.
- Changes in operational and/or maintenance practices or simple control modifications not involving capital costs.
- Backup and redundant equipment and systems unless otherwise noted (i.e., only the minimum number of units required to meet the applicable peak HVAC or process demand is eligible for incentives, regardless whether more than the minimum number of units required to meet the peak demand will be operated and all operating units load-leveled to maximize energy efficiency).
- On-site electricity generation.
- Projects that involve peak-shifting (and not kWh savings).
- Projects involving renewable energy.
- Projects involving systems designed to allow carbon-dioxide (CO_2) levels in occupied spaces to exceed a maximum level of 1,200 ppm.
- LED lighting products that are not listed as an approved product for their specific purpose by the acceptable certifying body specified in the requirements for the applicable lighting measure (DesignLights Consortium® (DLC®) or ENERGY STAR®), unless the lighting product meets the non-listed requirements specified for the measure.
- Used equipment.
- Projects that involve a banned or ineligible contractor as the installer, general contractor, A&E firm, or supplier of qualifying equipment.

*May be eligible under the Self-Directed Program if overall Btu/hr. is reduced at that facility.

Equipment Specifications:

This Catalog provides the requirements and equipment specifications for the energy efficiency measures that are eligible for incentives. Existing equipment that is replaced must be recycled/disposed of according to state, federal and local regulations. Information about the requirements for the State of Michigan can be found at the Michigan Department of Environment, Great Lakes, and Energy website: **Michigan.gov/EGLE**.

Incentive Caps and Limits

Incentives are subject to limits to encourage equitable distribution of funds among as many Consumers Energy customers as possible. Incentive caps are imposed annually and are calculated based upon the program year in which the incentive is paid to the customer.

Customer Annual Limits:

The amount of incentives a facility or customer can receive is limited. A facility is defined as contiguous property for which a single customer is responsible for paying the Consumers Energy electricity and/or natural gas bill. A customer is defined as the organization under which the company (or companies) are owned or operated, regardless of who is responsible for paying the bill. Program year incentive limits are per customer, facility, project or measure as shown below.

Prescriptive Incentives	100% of the total project cost, and per measure, facility, or project where specified in this Catalog or the Incentive Application
Custom Incentives	50% of the total project cost
Electric Customer Incentive Limit	$2 million across all facilities per customer
Natural Gas Customers Incentive Limit	$1 million across all facilities per customer
Natural Gas Custom Tiers per Customer	100% of the calculated natural gas incentive up to $500,000
	50% of the calculated natural gas incentive above $500,000

Prescriptive Incentive Caps:

For prescriptive projects, project incentives cannot exceed the total project cost for implementing energy efficiency measures (see explanation of eligible project costs and documentation requirements under "Custom Incentive Caps and Calculation of Cost Basis" below). Select prescriptive incentives have limits and/or caps applicable per measure, facility, or project which are specified in this Catalog and the Incentive Application.

Custom Incentive Caps and Calculation of Cost Basis:

For custom projects, project incentives cannot exceed 50% of the total project cost for implementing energy efficiency measures. Project costs may include the labor necessary to implement the measure (internal labor costs cannot be included) and costs associated with disposal of removed equipment. The customer is responsible for providing sufficient documentation to validate the project costs. Manufacturer, vendor, distributor, Trade Ally or contractor provided incentives (credits, deductions, refunds, etc.) must be subtracted from the total installation costs. Consumers Energy reserves the right to apply a cap to individual custom measure costs, in addition to the whole project cost, when measure costs are significantly higher than typical costs seen in this program.

The simple payback period for custom incentive projects must be greater than or equal to one year and less than or equal to 15 years. The total calculated incentive cannot exceed 50% of the measure cost. Natural gas custom incentives are awarded at 100% of the calculated incentive up to $500,000, and at 50% of the calculated incentive above $500,000.

Simple Payback Period is calculated with the following equation:

$$\text{Simple Payback Period} = \frac{\text{Incremental Measure Cost}}{(\text{Annual kWh Saved} \times \text{Electricity Rate}) + (\text{Annual Mcf Saved} \times \text{Natural Gas Rate})}$$

The Incremental Measure Cost (IMC) is the cost of implementing a measure less any costs that would have been incurred by the applicant to achieve project benefits other than those resulting in the incentivized energy savings. The IMC can either be the incremental equipment cost or the full cost of implementing a measure, depending on the cost basis. The cost basis is derived from the type of measure in the Incentive Application (retrofit, replace-on-burnout, or new construction) and whether the measure is displacing existing technology, being installed in the absence of any existing technology, or is an alternative to a competing technology. In general, new construction and replace-on-burnout measures use the incremental equipment cost as the IMC. For retrofit measures, the full cost is typically used as the IMC, such as in the case where a customer installs new technology (e.g. high-efficiency boiler in place of a less efficient boiler).

New Construction Incentive Caps:

New Construction projects are subject to the same customer caps and limits as retrofit projects. Prescriptive and custom incentive caps are set forth in the "Customer Annual Limits" section. Not all prescriptive measures are eligible for participation in the New Construction Program. Eligible measures are identified in the Incentive Application and the measure requirements are specified in this Catalog (subject to code requirements where noted).

Application Process

The application process is described in Section 1 of the applicable Incentive Application, which is available online at the Consumers Energy website. If you have questions regarding the applicable program or Incentive Application, please contact the program team at either: 877-607-0737 or ConsumersEnergyBusinessSolutions@cmsenergy.com.

Documentation Requirements:

Pre-Notification Application Information:

Please review this Catalog and pay close attention to the supporting documentation required to be included with the Pre-Notification Application. These documents must be legible and included with your Incentive Application.

A Pre-Notification Application is required for any measure with a Pre-Notification designation. A Pre-Notification is also strongly recommended for all projects requesting an incentive greater than $10,000.

Before submitting your Pre-Notification Application, make sure you have completed the following:

- Include all required information in the applicant information and measure worksheet sections of the Incentive Application.
- Verify that all required supporting documentation and new equipment specifications are included.
- Make copies of all documentation for your records.
- Include a copy of payee's W-9.

Final Application Information:

Please review this Catalog and pay close attention to the supporting documentation required to be included with the Final Application. These documents must be legible and included with your Final Application. Your Final Application must be received within 60 days of the completion date, or on or before the reservation expiration date, whichever occurs first. Invoices and/or proof of purchase must include all the following information:

- Invoice number and date.
- Vendor name and address.
- Itemized list of specific equipment, including model number, manufacturer, price, and quantity.
- Customer name, address, email, and phone number.
- Total cost of the of purchase.

Please allow six to eight weeks to receive your incentive check. Incentives cannot be processed for payment until the complete Final Application and all required documentation is received and approved.

Please carefully read the Terms and Conditions. Before submitting your Final Application, make sure you have completed the steps outlined below. Any missing information will delay the processing of your Final Application. Include all required information in the applicant information, Final Application and measure worksheet sections of the Final Application.

- Make sure your Final Application is signed by an authorized representative of the Consumers Energy account holder.
- Verify all required invoices, supporting documentation and equipment specifications are included.
- Make copies of all documentation for your records.
- Include a copy of payee's W-9.

Lighting

General Requirements

- Must be a Consumers Energy electric customer.
- Specifications (e.g. specification sheet) must be included with the Incentive Application for all new measure related lighting products.
- LED lighting products not listed as an approved product for their specific purpose by the acceptable certifying body specified in the requirements for the applicable lighting measure [DesignLights Consortium® (DLC®) or ENERGY STAR®] must meet the following requirements:
  - Safety Certification recognized by OSHA or the Standards Council of Canada (e.g. UL, ETL, cUL, CSA, etc.).
  - Have an IES-LM-79-08 testing report from an accredited laboratory.
  - Lifetime (hours): $L_{70} \geq 50{,}000$ or $L_{90} \geq 36{,}000$.
  - Warranty ≥ 5 years.
  - Additional non-listed product requirements indicated for the applicable measure.
- Lighting fixture wattage, as listed on the Incentive Application, must include the energy consumption of the applicable ballast and/or any other required operating device, and documentation must be included with the Incentive Application sufficient to verify the existing fixture wattage if the existing fixture is not listed in Table 2a, 2b or 2c, or the fixture wattage is different than what is shown in those tables for a listed fixture.
- For LED lighting fixtures featuring the capability of varying wattages and/or lumen outputs after installation, the "post" wattage listed on the Incentive Application must be the maximum wattage unless documentation is provided sufficient to verify any setting that is less than the maximum allowable fixture wattage setting,
- Rebranded LED lighting products are not eligible for these measures unless:
  - The lighting product is listed as an approved product for its specific purpose by the acceptable certifying body specified in the requirements for the applicable lighting measure (DLC® or ENERGY STAR®).
  - The model number matches on the lighting product, invoice (see Sample Lighting Invoice in the Appendix to this Catalog), specifications, and DLC® listing or ENERGY STAR® certification.
  - The lighting product only has one manufacturer's name listed on the specifications, which must be the DLC® listed or ENERGY STAR® certified manufacturer.
  - The lighting product only has one manufacturer's label, which must be the DLC® listed or ENERGY STAR® certified manufacturer.

Interior Linear LED Tube Light Retrofits

General Requirements for Linear LED Tube Light Measures (Pre-Notification Required) (LT101 – LT129)

Linear LED tube lights (TLEDs) are defined by the DesignLights Consortium® (DLC®) as all tube-style LED products that use the lamp holders (e.g. sockets or tombstones) in the luminaire to connect to the lighting fixture housing and the electrical supply mechanically and electrically.

- Type classifications are as follows:
  - **UL Type A** (LT101 – LT113): TLEDs are used as a direct replacement for existing fluorescent tubes, reusing the existing fluorescent ballast and lamp holders to connect the TLED to the fixture.
  - **UL Type B** (LT101 – LT113): TLEDs typically use the lamp holders (either existing or retrofitted) to connect the TLEDs to the existing fluorescent fixture and the existing fluorescent ballast is bypassed or removed. TLEDs have internal drivers and run off line voltage.
  - **UL Type C** (LT114 – LT126): TLEDs are connected to the low voltage side of a new TLED external driver and the existing fluorescent ballast is disconnected and fully removed from the existing fluorescent fixture.
  - **Dual Mode (DM) Internal Drivers (UL Type A and Type B)** (LT101 – LT113): TLEDs may operate off the existing fluorescent ballast or be rewired to operate off line voltage. They have the same requirements as Type A or Type B TLEDs.
- Linear LED tube lights must be listed by the DesignLights Consortium® (DLC®) for linear replacement lamps or meet the following requirements:
  - Non-Listed LED lighting requirements indicated under Lighting - General Requirements.
  - Efficacy ≥ 120 lumens/watt.
  - CR I ≥ 80.
  - CCT ≤ 6,500 kelvin.
- Lighting fixtures installed 15 feet or higher above the floor are considered “high bay” (LT107, LT109, LT120, LT122).
- New lighting fixtures utilizing LED tube lights are not eligible for any of the Interior Linear LED Tube Lights (LT101 – LT129) measures, however they may be eligible for one of the Interior Linear LED Tube Light Fixtures (LT207 – LT209) measures.

Interior Linear LED Tube Lights Replacing T8 or T12 Fluorescent Lamps (Pre-Notification Required) (LT101 - LT107, LT110 - LT120, LT123 - LT126)

Requirements:

- These measures are available for replacing existing interior T8 and T12 linear fluorescent lamps with linear LED tube lights.
- Any existing T12 lighting fixture ballasts must be removed or permanently disabled.
- Projects must meet the General Requirements for Linear LED Tube Light Measures specified separately in this section of the Catalog.
- Incentive is per fluorescent lamp replaced with an LED tube light.

Interior Linear LED Tube Lights Replacing 4-Foot T5 Fluorescent Lamps (Pre-Notification Required) (LT108, LT109, LT121, LT122)

Requirements:

- These measures are available for replacing existing interior T5 linear fluorescent lamps with linear LED tube lights.
- Projects must meet the General Requirements for Linear LED Tube Light Measures specified separately in this section of the Catalog.
- Incentive is per fluorescent lamp replaced with an LED tube light.
- Incentive is per fluorescent lamp replaced with an LED tube light.

Permanent Interior T8 or T12 Fluorescent Lamp Removal (Pre-Notification Required) (LT127 - LT129)

Requirements:

- These measures are available for permanently removing, and not replacing, some of the existing T8 or T12 fluorescent lamps in a lighting fixture and replacing the remaining fluorescent lamps with LED tube lights.
- These measures must be combined with an LED Tube Light retrofit measure (LT101 – LT126).
- An inspection by program staff may be required prior to permanently removing lamps.
- Unused lamps, lamp holders and ballasts must be permanently removed from the lighting fixture and disposed of in accordance with local regulations.
- Customers are responsible for determining whether to use reflectors in combination with lamp removal to maintain adequate lighting levels, which are expected to meet the Illuminating Engineering Society of North America (IESNA) recommended light levels.
- See General Requirements for Linear LED Tube Light Measures (LT101 – LT129) above for an explanation of LED tube light type classifications and additional requirements.
- Documentation must be included with the Pre-Notification Application sufficient to verify the existing type and quantity of lamps in each affected existing fixture.
- Incentive is per existing fluorescent lamp permanently removed, and the quantity of lamps permanently removed is based on the difference between the pre-existing quantity of operational fluorescent lamps and the quantity replaced with LED tube lights in the affected lighting fixtures.

LED Fixture and Lamp Retrofits

Exterior LED Lighting (Pre-Notification Required) (LT201)

Requirements:

- This measure is available for replacing or retrofitting existing incandescent (greater than 250W) and high-intensity discharge (HID) lighting fixtures in exterior applications with new LED lighting fixtures or retrofit kits.
- Existing lighting fixtures must be on a minimum of 11 hours per day.
- The new LED lighting fixture or retrofit kit must be listed by the DesignLights Consortium® (DLC®) or meet the following requirements:
  - Non-Listed LED lighting requirements indicated under Lighting - General Requirements.
  - Efficacy ≥ 105 lumens/watt.
  - CR I ≥ 70.
  - CCT ≤ 6,500 kelvin.
- Linear LED tube light retrofits, new Linear LED tube light fixtures, screw-in LED lamps, signage LED lamp retrofits and fixtures, and Canopy Decorative/Security LED lamp retrofits and fixtures are not eligible for this measure, however they may be eligible for another LED lighting measure.
- Incentive is based on the lighting input power reduction (watts) resulting from the project.

Parking Garage LED Lighting (Pre-Notification Required) (LT202)

Requirements:

- This measure is available for replacing or retrofitting existing incandescent (greater than 250W) and high-intensity discharge (HID) lighting fixtures in parking garage applications with new LED lighting fixtures or retrofit kits.
- Existing lighting fixtures must be on approximately 20 hours per day.
- The new LED lighting fixture or retrofit kit must be listed by the DesignLights Consortium® (DLC®) or meet the following requirements:
  - » Non-Listed LED lighting requirements indicated under Lighting - General Requirements.
  - » Efficacy ≥ 105 lumens/watt.
  - » CR I ≥ 70.
  - » CCT ≤ 6,500 kelvin.
- Linear LED tube light retrofits, new Linear LED tube light fixtures, and screw-in LED lamps are not eligible for this measure, however they may be eligible for another LED lighting measure.
- Incentive is based on the lighting input power reduction (watts) resulting from the project.

Interior LED Lighting (Pre-Notification Required) (LT203 - LT206)

Requirements:

- These measures are available for replacing or retrofitting existing incandescent, mercury vapor, T5/T8/T12 fluorescent, and high-intensity discharge (HID) lighting fixtures in interior applications with permanently wired LED lamp retrofits or completely new LED lighting fixtures.
- New LED lighting product must be listed by the DesignLights Consortium® (DLC®) or meet the following requirements:
  - » Low bay:
    - Non-Listed LED lighting requirements indicated under Lighting - General Requirements.
    - Efficacy ≥ 115 lumens/watt.
    - CR I ≥ 80.
    - CCT ≤ 6,500 kelvin.
  - » High bay:
    - Non-Listed LED lighting requirements indicated under Lighting - General Requirements.
    - Efficacy ≥ 120 lumens/watt.
    - CR I ≥ 70.
    - CCT ≤ 6,500 kelvin.
- LED lighting fixtures installed 15 feet or higher above the floor are considered “high bay” (LT203, LT204).
- Linear LED tube light retrofits, linear LED tube light fixtures, LED trim kits and screw-in LED lamps are not eligible for these measures, however they may be eligible for another LED lighting measure.
- Existing low bay lighting fixture must be on a minimum of 8,000 hours per year to be eligible for the low bay continuous operation measure (LT206).
- Existing high bay lighting fixture must be on continuously (24/7) to be eligible for the high bay continuous operation measure (LT204).
- Incentive is based on the lighting input power reduction (watts) resulting from the project.

Interior Linear LED Tube Light Fixtures (Pre-Notification Required) (LT207 - LT209)

Requirements:

- These measures are available for replacing existing incandescent, mercury vapor, T5/T8/T12 fluorescent, and high-intensity discharge (HID) lighting fixtures in interior applications with new lighting fixtures that utilize linear LED tube lights.
- Linear LED tube lights must be listed by the DesignLights Consortium® (DLC®) for linear replacement lamps or meet the following requirements:
  - » Non-Listed LED lighting requirements indicated under Lighting - General Requirements.
  - » Efficacy ≥ 120 lumens/watt.
  - » CR I ≥ 80.
  - » CCT ≤ 6,500 kelvin.
- LED lighting fixtures installed 15 feet or higher above the floor are considered “high bay” (LT207, LT208).
- Existing high bay lighting fixture must be on continuously (24/7) to be eligible for the high bay continuous operation measure (LT208).
- Incentive is based on the lighting input power reduction (watts) resulting from the project.

Screw-In LED Lamp Replacing HID Lamp (HID Lamp ≤ 400W) (Pre-Notification Required) (LT210, 211)

Requirements:

- This measure is available for replacing existing mogul base high-intensity discharge (HID) lamps with screw-in mogul base LED lamps.
- Existing HID lamp must be rated less than or equal to 400 watts.
- The new LED lamp must:
  - » Receive power through existing mogul base.
  - » Be permanently wired around the existing ballast (i.e., NOT "plug and play").
  - » Be in full compliance with the authorities having jurisdiction.
  - » Comply with applicable LED lighting measure requirements specified in this section (Lighting) of this Catalog (LT201 – LT206, LT212, LT213).
- Existing lighting fixture must be on a minimum of 8,000 hours per year to be eligible for the continuous operation measure (LT211).
- Incentive is based on the lighting input power reduction (watts) resulting from the project.

Signage and Canopy Decorative/Security LED Lighting (Pre-Notification Required) (LT212, LT213)

Requirements:

- These measures are available for replacing or retrofitting existing incandescent, high-intensity discharge (HID) and fluorescent interior-lit roadway/walkway signage fixtures, canopy decorative/security lighting fixtures, and permanently wired neon lighting fixtures with permanently wired LED lamp retrofits or completely new LED lighting fixtures.
- New LED lighting product must be listed by DesignLights Consortium® (DLC®) or ENERGY STAR® for the applicable lighting type or meet the following requirements:
  - » Non-Listed LED lighting requirements indicated under Lighting - General Requirements.
  - » Efficacy ≥ 80 lumens/watt.
- Existing lighting fixture must be on a minimum of 10 hours per day to be eligible for the commercial hours measure (LT213).
- Existing lighting fixture must be on continuously (24/7) to be eligible for the continuous operation measure (LT212).
- Incentive is based on the lighting input power reduction (watts) resulting from the project.

Interior Hardwired LED Trim Kits and Downlight Fixtures (Pre-Notification Required) (LT301)

Requirements:

- This measure is available for replacing existing incandescent downlight fixtures with new hardwired LED trim kits or new LED downlight fixtures in interior applications.
- A downlight fixture is defined as a recessed, surface mounted, or suspended direct-lighting unit that distributes 90% to 100% of the emitted light in a downward direction (see ANSI/IES RP-16-17).
- LED trim kits that receive power through the Edison base of the existing lighting fixture are not eligible for this measure.
- Pin-based LED products are not eligible for this measure.
- The new LED trim kit or downlight fixture must be approved by ENERGY STAR® under a Fixture Type that includes the word "Downlight" or meet the following requirements:
  - » Non-Listed LED lighting requirements indicated under Lighting - General Requirements
  - » Meet the definition of a qualified LED trim kit or downlight fixture as specified above.
  - » Efficacy ≥ 60 lumens/watt.
  - » CR I ≥ 80.
  - » CCT ≤ 5,000 kelvin.
- Incentive is per qualified fixture replaced with a qualified LED trim kit or downlight fixture.

Table 1: Lumen Reduction

Lighting Technology	Initial Lumens	Mean Lumens	Reduction Factor	Mean Lumens/ Watt
Metal Halide – 70W	4,900	3,300	32.7%	36.7
Metal Halide – 100W	8,500	5,900	30.6%	46.1
Metal Halide – 175W	13,500	8,775	35.0%	41.8
Metal Halide – 250W	20,500	13,500	34.1%	46.6
Metal Halide – 315W Ceramic (T9)	37,800	34,000	10.1%	100.6
Metal Halide – 320W Pulse Start	29,500	20,650	30.0%	56.7
Metal Halide – 320W Pulse Start Ceramic	28,800	23,000	20.1%	63.2
Metal Halide – 400W	36,000	24,000	33.3%	52.7
Metal Halide – 1000W	110,000	71,500	35.0%	66.2
High Pressure Sodium – 70W	6,300	5,850	7.1%	65.0
High Pressure Sodium – 100W	9,400	8,460	10.0%	66.1
High Pressure Sodium – 150W	15,000	13,500	10.0%	71.1
High Pressure Sodium – 250W	27,000	24,300	10.0%	83.8
High Pressure Sodium – 400W	50,000	45,000	10.0%	98.9
High Pressure Sodium – 1000W	125,000	112,000	10.4%	103.7
Mercury Vapor – 75W	2,800	2,250	19.6%	24.2
Mercury Vapor – 100W	4,400	3,400	22.7%	26.6
Mercury Vapor – 175W	7,900	7,600	3.8%	36.2
Mercury Vapor – 250W	13,000	10,700	17.7%	36.9
Mercury Vapor – 400W	23,000	19,100	17.0%	42.0
Mercury Vapor – 1000W	63,000	47,500	24.6%	44.0
LED*			10.0%	
Induction*			15.0%	
T12 (4-foot, 34W per lamp)	2,600	2,300	13.2%	67.6
T12 (8-foot, 60W per lamp)	5,400	4,750	12.0%	79.2
T12 HO (8-foot, 110W per lamp)	8,000	6,950	13.1%	63.2
T8 (4-foot, 32W per lamp)	2,950	2,800	5.1%	87.5
T5 (4-foot, 54W per lamp)	5,000	4,750	5.0%	88.0
CFL (Avg: 13W, 18W, 26W)	1,300	1,125	13.5%	

* Lumen Values vary significantly by manufacturer and wattage

Non-Defined LED Lighting Retrofits

These measures apply to new LED lighting fixture replacements and retrofits that do not qualify for any of the other prescriptive lighting measures offered.

General Requirements:

- A separate Non-Defined Lighting Measure form is required for each area (office, production, warehouse, etc.) receiving the lighting upgrade.
- These measures must be part of a capital investment project that results in energy savings and must not be easily reversible.
- If applicable, all proposed technologies utilized in the Non-Defined Lighting section must meet the requirements for any prescriptive measure featuring those same technologies.
- For technologies that feature certification and/or approval by DesignLights Consortium® (DLC®) or ENERGY STAR®, the installed product must be approved by the appropriate certifying body or meet applicable non-listed lighting requirements, subject to approval by program staff.

Lumens per Watt Improvement (Mean Efficacy Increase ≥ 5%) (Pre-Notification Required) (LT302)

Requirements:

- This measure is available if the rated mean efficacy of the lighting system will increase by a minimum of 5% and result in the total lighting input power (watts) being reduced.
- If no mean efficacy is available on the product's literature, a degradation factor will be assessed via Table 1.
- The simple payback period for the project must be greater than or equal to one year and less than or equal to 15 years.
- Incentive is based on the total annual lighting input power reduction (kWh) and cannot exceed 50% of the total project cost.

Energy Conservation Improvement (Mean Efficacy Increase < 5%) (Pre-Notification Required) (LT303)

Requirements:

- This measure is available if the rated mean efficacy of the existing lighting system will change by less than 5% and result in the total lighting input power (watts) being reduced.
- If no mean efficacy is available on the product's literature, a degradation factor will be assessed via Table 1.
- The simple payback period for the project must be greater than or equal to one year and less than or equal to 15 years.
- Incentive is based on the total annual lighting input power reduction (kWh) and cannot exceed 50% of the total project cost.

Table 2a: Default Wattages for Standard Linear Fluorescent Lighting Fixtures

	Default Fixture Wattage			
Fixture Description	**1 Lamp**	**2 Lamp**	**3 Lamp**	**4 Lamp**
4-foot F32 T8	31	58	85	112
2-foot F17 T8	20	33	48	63
3-foot F25 T8	26	46	68	88
4-foot F28 T5	32	65	93	126
4-foot F40 T12	43	85	130	170

Table 2b: Default Wattages for High-Output and High-Performance Linear Fluorescent Lighting Fixtures

Fixture Description	**1 Lamp**	**2 Lamp**	**3 Lamp**	**4 Lamp**	**6 Lamp**	**8 Lamp**
4-foot F32 T8 HP Ballast	38	74	110	144	220	288
F54 T5 HO	62	122	185	243	365	486

Table 2c: Default Wattages for High-Intensity Discharge (HID) and Non-Standard T12 Fluorescent Lighting Fixtures

Fixture Description	**Default Fixture Wattage**
32W HID	43
50W HID	64
75W HID	93
100W HID	128
150W HID	183
175W HID	208
250W HID	290
360W HID	414
400W HID	455
600W HID	665
750W HID	812
1,000W HID	1,080
2-Lamp, 8-foot T12 HO	210
2-Lamp, 8-foot T12 VHO	380
2-Lamp, 8-foot T12	132
4-Lamp, 8-foot T12	264
2-Lamp, 4-foot T12 (34 Watt/lamp)	74
3-Lamp, 4-foot T12 (34 Watt/lamp)	117
4-Lamp, 4-foot T12 (34 Watt/lamp)	143

New Construction LED Lighting

New Construction LED Lighting Power Density (Pre-Notification Required) (LT401 - LT403)

Requirements:

- These measures are available for interior (LT401, LT403) and exterior (LT402) LED lighting fixtures included in new construction and major renovation projects (see definition under "New Construction Program - Eligibility" on page 6 of this Catalog).
- Lighting power density (LPD) of the new LED lighting must be at least 10% lower than the ASHRAE 90.1-2013 requirements.
- Either the Space-By-Space Method (see ASHRAE 90.1-2013) or Building Area Method (see ASHRAE 90.1-2013 and refer to sample COMcheck Report below for an example of how the total allowed and total proposed watts can be determined) can be used to calculate interior lighting LPD for the purposes of the interior lighting measures (LT401, LT403) (see Building Area Method LPDs in the Appendix of this Catalog).
- For the exterior lighting measure (LT402), each line item on the COMcheck report must be evaluated individually (i.e., area by area) and only qualified line items included on the Incentive Application (see Exterior Lighting LPDs in the Appendix of this Catalog); program staff will analyze exterior lighting design and revise the Incentive Application to properly account for light spillover between adjacent areas as appropriate.
- Please reference the requirements of the applicable prescriptive lighting measure (LT201 – LT303) in this catalog to verify the fixtures are eligible for incentives; fixtures that do not fall under one of those measures and meet the specified requirements are not eligible for these measures.
- The following must be included with the Pre-Notification Application:
  - COMcheck Interior and/or Exterior Lighting Compliance Certificate (U.S. Department of Energy COMcheck software available at **energycodes.gov/COMcheck**.
  - Scaled building lighting and floor plans and/or site (exterior) lighting plans.
  - Lighting fixture and lamp schedules.
  - Specifications for all lighting fixtures and lamps.
- Must submit updates for, and explanations of, any changes to the plans, schedules and/or specifications previously included with the Incentive Application.
- The incentive is based on the difference between the ASHRAE 90.1-2013 allowed wattage and the qualified lighting fixture wattage.

COMcheck

Sample COMcheck Report

Section 2: Interior Lighting and Power Calculation

A	B	C	D
	Floor Area (ft²)	**Allowed Watts / (ft²)**	**(B x C)**
Office	20,000	0.98	19,600
Manufacturing Facility	80,000	1.23	98,400
		Total Allowed Watts =	118,000

Section 3 Interior Lighting Fixture Schedule

A	B	C	D	E
Fixture ID: Description/Lamp/Wattage Per Lamp/Ballast	**Lamps/ Fixture**	**Quantity of Fixtures**	**Fixture Wattage**	**(C x D)**
Office (20,000 ft²) Linear Fluorescent lamp 4-ft T8 32W (Super 8) Electronic	4	70	144	10,080
Manufacturing Facility (80,000 ft²) LED1: B LED High Bays: Others	6	200	250	50,000
			Total Allowed Watts =	60,080

Interior Lighting PASSES Design 49% better than code

Design is greater than or equal to 10% better than code and eligible for incentives if other requirements are met.

Lighting Controls

General Requirements

- Must be a Consumers Energy electric customer.
- Specifications (e.g. specification sheet) must be included with the Incentive Application for all new measure related lighting control products and equipment.

Interior Lighting Occupancy Sensor Controls (Retrofit) (LC101, LC102)

Requirements:

- These measures are available for installing passive infrared, ultrasonic, or microwave detectors to control existing or replacement interior lighting fixtures.
- Lighting fixtures with magnetic ballasts are not eligible for these measures.
- Replacing an existing, operational occupancy sensor is not eligible for these measures.
- Integrated sensors, and sensors controlling only one lighting fixture, are only eligible for measures LC101a (< 150 ft²) or LC102 (per watt controlled) except for high bay fixtures, which can also qualify for measure LC101b (≥ 150 and ≤ 500 ft²).
- Integrated sensors, and sensors controlling only one lighting fixture, are not eligible for LC101c (> 500 ft²).
- Combined or alternate measure eligibility:
  - » Cannot be combined with Interior Centralized Lighting Controls (LT105) measure.
  - » Cannot be combined with Interior Lighting Daylight Sensor Controls (LC104) measure.
  - » May be eligible for Interior Lighting Occupancy and Daylight Sensor Controls (LC103) measure instead of this measure if both types of sensors are being installed.
- The following must be included with the Final Application:
  - » Inventory of the controlled lighting fixtures (e.g. schedule, spreadsheet, etc.).
  - » For measures LC101b (≥ 150 and ≤ 500 ft²) and LC101c (> 500 ft²), scaled floor plans showing the area controlled per sensor.
- Incentive is based on the number of new sensors installed and varies depending on the size (ft²) of the area controlled per sensor (LC101), or the watts controlled by the new sensors (LC102); must select LC101 or LC102 for each space.
- These measures qualify for retrofit applications, but do not qualify for new construction applications.

Interior Lighting Occupancy and Daylight Sensor Controls (Retrofit) (Pre-Notification Required) (LC103)

Requirements:

- This measure is available for installing passive infrared, ultrasonic, or microwave detectors together with daylight sensors to control existing or replacement interior lighting fixtures.
- Must comply with the requirements for, and cannot be combined with, applicable Interior Lighting Occupancy Sensor Controls (LC101, LC102) measure and Interior Lighting Daylight Sensor Controls (LC104) measure.
- Documentation must be included with the Final Application sufficient to verify the wattage of the controlled lighting fixtures (e.g. schedule, spreadsheet, etc.).
- Incentive is per watt controlled.
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Interior Lighting Daylight Sensor Controls (Pre-Notification Required) (LC104)

Requirements:

- This measure is available for installing daylight sensor controls to control lighting fixtures in indoor spaces where reasonable amounts of sunlight exposure is available and task lighting is not critical.
- The controls can be on/off, stepped, or continuous (dimming).
- The on/off controller should turn off artificial lighting when the interior illumination meets the desired indoor lighting level.
- The stepped controller generally dims the artificial lighting 50% when the interior illumination levels reach 50% of the desired lighting levels.
- All types of daylight sensor controls are required to be commissioned to ensure proper sensor calibration and energy savings.
- Lighting fixtures with magnetic ballasts are not eligible for this measure.
- Lighting must be within a 15-foot perimeter of a natural light source.
- Combined or alternate measure eligibility:
  - » Cannot be combined with Interior Lighting Occupancy Sensor Controls (LC101, LC102) measure.
  - » May be eligible for Interior Lighting Occupancy and Daylight Sensor Controls (LC103) measure instead of this measure if both types of sensors are being installed.
- Documentation must be included with the Final Application sufficient to verify the wattage of the controlled lighting fixtures (e.g. schedule, spreadsheet, etc.).
- Incentive is per watt controlled.
- This measure qualifies for retrofit applications and may qualify for new construction applications if daylight sensor controls are not required by code (consult ASHRAE 90.1-2013 and local building codes).

Interior Centralized Lighting Controls (Retrofit) (Pre-Notification Required) (LC105)

Requirements:

- This measure is available for installing an automated centralized lighting control system with override capabilities to control existing or replacement interior lighting fixtures.
- The occupants' schedule of operation must be taken into consideration when programming the system.
- Control system may include time clocks, packaged programmable relay panels, and/or complete building automation controls.
- Photo sensors may be incorporated with the new centralized lighting control system.
- Replacements of existing, functional lighting control systems are not eligible for this measure.
- Combined measure eligibility:
  - » Cannot be combined with Interior Lighting Occupancy Sensor Controls (LC101, LC102) measures.
  - » Cannot be combined with Interior Lighting Occupancy and Daylight Sensor Controls (LC103) measure.
  - » May be combined with Interior Lighting Daylight Sensor Controls (LC104) measure.
  - » May be combined with Interior Stairwell Lighting Controls (LC106) measure; if LC105 and LC106 are combined, stairwell square footage shall not be included in the square footage for LC105.
- Scaled floor plans showing the areas controlled must be included with the Final Application.
- Incentive is based on the size of the area controlled (ft^2).
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Interior Stairwell Lighting Controls (Pre-Notification Required) (LC106)

Requirements:

- This measure is available for installing stepped dimming occupancy controls to control interior stairwell or passageway LED lighting fixtures (i.e., applications requiring continuous lighting 24 hours per day by code).
- The stepped dimming controls must operate the lighting at full power and full light output when the space is occupied and at a reduced power level and reduced light output when unoccupied.
- The occupancy sensor must be a hardwired passive infrared or microwave detector that will reduce the lighting fixture output to use no more than 50% of full power when the space is unoccupied.
- May be combined with Interior Centralized Lighting Controls (LC105) measure; if LC105 and LC106 are combined, stairwell square footage shall not be included in the square footage for LC105.
- Documentation must be included with the Final Application sufficient to verify the wattage of the controlled lighting fixtures (e.g. schedule, spreadsheet, etc.).
- Incentive is per watt controlled.
- This measure qualifies for new construction and retrofit applications.

Exterior Lighting Multi-Step Dimming Occupancy Sensor Controls (Pre-Notification Required) (LC107)

Requirements:

- This measure is available for installing stepped dimming occupancy controls to control exterior LED lighting fixtures.
- The stepped dimming controls must operate the lighting at full power and full light output when the space is occupied and at a reduced power level and reduced light output when unoccupied.
- The occupancy sensor must be a hardwired passive infrared or microwave detector that will reduce the lighting fixture output to use no more than 50% of full power when the space is unoccupied.
- Cannot be combined with any other lighting control measures other than photo sensors or timers that schedule the exterior lighting to be on a minimum of eight hours per night.
- Documentation must be included with the Final Application sufficient to verify the wattage of the controlled lighting fixtures (e.g. schedule, spreadsheet, etc.).
- Incentive is per watt controlled.
- This measure qualifies for new construction and retrofit applications.

Exterior Lighting Occupancy Sensor Controls (Retrofit) (Pre-Notification Required) (LC108)

Requirements:

- This measure is available for installing occupancy sensors to control existing or replacement exterior LED lighting systems that will turn a lighting fixture off when the space is unoccupied.
- Sensor may be a passive infrared or ultrasonic detector, depending on the area being lit.
- Existing lighting system must currently operate continuously during night hours.
- Cannot be combined with other lighting control measures other than photo sensors or timers that schedule the exterior lighting to be on a minimum of eight hours per night.
- Documentation must be included with the Final Application sufficient to verify the wattage of the controlled lighting fixtures (e.g. schedule, spreadsheet, etc.).
- Incentive is per watt controlled.
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Exterior Multi-Step Dimming Timer Controls (Pre-Notification Required) (LC109)

Requirements:

- This measure is available for installing stepped dimming timer controls for exterior lighting systems.
- Stepped dimming timer controls must be an automatic (digital) lighting system that operates at full power and full light output during periods of higher traffic, and at a reduced power level and reduced light output during periods of lower traffic.
- The installation of a new time clock system featuring no multi-step dimming capabilities is not eligible for this measure.
- During low traffic periods, lighting fixtures must use no more than 50% of full rated power.
- Lighting fixtures must be at low power at least five hours per night.
- Cannot be combined with other lighting control measures other than photo sensors or timers that schedule the exterior lighting to be on a minimum of eight hours per night.
- Documentation must be included with the Final Application sufficient to verify the wattage of the controlled lighting fixtures (e.g. schedule, spreadsheet, etc.).
- Incentive is per watt controlled.
- This measure qualifies for new construction and retrofit applications.

Network Lighting Controls (Pre-Notification Required) (LC110, LC111)

The goal of these measures is to implement and incorporate best practice lighting design for energy savings, visual appeal, visual acuity, and productivity. The Network Lighting Controls (NLC) measures identify the project as a system, combining lighting control and fixture and lamp replacement and/or elimination savings into a custom lighting design project. By requiring a central/master front end system, the goal is to continuously monitor and adjust the lighting system(s) for energy savings and comfort within the facilities. Participation in the program can result in energy savings ranging from 65% for a basic networked control system to as much as 90% for an advanced networked solution.

Requirements:

- These measures are available for installing a networked lighting control (NLC) system with a central/master programming, control and reporting interface that is connected via hardwire and/or wireless technology to all devices and luminaires throughout the entire system for both interior and exterior spaces.
- For new construction applications, the baseline shall be in accordance with Michigan Energy Code or standard customary practice.
- New LED lighting fixtures or lamps must meet the requirements specified for the applicable interior or exterior LED lighting measure (LT101 – LT303) to be eligible for inclusion in the fixture and lamp savings.
- The simple payback period for the project must be greater than or equal to one year and less than or equal to 15 years.
- At a minimum, the NLC system shall be capable of the following:
  - Providing complete programming and control from a central location.
  - Stepped dimming.
  - Remote interface and control such as BACnet, LONworks, etc.
  - Occupancy Sensing reporting.
  - Operational reporting.
  - Energy use reporting with a maximum 15-minute monitoring interval.
  - Storing and delivering, in raw data format, polled energy use information for at least one year.
  - At least three energy saving control strategies, which may include, but are not limited to:
    - Time scheduling.
    - Daylight harvesting.
    - Occupancy/vacancy sensing.
    - Task tuning.
    - Load shedding.
    - High end trim.
    - Load Shed/Demand Response
- The following must be included with the Pre-Notification Application:
  - Approved purchase order for NLC project.
  - Proposed new lighting plans.
  - Specifications for proposed new lighting fixtures.
  - Specifications for proposed new control system.
  - Proposed new operating schedule.
  - Proposed new control strategies.
  - For retrofit applications:
    - Existing lighting plans.
    - Existing lighting fixture inventory.
    - Current operating schedule.
    - Current lighting control strategies.
- The following must be included with the Final Application:
  - New lighting plans.
  - Specifications for new lighting fixtures.
  - Specifications for new control system.
  - New operating schedule.
  - New control strategies.
  - Raw data file with kWh readings in an Excel spreadsheet. The metered data should have a maximum of 15-minute intervals over a minimum of a two-week period.
- Incentive is based on the combined lighting control and fixture and lamp replacement and/or elimination total system input power reduction (kWh) and cannot exceed 50% of the total NLC project cost; the incentive rate varies depending on the type of facility (based on the majority use (ft^2) and SIC/NAISC description of the building).
- These measures qualify for new construction and retrofit applications.

Variable Frequency Drives

General Requirements

- Must be a Consumers Energy electric customer.
- Specifications (e.g. specification sheet) must be included with the Incentive Application for all new measure related Variable Frequency Drives (VFDs) and motors.
- Replacement of existing VFDs, replacement of two-speed motors with VFDs, installation of VFDs for backup or redundant equipment (see definition under "Project Requirements - Project and equipment types that are NOT eligible for incentives..." on page 8 of this Catalog), and installation of VFDs for soft start purposes only, is not eligible for incentives.

HVAC Variable Frequency Drives

Variable Frequency Drives on HVAC Fans, HVAC Cooling Tower Fans and HVAC Pumps (≤ 100 HP) (VF101 - VF105)

Requirements:

- These measures are available for variable frequency drives (VFDs) installed to vary the speed of HVAC fans (VF101, VF102), HVAC cooling tower fans (VF103), and HVAC pumps (VF104, VF105).
- VFD must be automatically controlled by differential pressure, flow, temperature, or another variable signal.
- For retrofit applications:
  - The installation of a VFD must accompany the permanent removal or disabling of any throttling devices such as inlet vanes, bypass dampers, bypass valves, or throttling valves.
  - The existing motor must be constant speed.
- The controlled motor must operate more than 2,000 hours per year.
- New cooling system supply and return fans are not eligible for these measures if the total fan system nameplate horsepower is rated > 5 HP and one of the following conditions are applicable unless an exception to the code is satisfied (consult ASHRAE 90.1-2013):
  - The cooling system is a DX cooling system with a cooling capacity that is greater than or equal to 5.4 tons.
  - The cooling system is a chilled water cooling system.
  - The cooling system fan motor horsepower is greater than or equal to 1/12 HP and less than 1 HP.
- New HVAC fans and pumps, including fans and pumps integrated into new equipment, are not eligible for these measures if variable speed control is required by code (consult ASHRAE 90.1-2013).
- VFDs on new chillers are not eligible for these measures, however new chillers with integrated VFDs may be eligible for one of the High-Efficiency Air- and Water-Cooled Chillers (HV203 – HV205) measures.
- Fans and pumps for new HVAC cooling towers are not eligible for these measures if variable speed control is required by code.
- Motors rated greater than 100 HP are not eligible for these measures, however they may be eligible for a custom incentive; if eligible for a custom incentive, a completed Variable Frequency Drive Information Worksheet (see Appendix of this Catalog) must be included with the custom incentive Pre-Notification Application, and must complete the pre- (if applicable) and post-retrofit power monitoring specified on the VFD Information Worksheet and include the data (kW) with the custom incentive Final Application.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Rated horsepower (HP) of the controlled motor.
  - Annual operating schedule of the controlled motor.
  - VFD control strategy.
  - For retrofit applications, the pre-existing motor control strategy.
- Incentive is based on the rated horsepower (HP) of the controlled motor.
- These measures qualify for retrofit applications and may qualify for new construction applications if variable speed control is not required by code (consult ASHRAE 90.1-2013).

Fixed Speed (Non-Dynamic) Variable Frequency Drive Control on HVAC Fans and Pumps (≤ 100 HP) (VF106 – VF110)

Requirements:

- These measures are available for variable frequency drives (VFDs) installed to control HVAC fans (VF106) and pumps (VF107 – VF110) at a fixed speed (non-dynamic).
- VFD must operate at a fixed frequency (Hz) of no more than 54 Hz.
- The controlled motor must:

- Operate more than 2,000 hours per year.
- Have a rated frequency (Hz) of 60 Hz.

- For retrofit applications, the existing motor must be:
  - Operating at a constant speed.
  - Operating at a frequency (Hz) of 60 Hz.
- New HVAC fans and pumps, including fans and pumps integrated into new equipment, are not eligible for these measures if variable speed control is required by code (consult ASHRAE 90.1-2013).
- Automatically controlled VFDs are not eligible for these measures, however they may be eligible for another prescriptive VFD or integrated variable speed motor (e.g. ECM) measure, or a custom incentive; if eligible for a custom incentive, a completed Variable Frequency Drive Information Worksheet (see Appendix of this Catalog) must be included with the custom incentive Pre-Notification Application, and must complete the pre- (if applicable) and post-retrofit power monitoring specified on the VFD Information Worksheet and include the data (kW) with the custom incentive Final Application.
- Motors rated greater than 100 HP are not eligible for these measures, however they may be eligible for a custom incentive; if eligible for a custom incentive, a completed Variable Frequency Drive Information Worksheet (see Appendix of this Catalog) must be included with the custom incentive Pre-Notification Application, and must complete the pre- (if applicable) and post-retrofit power monitoring specified on the VFD Information Worksheet and include the data (kW) with the custom incentive Final Application.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Rated horsepower (HP) of the controlled motor.
  - Annual operating schedule of the controlled motor.
  - Rated frequency (Hz) of the controlled motor.
  - Frequency (Hz) of power being supplied to the controlled motor.
  - For retrofit applications:
    - The pre-existing motor control strategy.
    - The pre-existing motor operating frequency (Hz).
- Incentive is based on the rated horsepower (HP) of the controlled motor.
- These measures qualify for retrofit applications and may qualify for new construction applications if variable speed control is not required by code (consult ASHRAE 90.1-2013).

Two-Speed RTU Supply Fan Control (VF111)

Requirements:

- This measure is available for two-speed supply fan control installed on unitary single package air conditioning systems (e.g. RTUs).
- The RTU must operate more than 2,000 hours per year.
- The two-speed supply fan motor speed must be automatically controlled by differential pressure, flow, temperature, or another variable signal.
- For retrofit applications, the existing fan motor must be constant speed.
- Installation of a new RTU with two-speed supply fan control is not eligible for this measure if two-speed fan control is required by code (ASHRAE 90.1-2013), however the new RTU may be eligible for the Unitary (e.g. RTU) and Split Air Conditioning Systems and Heat Pumps (HV101) measure.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Nameplate (nominal) cooling capacity (tons) of the RTU.
  - Annual operating schedule of the RTU.
  - Fan Motor control strategy.
  - For retrofit applications, the pre-existing fan motor control strategy.
- Incentive is based on the nameplate (nominal) cooling capacity (tons) of the RTU.
- This measure qualifies for retrofit applications and may qualify for new construction applications if variable speed control is not required by code (consult ASHRAE 90.1-2013).

Variable Frequency Drives on HVAC and Grocery Store Refrigeration System Condenser Fans (VF112)

Requirements:

- This measure is available for variable frequency drives (VFDs) installed to vary the speed of air-cooled condenser unit fans for HVAC and grocery store refrigeration systems.
- Cooling and refrigeration systems that use “free cooling” economizers, which shut down the compressor/condenser and evaporator when the outdoor air temperature is favorable for free cooling, are not eligible for this measure.
- Installation of a new condenser unit with VFD fan control is not eligible for this measure if variable speed control of condenser fans is required by code (ASHRAE 90.1–2013), however the new condenser unit may be eligible for the Unitary (e.g. RTU) and Split Air Conditioning Systems and Heat Pumps (HV101) measure.
- For retrofit applications, the existing condenser:
  - Cannot have ambient temperature and pressure fan cycling controls.
  - Can only have on/off fan controls.
  - Must routinely operate at less than full load and frequently cycle the fans on and off.
  - Cannot be equipped with variable or two-speed fan control.
- For HVAC system applications:

- HVAC system must run primarily during the summer months.
- VFD controls shall automatically modulate the condenser fan speed in proportion to the HVAC cooling load.
- Controls for multi-cell condenser units with a VFD(s) installed for the fans must operate the maximum number of fans allowed (per manufacture requirements) and vary the speed of all operating fans in unison as opposed to staging fans on and off.
- For new construction applications, individual condenser fan motors, and fan arrays for a single cell acting as one fan, rated greater than or equal to 7.5 HP are not eligible for this measure unless an exception to the code is satisfied (consult ASHRAE 90.1-2013).

- For grocery store refrigeration system applications:
  - VFD controls shall automatically modulate the condenser fan speed in proportion to the refrigeration system load.
  - Controls for multiple fan arrays with a VFD(s) installed for the fans must vary the speed of all operating fans in unison as opposed to staging fans on and off.
  - New construction applications are not eligible for this measure.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Condenser load (tons) controlled by the condenser fan VFD.
  - VFD control strategy.
  - For retrofit applications, the pre-existing condenser fan control strategy.
- Incentive is based on the total condenser load (tons) controlled by the condenser fan VFD.
- This measure qualifies for retrofit applications and may qualify for new construction applications if variable speed control is not required by code (consult ASHRAE 90.1-2013).

Process Variable Frequency Drives

Variable Frequency Drives on Process Pumps and Fans (≤ 250 HP) (Pre-Notification Required > 50 HP) (VF201 - VF204)

Requirements:

- These measures are available for variable frequency drives (VFDs) installed to vary the speed of process (non-HVAC) pumps (VF201, VF202) and fans (VF203, VF204).
- VFD must be automatically controlled by differential pressure, flow, temperature, or another variable parameter.
- The controlled motor must operate at least 2,000 hours per year.
- For retrofit applications:
  - The installation of a VFD must accompany the permanent removal or disabling of any throttling devices such as inlet vanes, bypass dampers, bypass valves, or throttling valves.
  - The existing motor must be constant speed.
- Motors rated greater than 250 HP are not eligible for these measures, however they may be eligible for a custom incentive; if eligible for a custom incentive, a completed Variable Frequency Drive Information Worksheet (see Appendix of this Catalog) must be included with the custom incentive Pre-Notification Application, and must complete the pre- (if applicable) and post-retrofit power monitoring specified on the VFD Information Worksheet and include the data (kW) with the custom incentive Final Application.
- Open pumping systems (e.g. open loop once through wells), deep well pumps, and high static head pumps discharging into systems with varying head requirements (e.g. water storage tanks), are not eligible for these measures, however they may be eligible for the prescriptive Variable Frequency Drives on Open Loop Pumping Systems (VF208) measure or a custom incentive; if eligible for a custom incentive, a completed Variable Frequency Drive Information Worksheet (see Appendix of this Catalog) must be included with the custom incentive Pre-Notification Application, and must complete the pre- (if applicable) and post-retrofit power monitoring specified on the VFD Information Worksheet and include the data (kW) with the custom incentive Final Application.
- For motors rated greater than 50 HP:
  - Must submit a Pre-Notification Application.
    - A completed VFD Information Worksheet (see Appendix of this Catalog) must be included with the Pre-Notification Application.
  - Must complete the post-retrofit power monitoring specified on the VFD Information Worksheet.
  - For retrofit applications, must complete the pre-retrofit power monitoring specified on the VFD Information Worksheet.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Rated horsepower (HP) of the controlled motor.
  - Annual operating schedule of the controlled motor.
  - VFD control strategy.
  - For motors rated greater than 50 HP, post-retrofit average power consumption [power monitoring data (kW)] as specified on the VFD Information Worksheet in the Appendix of this Catalog).
  - For retrofit applications:
    - Pre-existing motor control strategy.
    - For motors rated greater than 50 HP, pre-retrofit average power consumption [power monitoring data (kW)] as specified on the VFD Information Worksheet in the Appendix of this Catalog).
- Incentive is based on the rated horsepower (HP) of the controlled motor.
- These measures qualify for new construction and retrofit applications.

Fixed Speed (Non-Dynamic) Variable Frequency Drive Control on Process Pumps and Fans (≤ 250 HP) (Pre-Notification Required > 50 HP) (VF205, VF206)

Requirements:

- These measures are available for variable frequency drives (VFDs) installed to control process (non-HVAC) fans (VF205) and pumps (VF206) at a fixed speed (non-dynamic).
- VFD must operate at a fixed frequency (Hz) of no more than 54 Hz.
- The controlled motor must:
  - Operate more than 2,000 hours per year.
  - Have a rated frequency (Hz) of 60 Hz.
- For retrofit applications, the existing motor must be:
  - Operating at a constant speed.
  - Operating at a frequency (Hz) of 60 Hz.
- Open pumping systems (e.g. open loop once through wells), deep well pumps, and high static head pumps discharging into systems with varying head requirements (e.g. water storage tanks), are not eligible for these measures, however they may be eligible for the prescriptive Variable Frequency Drives on Open Loop Pumping Systems (VF208) measure or a custom incentive; if eligible for a custom incentive, a completed Variable Frequency Drive Information Worksheet (see Appendix of this Catalog) must be included with the custom incentive Pre-Notification Application, and must complete the pre- (if applicable) and post-retrofit power monitoring specified on the VFD Information Worksheet and include the data (kW) with the custom incentive Final Application.
- Automatically controlled VFDs are not eligible for these measures, however they may be eligible for another prescriptive VFD or integrated variable speed motor (e.g. ECM) measure, or a custom incentive; if eligible for a custom incentive, a completed Variable Frequency Drive Information Worksheet (see Appendix of this Catalog) must be included with the custom incentive Pre-Notification Application, and must complete the pre- (if applicable) and post-retrofit power monitoring specified on the VFD Information Worksheet and include the data (kW) with the custom incentive Final Application.
- For motors rated greater than 50 HP, must submit a Pre-Notification Application along with a completed Variable Frequency Drive Information Worksheet (see Appendix of this Catalog).
- Motors rated greater than 250 HP are not eligible for these measures, however they may be eligible for a custom incentive; if eligible for a custom incentive, a completed Variable Frequency Drive Information Worksheet (see Appendix of this Catalog) must be included with the custom incentive Pre-Notification Application, and must complete the pre- (if applicable) and post-retrofit power monitoring specified on the VFD Information Worksheet and include the data (kW) with the custom incentive Final Application.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Rated horsepower (HP) of the controlled motor.
  - Annual operating schedule of the controlled motor.
  - Rated frequency (Hz) of the controlled motor
  - Frequency (Hz) of power being supplied to the motor.
  - For retrofit applications:
    - The pre-existing motor control strategy.
    - The pre-existing motor operating frequency (Hz).
- Incentive is based on the rated horsepower (HP) of the controlled motor.
- These measures qualify for new construction and retrofit applications.

Variable Frequency Drives on Data Center, Telecom, and Computer Room Air Conditioning System (CRAC) Pumps and Fans (VF207)

Requirements:

- This measure is available for variable frequency drives installed to control data center, telecom, and computer room air conditioning system (CRAC) pumps and fans.
- A feedback loop must be implemented to modulate the cooling output of the CRAC.
- The air conditioning system must operate:
  - Continuously
  - Year-round.
- For retrofit applications, the existing motors must be constant speed.
- Installation of a new CRAC with VFD control of pumps and fans is not eligible for this measure if variable speed control is required by code (ASHRAE 90.1–2013), however the new CRAC system may be eligible for one of the CRAC system measures (HV102, HV103).
- Documentation must be included with the Final Application sufficient to verify the following:
  - Rated horsepower (HP) of each of the pump and fan motors.
  - VFD control strategy for each of the pump and fan motors.
  - For retrofit applications, the control strategy for each of the pre-existing pump and fan motors.
- Incentive is based on the rated horsepower (HP) of the controlled motor.
- This measure qualifies for retrofit applications and may qualify for new construction applications if variable speed control is not required by code (consult ASHRAE 90.1-2013).

Variable Frequency Drives on Open Loop Pumping Systems (≤ 100 HP) (Pre-Notification Required > 50 HP) (VF208)

Requirements:

- This measure is available for variable frequency drives (VFDs) installed to vary the speed of pumps on open loop pumping systems (e.g. open loop once through wells), deep well pumps, and high static head pumps discharging into systems with varying head requirements (e.g. water storage tanks).
- The controlled motor must:
  - Operate more than 2,000 hours per year.
  - Have a rated frequency (Hz) of 60 Hz.
  - Be serving a centrifugal pump.
- For retrofit applications, the existing pump motor must be:
  - Operating at a constant speed.
  - Operating at a frequency (Hz) of 60 Hz.
- VFD may be automatically or manually controlled.
  - If automatically controlled, VFD must be controlled by differential pressure, flow, temperature, or another variable signal.
  - If manually controlled, VFD must be controlled at a fixed frequency (Hz) of no more than 50 Hz.
- Motors rated greater than 100 HP are not eligible for this measure, however they may be eligible for a custom incentive; if eligible for a custom incentive, a completed Variable Frequency Drive Information Worksheet (see Appendix of this Catalog) must be included with the custom incentive Pre-Notification Application, and must complete the pre- (if applicable) and post-retrofit power monitoring specified on the VFD Information Worksheet and include the data (kW) with the custom incentive Final Application.
- For motors rated greater than 50 HP, must submit a Pre-Notification Application along with a completed Variable Frequency Drive Information Worksheet (see Appendix of this Catalog).
- Documentation must be included with the Final Application sufficient to verify the following:
  - Rated horsepower (HP) if the controlled pump motor.
  - Annual operating schedule of the controlled pump motor.
  - Rated frequency (Hz) of the controlled pump motor.
  - Frequency (Hz) of power being supplied to the controlled pump motor.
  - The type of pump being controlled.
  - VFD control strategy.
  - For retrofit applications:
    - The pre-existing pump motor control strategy.
    - The pre-existing pump motor operating frequency (Hz).
- Incentive is based on the rated horsepower (HP) of the controlled motor.
- This measure qualifies for new construction and retrofit applications.

Variable Frequency Drives on Industrial Process Cooling and Refrigerated Warehouse Refrigeration System Condenser Fans (VF209, VF210)

Requirements:

- These measures are available for variable frequency drives (VFDs) installed to vary the speed of air-cooled condenser unit fans for medium (VF209) and low temperature (VF210) industrial process cooling and refrigerated warehouse refrigeration systems.
- For retrofit applications, the existing condenser:
  - Cannot have ambient temperature and pressure fan cycling controls.
  - Can only have on/off fan controls.
  - Must routinely operate at less than full load and frequently cycle the fans on and off.
  - Cannot be equipped with variable or two-speed fan control.
- Cooling or refrigeration system must operate year-round.
- VFD must be automatically controlled in response to a variable floating head pressure signal.
- Controls for a multiple fan array with a VFD(s) installed for the fans must vary the speed of all operating fans in unison as opposed to staging fans on and off.
- Cooling and refrigeration systems that use “free cooling” economizers, which shut down the compressor/condenser and evaporator when the outdoor air temperature is favorable for free cooling, are not eligible for this measure.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Rated horsepower (HP) of the controlled fan motor(s).
  - VFD control strategy.
  - For retrofit applications, the pre-existing condenser fan(s) control strategy.
- The incentive is based on the rated horsepower (HP) of the motor(s) controlled by the VFD, and is higher for a low temperature refrigeration system.
- These measures qualify for new construction and retrofit applications.

Variable Frequency Drives on Pool Circulation Pumps (≤ 50 HP) (VF211)

Requirements:

- This measure is available for variable frequency drives (VFDs) installed to vary the speed of pool circulation pumps.
- For retrofit applications, the existing pump motor must be constant speed.
- Pumps must operate continuously (24/7) throughout the year.
- Seasonal pool pumps (i.e., summer use only) are not eligible for this measure.

- VFD must be automatically controlled to maintain the minimum required volume flow rate (must comply with local and state regulations).
- It is recommended that the VFD be automatically controlled by a digital flowmeter, and that the flow rate be displayed for facility staff to see so that they may better understand and manage the flow rate.
- Motors rated greater than 50 HP are not eligible for this measure, however they may be eligible for a custom incentive; if eligible for a custom incentive, a completed Variable Frequency Drive Information Worksheet (see Appendix of this Catalog) must be included with the custom incentive Pre-Notification Application, and must complete the pre- (if applicable) and post-retrofit power monitoring specified on the VFD Information Worksheet and include the data (kW) with the custom incentive Final Application.
- Best practice is to install a filter differential pressure alarm to maximize savings.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Rated horsepower (HP) of the controlled pump motor.
  - Pool annual operating schedule.
  - VFD control strategy.
  - For retrofit applications, the pre-existing pump motor control strategy.
- Incentive is based on the rated horsepower (HP) of the controlled motor.
- This measure qualifies for new construction and retrofit applications.

Variable Frequency Drives on Process Cooling Tower Fans (Pre-Notification Required > 50 HP) (VF212)

Requirements:

- This measure is available for variable frequency drives (VFDs) installed to control the speed of process (non-HVAC) cooling tower fans.
- The controlled motor must:
  - Operate more than 2,000 hours per year.
  - Have a rated frequency (Hz) of 60 Hz.
- For retrofit applications, the existing fan motor must be:
  - Operating at a constant speed.
  - Operating at a frequency (Hz) of 60 Hz.
- VFD may be automatically or manually controlled.
  - If automatically controlled, VFD must be controlled by differential pressure, flow, temperature, or another variable signal
  - If manually controlled, VFD must be controlled at a fixed frequency (Hz) of no more than 54 Hz.
- For motors rated greater than 50 HP, must submit a Pre-Notification Application along with a completed Variable Frequency Drive Information Worksheet (see Appendix of this Catalog).
- Documentation must be included with the Final Application sufficient to verify the following:
  - Rated horsepower (HP) of the controlled fan motor.
  - Annual operating schedule of the controlled fan motor.
  - Rated frequency (Hz) of the controlled fan motor.
  - VFD control strategy.
  - Frequency (Hz) of power being supplied to the controlled fan motor.
  - For retrofit applications:
    - The pre-existing fan motor control strategy.
    - The pre-existing fan motor operating frequency (Hz).
- Incentive is based on the rated horsepower (HP) of the controlled motor.
- This measure qualifies for new construction and retrofit applications.

Variable Speed Drives on Industrial Vacuum Pump Systems (≤ 25 HP) (VF213)

Requirements:

- This measure is available for adding a variable speed drive (VSD) to an existing or new vacuum pump system that is used for manufacturing and industrial applications.
- Vacuum pump must:
  - Have a rotary-lobe or regenerative blower.
  - Be operating in a low-pressure application (3 to 15 psi vacuum).
- For retrofit applications, the existing pump must be:
  - A constant speed blower-type vacuum pump.
  - Operating at a frequency (Hz) of 60 Hz.
- VSD may be automatically or manually controlled.
  - If automatically controlled, VSD must be controlled by differential pressure, flow, temperature, or another variable signal.
  - If manually controlled, VSD must be controlled at a fixed frequency (Hz) of no more than 50 Hz.
- The controlled vacuum pump motor must:
  - Operate at least 4,000 hours per year.
  - Have a standard rated frequency (Hz) of 60 Hz.
- Motors rated greater than 25 HP are not eligible for this measure, however they may be eligible for a custom incentive; if eligible for a custom incentive, a completed Variable Frequency Drive Information Worksheet (see Appendix of this Catalog) must be included with the custom incentive Pre-Notification Application, and must complete the pre- (if applicable) and post-retrofit power monitoring specified on the VFD Information Worksheet and include the data (kW) with the custom incentive Final Application.
- Documentation must be included with the Final Application sufficient to verify the following:

- Rated horsepower (HP) of the controlled vacuum pump motor.
- Annual operating schedule of the controlled vacuum pump motor.
- VSD control strategy.
- Rated frequency (Hz) of the controlled vacuum pump motor.
- Frequency (Hz) of power being supplied to the controlled vacuum pump motor.
- For retrofit applications:
  - The pre-existing vacuum pump design.
  - The pre-existing vacuum pump motor control strategy.
  - The pre-existing vacuum pump motor operating frequency (Hz).

- Incentive is based on the rated horsepower (HP) of the controlled motor.
- This measure qualifies for new construction and retrofit applications.

Integrated Variable Speed Motors

Integrated Variable Speed Motor (e.g. ECM) on Furnace, UV, FCU, and Light Duty AHU Fans (≤ 7.5 HP) (VF301)

Requirements:

- This measure is available for equipping a furnace, unit ventilator (UV), fan coil unit (FCU), or light duty air handling unit (AHU) fan with an integrated variable speed motor (e.g. ECM).
- The speed of the new motor must be automatically controlled by differential pressure, flow, temperature, or another variable signal.
- A brushless DC motor, also known as an electronically commutated motor (ECM), is eligible for this measure.
- The controlled motor must operate more than 2,000 hours per year.
- For retrofit applications:
  - The installation of an integrated variable speed motor must accompany the permanent removal or disabling of any throttling devices such as inlet vanes, bypass dampers, bypass valves, or throttling valves.
  - The existing motor must be constant speed.
- New cooling system supply and return fans are not eligible for this measure if the total fan system nameplate horsepower is rated > 5 HP and one of the following conditions are applicable unless an exception to the code is satisfied (consult ASHRAE 90.1-2013):
  - The cooling system is a DX cooling system with a cooling capacity that is greater than or equal to 5.4 tons.
  - The cooling system is a chilled water cooling system.
  - The cooling system fan motor horsepower is greater than or equal to 1/12 HP and less than 1 HP.
- New HVAC fans, including fans integrated into new equipment, are not eligible for this measure if variable speed control is required by code (consult ASHRAE 90.1-2013).
- Motors rated greater than 7.5 HP are not eligible for this measure, however they may be eligible for another prescriptive VFD or integrated variable speed motor (e.g. ECM) measure, or a custom incentive; if eligible for a custom incentive, a completed Variable Frequency Drive Information Worksheet (see Appendix of this Catalog) must be included with the custom incentive Pre-Notification Application, and must complete the pre- (if applicable) and post-retrofit power monitoring specified on the VFD Information Worksheet and include the data (kW) with the custom incentive Final Application.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Rated horsepower (HP) of the new motor.
  - Annual operating schedule of the new motor.
  - Control strategy for the new motor.
  - For retrofit applications, the pre-existing fan motor control strategy.
- Incentive is based on the rated horsepower (HP) of the new motor.
- This measure qualifies for retrofit applications and may qualify for new construction applications if variable speed control and/or an ECM is not required by code (consult ASHRAE 90.1-2013).

Integrated Variable Speed Motor (e.g. ECM) on RTU and Grocery Store Refrigeration System Exterior Condenser Fans (VF302)

Requirements:

- This measure is available for equipping unitary single package air conditioning system (e.g. RTU) and grocery store refrigeration system air-cooled condenser unit fans with an integrated variable speed motor (e.g. ECM).
- For retrofit applications, the existing condenser:
  - Cannot have ambient temperature and pressure fan cycling controls
  - Existing condenser can only have on/off fan controls.
  - Can only have on/off fan controls.
  - Must routinely operate at less than full load and frequently cycle the fans on and off.
  - Cannot be equipped with variable or two-speed fan control.
- For unitary single package air conditioning system (e.g. RTU) applications:
  - The system must run primarily during the summer months.
  - Controls for multi-cell condenser units with integrated variable speed motors (e.g. ECMs) installed for the fans must operate the maximum number of fans allowed (per manufacture requirements) and vary the speed of all operating fans in unison as opposed to staging fans on and off.
  - The controls for the new motor shall automatically modulate the condenser fan speed in proportion to the RTU cooling load.
  - For new construction applications, individual condenser fan motors, and fan arrays for a single cell acting as one fan, rated greater than or equal to 7.5 HP are not eligible for this measure unless an exception to the code is satisfied (consult ASHRAE 90.1-2013).
- For grocery store refrigeration system applications:
  - The controls for the new motor shall automatically modulate the condenser fan speed in proportion to the refrigeration load.
  - Controls for multiple fan arrays with integrated variable speed motors (e.g. ECMs) installed for the fans must vary the speed of all operating fans in unison as opposed to staging fans on and off.
  - New construction applications are not eligible for this measure.
- Cooling and refrigeration systems that use "free cooling" economizers, which shut down the compressor/condenser and evaporator when the outdoor air temperature is favorable for free cooling, are not eligible for this measure.
- Installation of a new condenser unit with an integrated variable speed fan motor(s) is not eligible for this measure if variable speed control and/or an ECM is required by code (ASHRAE 90.1- 2013), however the new condenser unit may be eligible for the Unitary (e.g. RTU) and Split Air Conditioning Systems and Heat Pumps (HV101) measure.
- A brushless DC motor, also known as an electronically commutated motor (ECM), is eligible for this measure.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Rated horsepower (HP) of the new motor(s).
  - Control strategy for the new motor(s).
  - For retrofit applications, the pre-existing condenser fan(s) control strategy.
- Incentive is based on the rated horsepower (HP) of the new motor.
- This measure qualifies for retrofit applications and may qualify for new construction applications if variable speed control and/or an ECM is not required by code (consult ASHRAE 90.1-2013).

Integrated Variable Speed Motor (e.g. ECM) on DHW Recirculation and HVAC Hydronic Circulation Pumps (VF303 - VF305)

Requirements:

- These measures are available for equipping pumps used for domestic hot water (DHW) recirculation (VF303), hydronic heating circulation (VF304), or chilled water circulation (VF305) with an integrated variable speed motor (e.g. ECM).
- A brushless DC motor, also known as an electronically commutated motor (ECM), is eligible for these measures.
- For retrofit applications, the existing pump motor must be constant speed.
- New motor must be capable of variable speed operation and have integrated "smart" controls that will modulate flow based on demand.
- For HVAC hydronic circulation pump applications, the controlled motor must operate more than 2,000 hours per year.
- New HVAC hydronic circulation pumps are not eligible for these measures if variable speed control and/or an ECM is required by code (consult ASHRAE 90.1-2013).
- Documentation must be included with the Final Application sufficient to verify the following:
  - Rated watts (W) of the new motor.
  - Control strategy for the new motor.
  - For retrofit applications, the pre-existing pump motor control strategy.
- Incentive is per new integrated variable speed motor installed, and the incentive rate varies depending on the rated watts (W) of the motor.
- These measures qualify for retrofit applications and may qualify for new construction applications if variable speed control and/or an ECM is not required by code (consult ASHRAE 90.1-2013).

Compressed Air

General Requirements

- Must be a Consumers Energy electric customer unless otherwise noted.
- Specifications (e.g. specification sheet) must be included with the Incentive Application for all new measure related products and equipment.
- When replacing existing air compressor(s) with new, more energy efficient air compressor(s), the existing air compressor(s) must be turned off but may be left on site for cases of emergency. Old air compressor(s) left on site must be physically locked out of the system; qualifying lock points are padlocks on electrical boxes and valves with lockout devices employed to isolate the old air compressors from the main compressed air header.
- Unless otherwise noted, incentives are not available for backup, redundant and non-production air compressors (see definition under "Project Requirements - Project and equipment types that are NOT eligible for incentives..." on page 8 of this Catalog).
- A single air compressor system is defined as a compressed air system that only requires one air compressor to operate to meet the facility's post-installation or post-retrofit peak compressed air demand.
- A multiple air compressor system is defined as a compressed air system that requires two or more air compressors to operate simultaneously to meet the facility's post-installation or post-retrofit peak compressed air demand.

Supply Side Measures

VSD Air Compressor (Single Air Compressor Systems) (50 HP – 500 HP) (Pre-Notification Required) (CA101, CA102)

Requirements:

- These measures are available for installing a new variable speed (VSD) rotary screw (RS) air compressor, rated no less than 50 HP and no more than 500 HP, for a single air compressor system (see Compressed Air - General Requirements for definition).
- Installing a new VSD RS air compressor in a multiple air compressor system (see Compressed Air - General Requirements for definition) is not eligible for these measures, however it may be eligible for another compressed air measure.
- New VSD air compressor must operate at least 2,000 hours per year.
- If system demand conditions will require the new VSD air compressor to be constantly loaded above 80%, or constantly loaded below 30%, installation of a new VSD air compressor is not eligible for these measures, as these operating conditions will not realize savings from a VSD controlled air compressor.
- To help ensure reliable drive operation and expected energy savings are achieved, the customer should consult with the air compressor manufacturer to determine the optimal speed range for air compressor efficiency and the ability of the oil flow system to operate below full speed.
- For retrofit applications:
  - Each existing air compressor(s) must be a constant speed RS air compressor with inlet modulation (IM) or load/no-load (LNL) flow control and operate at least 2,000 hours per year.
  - The horsepower (HP) of the new VSD air compressor may be larger than the combined rated HP of the existing compressed air system.
  - A single VSD air compressor replacing multiple existing air compressors may be eligible for these measures if the resulting system is a single air compressor system (see Compressed Air - General Requirements for definition).
  - Replacement of an existing VSD air compressor with a new VSD air compressor of equal or lesser rated horsepower (HP) is not eligible for these measures, however if an existing VSD air compressor is replaced by a larger VSD air compressor, the difference in HP may be incentivized through these measures.
  - Adding a VSD to an existing air compressor is not eligible for these measures, however it may be eligible for one of the Retrofit Air Compressor with VSD (CA105, CA106) measures.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the following for each existing air compressor:
  - Model number.
  - Rated horsepower (HP).
  - Rated pressure (psig).
  - Current and proposed operating pressure (psig).
  - Annual hours of operation.
  - Annual load profile.
  - Flow control method (e.g. load/no-load, inlet modulation with or without blowdown, etc.).

- Documentation must be included with the Final Application sufficient to verify the following:
  - » For each new air compressor installed:
    - Model number.
    - Rated horsepower (HP).
    - Average percent loading.
    - Average percent runtime.
  - » For retrofit applications, status of the pre-existing air compressor(s).
- Incentive is based on the rated horsepower (HP) of the new VSD air compressor (based on the incremental increase in rated HP if an existing VSD air compressor is replaced by a larger VSD air compressor), and the incentive rate is higher if the new VSD air compressor will operate a minimum of 6,000 hours per year.
- These measures qualify for new construction and retrofit applications.

VSD Air Compressor (Multiple Air Compressor Systems) (50 HP – 500 HP) (Pre-Notification Required) (CA103, CA104)

Requirements:

- These measures are available for installing a new variable speed (VSD) rotary screw (RS) air compressor, rated no less than 50 HP and no more than 500 HP, in a multiple air compressor system (see Compressed Air - General Requirements for definition).
- Installing a new VSD RS air compressor in a single air compressor system (see Compressed Air - General Requirements for definition) is not eligible for these measures, however it may be eligible for another compressed air measure.
- These measures may not be combined with any other VFD/VSD measures.
- Only one VSD air compressor can be incentivized per compressed air plant (interconnected piping).
- The customer may choose to apply for a custom incentive instead of a prescriptive incentive if an enhanced compressed air plant control system (master controller) is also implemented, however this decision must be made during the Pre-Notification Application review.
- New VSD air compressor must operate at least 4,000 hours per year.
- Adding a VSD to an existing air compressor is not eligible for these measures, however it may be eligible for the Retrofit Air Compressor with VSD (VF106) measure.
- To help ensure reliable drive operation and expected energy savings are achieved, the customer should consult with the air compressor manufacturer to determine the optimal speed range for air compressor efficiency and the ability of the oil flow system to operate below full speed.
- For retrofit applications:
  - » Existing air compressor(s) must be a constant speed RS air compressor with inlet modulation (IM) or load/no-load (LNL) flow control.
  - » Compressed air plants that already have VSD or variable displacement (VD) air compressors are not eligible for these measures.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the following for each existing air compressor:
  - » Model number.
  - » Rated horsepower (HP).
  - » Rated pressure (psig).
  - » Current and proposed operating pressure (psig).
  - » Annual hours of operation.
  - » Annual load profile.
  - » Flow control method (e.g. load/no-load, inlet modulation with or without blowdown, etc.).
- Documentation must be included with the Final Application sufficient to verify the following:
  - » For each new air compressor installed:
    - Model number.
    - Rated horsepower (HP).
    - Average percent loading.
    - Average percent runtime.
  - » For retrofit applications, status of the pre-existing air compressors.
- Incentive is based on the rated horsepower (HP) of the new VSD air compressor, and the incentive rate is higher if the new VSD air compressor will operate a minimum of 7,200 hours per year.
- These measures qualify for new construction and retrofit applications.

Retrofit Air Compressor with VSD (50 HP – 300 HP) (Pre-Notification Required) (CA105, CA106)

Requirements:

- These measures are available for installing a VSD on an existing constant speed rotary screw air compressor, rated no less than 50 HP and no more than 300 HP, with either inlet modulation (IM) or load/no load (LNL) flow control, for a single or multiple air compressor system (see Compressed Air - General Requirements for definitions).
- These measures are available for retrofitting a VSD to existing air compressors; installing a new VSD air compressor is not eligible for these measures, however it may be eligible for another measure.
- These measures may not be combined with any other VFD/VSD measures.
- Only one retrofitted VSD air compressor can be incentivized per compressed air plant (interconnected piping).

- These measures are not available if any existing air compressor already has VSD control.
- In a single air compressor system (see Compressed Air - General Requirements for definition), the retrofitted VSD air compressor must operate a minimum of 6,000 hours per year (CA105).
- In a multiple air compressor system (see Compressed Air - General Requirements for definition):
  - The retrofitted VSD air compressor must operate a minimum of 7,200 hours per year (CA106).
  - System controls must maintain the retrofitted VSD air compressor as the always loaded (trim) unit.
- Documentation must be included with the Pre-Notification Application sufficient to verify the following for each existing air compressor:
  - Model number.
  - Rated horsepower (HP).
  - Rated pressure (psig).
  - Current and proposed operating pressure (psig).
  - Annual hours of operation.
  - Annual load profile.
  - Flow control method (e.g. load/no-load, inlet modulation with or without blowdown, etc.).
- Documentation must be included with the Final Application sufficient to verify the following:
  - Retrofitted air compressor Average percent loading.
  - Retrofitted air compressor average percent runtime.
  - Status of the pre-existing air compressor(s).
- Incentive is based on the rated horsepower (HP) of the retrofitted air compressor, and incentive rate is higher for a multiple air compressor system.
- These measures qualify for retrofit applications, but do not qualify for new construction applications.

VSD Air Compressor (< 50 HP) (Pre-Notification Required) (CA107)

Requirements:

- This measure is available for installing a new variable speed (VSD) rotary screw (RS) air compressor rated less than 50 HP for a single or multiple air compressor system (see Compressed Air - General Requirements for definitions).
- Only one VSD air compressor can be incentivized per compressed air plant (interconnected piping).
- The new VSD air compressor must operate at least 2,000 hours per year (annual average of one shift).
- In multiple air compressor systems (see Compressed Air - General Requirements for definition), system controls must maintain the new VSD air compressor as the always loaded (trim) unit.
- For retrofit applications:
  - Existing air compressor must be a constant speed RS air compressor with inlet modulation (IM) or load/no-load (LNL) flow control.
  - Rated horsepower (HP) of the new VSD air compressor may be larger than the rated HP of the existing air compressor.
  - This measure is for installing a new VSD air compressor; adding a VSD to an existing air compressor is not eligible for this measure, however it may be eligible for one of the Retrofit Air Compressor with VSD (CA105, CA106) measures.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the following for each existing air compressor:
  - Model number.
  - Rated horsepower (HP).
  - Rated pressure (psig).
  - Current and proposed operating pressure (psig).
  - Annual hours of operation.
  - Annual load profile.
  - Flow control method (e.g. load/no-load, inlet modulation with or without blowdown, etc.).
- Documentation must be included with the Final Application sufficient to verify the following:
  - Facility operating schedule.
  - For each new air compressor installed:
    - Model number.
    - Rated horsepower (HP).
    - Average percent loading.
    - Average percent runtime.
  - For retrofit applications, status of the pre-existing air compressor(s).
- Incentive is based on the rated horsepower (HP) of the new VSD air compressor, and the incentive rate varies depending on the annual average number of shifts the new VSD air compressor will operate.
- This measure qualifies for new construction and retrofit applications.

Variable Displacement (VD) Air Compressor (Single Air Compressor Systems) (≥ 50 HP) (Pre-Notification Required) (CA108)

Requirements:

- This measure is available for installing a new Variable Displacement (VD) rotary screw (RS) air compressor rated greater than or equal to 50 HP for a single air compressor system (see Compressed Air - General Requirements for definition).
- This measure is available for a single air compressor system only (see Compressed Air - General Requirements for definition), however installing a new VD air compressor for a multiple air compressor system (see Compressed Air - General Requirements for definition) may be eligible for a custom incentive.
- For retrofit applications:
  - Existing air compressor(s) must be a constant speed RS air compressor with inlet modulation (IM) or load/no-load (LNL) flow control and operate at least 4,000 hours per year.
  - Rated horsepower (HP) of the new VD air compressor must be less than or equal to the combined rated HP of the existing compressed air system.
  - A single VD air compressor replacing multiple existing air compressors may be eligible for this measure if the resulting system is a single air compressor system (see Compressed Air - General Requirements for definition).
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the following for each existing air compressor:
  - Model number.
  - Rated horsepower (HP).
  - Rated pressure (psig).
  - Current and proposed operating pressure (psig).
  - Annual hours of operation.
  - Annual load profile.
  - Flow control method (e.g. load/no-load, inlet modulation with or without blowdown, etc.).
- Documentation must be included with the Final Application sufficient to verify the following:
  - For each new air compressor installed:
    - Model number.
    - Rated horsepower (HP).
    - Average percent loading.
    - Average percent runtime.
  - For retrofit applications, status of the pre-existing air compressor(s).
- Incentive is based on the rated horsepower (HP) of the new VD air compressor.
- This measure qualifies for new construction and retrofit applications.

Two-Stage Rotary Screw Air Compressor (≥ 50 HP) (Pre-Notification Required) (CA109)

Requirements:

- This measure is available for installing a new two-stage rotary screw (RS) air compressor rated greater than or equal to 50 HP for a single or multiple air compressor system (see Compressed Air - General Requirements for definitions).
- This measure may be combined with any applicable VSD or VD air compressor measure.
- This measure may not be combined with any non-air compressor VFD/VSD measures.
- In multiple air compressor systems (see Compressed Air - General Requirements for definition), the new two-stage rotary screw air compressor must operate at least 4,000 hours per year.
- The savings from this design occur throughout the operating range, thus there are no loading requirements for the new air compressor.
- For retrofit applications, existing air compressor must be a single-stage air compressor.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the following for each existing air compressor:
  - Model number.
  - Rated horsepower (HP).
  - Rated pressure (psig).
  - Current and proposed operating pressure (psig).
  - Annual hours of operation.
  - Annual load profile.
  - Flow control method (e.g. load/no-load, inlet modulation with or without blowdown, etc.).
- Documentation must be included with the Final Application sufficient to verify the following:
  - For each new air compressor installed:
    - Model number.
    - Rated horsepower (HP).
    - Average percent loading.
    - Average percent runtime.
  - For retrofit applications, status of the pre-existing air compressor(s).
- Incentive is based on the rated horsepower (HP) of the new two-stage air compressor.
- This measure qualifies for new construction and retrofit applications.

Refrigerated Cycling Thermal Mass, VSD or Digital Scroll Compressed Air Dryer (Pre-Notification Required) (CA110 - CA112)

Requirements:

- These measures are available for installing a refrigerated cycling thermal mass (CA110), variable speed (CA111) or digital scroll (CA112) compressed air dryer.
- For retrofit applications, the existing compressed air dryer must be a non-cycling constant volume refrigerated compressed air dryer (i.e., existing compressed air dryer must run exclusively in non-cycling mode and cannot be equipped with a feature that allows it to run in a cycling mode).
- Documentation must be included with the Pre-Notification Application sufficient to verify the following:
  - Rated horsepower (HP) of each air compressor.
  - Rated air flow rate (CFM) of each air compressor.
  - For retrofit applications:
    - Existing dryer model number.
    - Existing dryer rated air flow rate (SCFM).
    - Existing dryer type.
    - Existing dryer operating modes.
- Documentation must be included with the Final Application sufficient to verify the following for the new compressed air dryer:
  - Model number.
  - Rated capacity (SCFM).
- Incentive is based on the rated capacity (SCFM) of the new compressed air dryer.
- These measures qualify for new construction and retrofit applications.

Refrigerated Non-Cycling Compressed Air Dryer replacing Desiccant Compressed Air Dryer (≥ 50 HP System) (Pre-Notification Required) (CA113)

Desiccant dryers are used in situations where air needs to be dried to a lower dew point (-20°F or below) than refrigerated-type dryers can provide (37°F). There are, however, instances where desiccant dryers are in use when higher dew point conditions are acceptable. In these instances, the desiccant dryer can be replaced with a more efficient refrigerated dryer.

Requirements:

- This measure is available for replacing existing desiccant compressed air dryers with refrigerated non-cycling compressed air dryers.
- Compressed air system combined horsepower (HP) must be rated greater than or equal to 50 HP excluding backup, redundant, and non-production air compressors (see Compressed Air – General Requirements for definitions).
- This measure may be combined with one of the Refrigerated Cycling Thermal Mass, VSD or Digital Scroll Compressed Air Dryer (CA110 – CA112) measures if a qualified refrigerated cycling dryer is installed instead of a qualified refrigerated non-cycling dryer.
- Documentation must be included with the Pre-Notification Application sufficient to verify the following:
  - Rated horsepower (HP) of each air compressor.
  - Rated air flow rate (CFM) of each air compressor.
  - Existing dryer model number.
  - Existing dryer rated air flow rate (SCFM).
  - Existing dryer type.
- Documentation must be included with the Final Application sufficient to verify the following for the new compressed air dryer:
  - Model number.
  - Rated capacity (SCFM).
- Incentive is based on the rated capacity (SCFM) of the new compressed air dryer.
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Heated Blower Purge Desiccant Compressed Air Dryer (Pre-Notification Required) (CA114)

Requirements:

- This measure is available for installing a heated blower purge desiccant compressed air dryer with dew point controls.
- For retrofit applications, existing compressed air dryer must be a timed heatless desiccant compressed air dryer.
- The compressed air system must have air compressors with qualified controls [variable speed (VSD), variable displacement (VD), or load/no-load (LNL)] which can effectively trim the system to match the reduced demand; compressed air systems which include an air compressor with inlet modulation (IM) flow control, but have a trim air compressor with any of the qualified control types, are eligible for this measure provided the system has adequate controls which can effectively trim the system to match the reduced demand.
- Documentation must be included with the Pre-Notification Application sufficient to verify the following:
  - Rated horsepower (HP) of each air compressor.
  - Rated air flow rate (CFM) of each air compressor.
  - Air flow control method for each air compressor.
  - For retrofit applications:
    - Existing dryer model number.
    - Existing dryer rated air flow rate (SCFM).
    - Existing dryer type.

- Documentation must be included with the Final Application sufficient to verify the following for the new compressed air dryer:
  - Model number.
  - Rated capacity (SCFM).
- Incentive is based on the rated capacity (SCFM) of the new compressed air dryer.
- This measure qualifies for new construction and retrofit applications.

Desiccant Compressed Air Dryer with Dew Point Sensor Control (Pre-Notification Required) (CA115)

Requirements:

- This measure is available for adding dew point controlled column regeneration to an existing desiccant compressed air dryer or installing a new desiccant compressed air dryer with dew point controlled column regeneration.
- This measure cannot be combined with the Heated Blower Purge Desiccant Compressed Air Dryer measure (CA114) measure.
- The compressed air system must have air compressors with qualified controls [variable speed (VSD), variable displacement(VD), or load/no-load (LNL)] which can effectively trim the system to match the reduced demand; compressed air systems which include an air compressor with inlet modulation (IM) flow control, but have a trim air compressor with any of the qualified control types, are eligible for this measure provided the system has adequate controls which can effectively trim the system to match the reduced demand.
- Documentation must be included with the Pre-Notification Application sufficient to verify the following:
  - Rated horsepower (HP) of each air compressor.
  - Rated air flow rate (CFM) of each air compressor.
  - Air flow control method for each air compressor.
  - For retrofit applications:
    - Existing dryer model number.
    - Existing dryer rated air flow rate (SCFM).
    - Existing dryer type.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Model number of the new compressed air dryer or installation of new dew point sensor controls on an existing compressed air dryer.
  - Rated capacity (SCFM) of the new or retrofitted compressed air dryer.
- Incentive is based on the rated capacity (SCFM) of the new or retrofitted compressed air dryer.
- This measure qualifies for new construction and retrofit applications.

Heat of Compression Desiccant Compressed Air Dryer (≥ 50 HP System) (Pre-Notification Required) (CA116)

Requirements:

- This measure is available for installing a heat of compression desiccant compressed air dryer that uses the heat in the compressed air to regenerate the desiccant media.
- Compressed air system combined horsepower (HP) must be rated greater than or equal to 50 HP excluding backup, redundant, and non-production air compressors (see Compressed Air – General Requirements for definitions).
- For retrofit applications, existing dryer media regeneration method may be any method other than heat-of-compression (e.g. supplemental heat, compressed air, blower air, or a combination of any of these methods).
- Documentation must be included with the Pre-Notification Application sufficient to verify the following:
  - Rated horsepower (HP) of each air compressor.
  - Rated air flow rate (CFM) of each air compressor.
  - For retrofit applications:
    - Existing dryer model number.
    - Existing dryer rated air flow rate (SCFM).
    - Existing dryer type.
    - Existing dryer media regeneration method.
- Documentation must be included with the Final Application sufficient to verify the following for the new compressed air dryer:
  - Model number.
  - Rated capacity (SCFM).
- Incentive is based on the rated capacity (SCFM) of the new compressed air dryer.
- This measure qualifies for new construction and retrofit applications.

Compressed Air Recycling Pneumatic Valve (≥ 60 psig) (CA117, CA118)

Compressed air recycling pneumatic valves briefly connect the cylinder ports during each cylinder stroke. As the valve cycles, the pressurized cylinder port connects to the opposing (unpressurized) cylinder port, recycling the compressed air from one end of the cylinder and it's connecting tubing to the other. This effectively pre-charges the depressurized end before it is connected to the supply.

Requirements:

- These measures are available for the installation of a compressed air recycling pneumatic valve on a pneumatic cylinder.
- Pneumatic valve must cycle at least 2,000,000 times/yr.
- Line pressure to the cylinder must be at least 60 psig.

- The cylinder's bore must be larger than one inch and the cylinder's stroke must be larger than two inches.
- For retrofit applications, new valve must be replacing an existing standard pneumatic valve serving a double-acting pneumatic cylinder that has a feature where the spool passes a center position to route the pressurized air from the energized side to the opposite side upon activation.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Cylinder line pressure (psig).
  - Cylinder Operating schedule (cycles per day, days per week, etc.).
  - Cylinder bore diameter (inches).
  - Cylinder stroke (inches).
  - For retrofit applications:
    - Pre-existing valve design.
    - Pre-existing valve application.
- Incentive is per new valve installed, and the incentive rate is higher if the new valve will cycle at least 4,000,000 times per year.
- These measures qualify for retrofit applications and they may qualify for new construction applications if the new valve will cycle at least 4,000,000 times per year (CA117).

Low Pressure Drop Compressed Air Filter (≥ 50 HP System) (CA119)

Potential energy savings from installation of a low pressure drop compressed air filter is attributed to elimination of over pressurization of the compressed air system to compensate for high pressure drop filtration.

Requirements:

- This measure is available for installing a low pressure drop air filter for a compressed air system.
- Compressed air system combined horsepower (HP) must be rated greater than or equal to 50 HP excluding backup, redundant, and non-production air compressors (see Compressed Air – General Requirements for definitions).
- The new filter must meet the following criteria:
  - Be of the deep bed "mist eliminator" style.
  - Have a pressure loss at rated flow up to 1 psig when new, and no more than 3 psig at element change.
  - Have particulate filtration that is 100% at 3 microns and at least 99.98% at 0.1 to 3 microns.
  - Be rated for up to 5 PPM liquid carryover.
  - Have a filter element life greater than or equal to five years.
- Documentation must be included with the Final Application sufficient to verify the rated horsepower (HP) of each air compressor in the system.
- Incentive is based on the combined rated horsepower (HP) of the compressed air system.
- This measure qualifies for new construction and retrofit applications.

Compressed Air Pressure-Flow Controller (≥ 50 HP System) (Pre-Notification Required) (CA120)

Requirements:

- This measure is available for installing a pressure-flow controller downstream of the compressed air receiver/ storage tank.
- Compressed air system combined horsepower (HP) must be rated greater than or equal to 50 HP excluding backup, redundant, and non-production air compressors (see Compressed Air – General Requirements for definitions).
- For retrofit applications, air compressor discharge pressure must be reduced by at least 5 psig.
- Documentation must be included with the Pre-Notification Application sufficient to verify the current discharge pressure of the existing air compressors.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Post-retrofit air compressor discharge pressures.
  - Rated horsepower (HP) of each air compressor in the system.
- Incentive is based on the combined rated horsepower (HP) of the compressed air system.
- This measure qualifies for new construction and retrofit applications.

Air Compressor Outdoor Air Intake (≥ 50 HP) (≥ 80 psig) (Pre-Notification Required) (CA121)

Outside air is, on average, cooler than the conditioned inside air, and colder air is denser and requires less energy to compress.

Requirements:

- This measure is available to permanently hard duct the air inlet for air compressors directly from the outside.
- For retrofit applications, the inlet air for the existing air compressor must currently be sourced from the ambient conditioned (heated) space.
- The air compressor must:
  - Run at least 2,000 hours per year.
  - Be rated no less than 50 HP.
  - Operate at no less than 80 psig.
- Consult the air compressor manufacturer to ensure the air compressor can address the increased static pressure drop on the ducted air intake as well as the colder inlet air temperatures without adverse effects.

- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the current source of inlet air for the existing air compressor.
- Documentation must be included with the Final Application sufficient to verify the following for the air compressor:
  - Model number.
  - Rated horsepower (HP).
  - Discharge pressure (psig).
  - Runtime.
  - Source of inlet air.
- Incentive is based on the rated horsepower (HP) of the air compressor.
- This measure qualifies for new construction and retrofit applications.

Air Compressor Waste Heat Recovery (Natural Gas) (Pre-Notification Required) (CA122)

Requirements:

- This measure is available for Consumers Energy natural gas customers to recover waste heat generated by an air compressor and utilize it to reduce the annual space and/or process (non-HVAC) heating natural gas use for a facility.
- For retrofit applications, existing air compressor to which the heat recovery system is proposed to be applied must currently be completely thermally isolated from the conditioned space or process that is proposed to benefit from the waste heat (i.e., excess heat from the air compressor room is rejected to the outside and the air compressor cannot already be located in the heated space).
- The waste heat recovery system damper/actuator must direct the waste heat into a conditioned space or process any time heat is required to maintain the space or process at setpoint.
- The waste heat recovery system must be controlled by a thermostat, building automation system, or process heating setpoint controller; may be controlled via manual dampers, subject to program approval.
- The waste heat recovery system shall be designed such that the rated external static pressure of any affected air compressor's cooling fan is not exceeded.
- The following must be included with the Pre-Notification Application:
  - Scope of work.
  - For retrofit applications, documentation sufficient to verify the current location of the existing air compressor.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Rated horsepower (HP) of the air compressor.
  - The targeted area and/or process is receiving the recovered waste heat.
- Incentive is based on the rated horsepower (HP) of the air compressor.
- This measure qualifies for new construction and retrofit applications.

Compressed Air Storage Tank (≥ 90 psig) (Pre-Notification Required) (CA123)

Requirements:

- This measure is available for installing a compressed air storage tank.
- The compressed air plant can only have rotary screw air compressors with load/no-load (LNL), variable displacement (VD), variable speed (VSD) and/or inlet modulation (IM) flow control operating at greater than 90 psig.
- For retrofit applications, new storage tank capacity must be greater than existing storage tank capacity.
- Documentation must be included with the Pre-Notification Application sufficient to verify the following:
  - Air compressor type for each air compressor.
  - Air compressor flow control method for each compressor.
  - For retrofit applications, the existing compressed air storage tank capacity (gal).
- Documentation must be included with the Final Application sufficient to verify the following:
  - Trim air compressor rated horsepower (HP).
  - Trim air compressor rated air flow rate capacity (CFM)
    - If unknown, assume 5 SCFM/HP.
  - New compressed air storage tank capacity (gal).
- Measures CA123a (≤ 1 gal/CFM to ≥ 3 gal/CFM), CA123b (≤ 3 gal/CFM to ≥ 5 gal/CFM) and CA123c (≤ 5 gal/CFM to ≥ 10 gal/CFM) may be combined to capture the total storage capacity increase (e.g. an increase from 0.5 gal/CFM to 5.5 gal/CFM of trim air compressor air flow capacity would combine measures CA123a and CA123b).
- Incentive is based on the rated horsepower (HP) of the trim air compressor and the increase in storage tank capacity per CFM of trim air compressor air flow capacity (assume 5 SCFM/HP for trim air compressor air flow capacity if unknown).
- This measure qualifies for new construction and retrofit applications.

Correct Sizing Air Compressor (Single Air Compressor System) (Retrofit) (Pre-Notification Required) (CA124)

Requirements:

- This measure is available for replacing an existing rotary screw (RS) or reciprocating air compressor(s) with a new RS air compressor that has a rated horsepower (HP) that is at least 23.1% less than the existing air compressor(s) (i.e., existing air compressor(s) rated HP at least 30% higher than new rotary screw air compressor) for a single air compressor system (see Compressed Air - General Requirements for definition).
- The new rotary screw air compressor must operate at least 3,000 hours per year.
- Air compressors on multiple air compressor systems (see Compressed Air - General Requirements for definition) are not eligible for this measure.
- A single RS air compressor replacing multiple air compressors may be eligible for this measure if all the existing air compressors are always controlled in unison (as opposed to staged on/off operation) and the resulting system is a single air compressor system (see Compressed Air - General Requirements for definition).
- This measure may be combined with any applicable VSD air compressor measure.
- This measure may not be combined with any non-air compressor VFD/VSD measures.
- Must complete a minimum of seven continuous days of power monitoring (kW) on a typical production schedule before and after the retrofit (it is recommended to meter power every 15 seconds).
- The following must be included with the Pre-Notification Application:
  - Documentation sufficient to verify the rated horsepower (HP) of each existing air compressor in the system.
  - Compressed Air Correct Sizing Worksheet (see Appendix of this Catalog).
- The following must be included with the Final Application:
  - Documentation sufficient to verify the following:
    - New air compressor model number.
    - New air compressor rated horsepower (HP).
    - New air compressor runtime.
    - Status of the pre-existing air compressor(s).
  - Power monitoring data (kW) per the requirements specified above.
- Incentive is based on the reduction in air compressor rated horsepower (HP).
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Demand Side Measures

Compressed Air Energy Audit (≥ 50 HP System) (CA201 - CA204)

Requirements:

- These measures are available for completing a comprehensive audit of a compressed air system, including a major leak detection and tagging survey and analysis of the system to potentially identify energy efficiency improvement opportunities.
- At least 50% by volume of the compressed air leaks identified in the audit must be repaired.
- Compressed air system must meet the following criteria:
  - Be electrically driven.
  - Have a combined rated horsepower (HP) of at least 50 HP excluding backup, redundant, and non-production air compressors (see Compressed Air – General Requirements for definitions).
  - Have a runtime greater than or equal to 2,000 hours per year excluding backup, redundant, and non- production air compressors (see Compressed Air – General Requirements for definitions).
- The audit must be completed by an independent contractor that has at least five years of experience implementing a fully instrumented compressed air audit.
- These measures are available once every other program year per facility and may not be combined with any of the Compressed Air Leak Repair (CA205, CA206) measures.
- An incentive for both a Compressed Air Energy Audit (CA201 – CA204) and a Compressed Air Leak Repair (CA205, CA206) measure is not available for the same facility within a program year; a facility is only eligible for one or the other within a program year.
- The following must be included with the Final Application:
  - Written report prepared by contractor containing all the information specified on the Compressed Air Energy Audit Checklist (see Appendix of this Catalog).
  - Logged data (email or CD/USB with 7 to 14 days of on-site data collection) for the parameters specified to be monitored on the Compressed Air Energy Audit Checklist (see Appendix of this Catalog), including flowmeter logged data if applying for CA204 or CA205.
- Incentive is based on the combined installed horsepower (HP) of operational air compressors in the system excluding backup, redundant, and non-production air compressors (see Compressed Air – General Requirements for definitions), with a maximum incentive of $20,000 per facility; incentive rate is higher when flow data is collected and/or if a variable speed (VSD) air compressor is operational in the compressed air system.
- These measures qualify for retrofit applications, but do not qualify for new construction applications.

Compressed Air Leak Repair (≥ 50 HP System) (CA205, CA206)

Requirements:

- These measures are available for completing a major leak detection and tagging survey for the compressed air system.
- At least 50% by volume of the compressed air leaks identified in the survey must be repaired.
- The leak detection/tagging survey must be completed by an independent contractor that has at least five years of experience implementing a fully instrumented compressed air leak detection/tagging survey.
- These measures are available once every other program year per facility and cannot be combined with any of the Compressed Air Energy Audit (CA201 – CA204) measures.
- An incentive for both a Compressed Air Leak Repair (CA205, CA206) and a Compressed Air Energy Audit (CA201 – CA204) measure is not available for the same facility within a program year; a facility is only eligible for one or the other within a program year.
- Compressed air system must meet the following criteria:
  - Be electrically driven.
  - Have a combined rated horsepower (HP) of at least 50 HP excluding backup, redundant, and non-production air compressors (see Compressed Air – General Requirements for definitions).
  - Have a runtime greater than or equal to 2,000 hours per year excluding backup, redundant, and non-production air compressors (see Compressed Air – General Requirements for definitions).
- The following must be included with the Final Application:
  - Major compressed air leak detection survey report prepared by contractor, including identification, tagging, and quantification of total and repaired air leaks.
  - Spreadsheet detailing leak location, leak volume, and date of repair.
  - Documentation verifying repairs which may include repair tickets, work orders and/or invoices for material and labor.
  - Documentation sufficient to verify the following for each air compressor:
    - Rated horsepower (HP).
    - Annual runtime.
- Incentive is based on the combined installed horsepower (HP) of operational air compressors in the system excluding backup, redundant, and non-production air compressors (see Compressed Air – General Requirements for definitions), with a maximum incentive of $20,000 per facility; incentive rate is higher if a variable speed (VSD) air compressor is operational in the compressed air system.
- These measures qualify for retrofit applications, but do not qualify for new construction applications.

Compressed Air Zero-Loss Condensate Drain (CA207, CA208)

Requirements:

- These measures are available for installing a new "no-loss" compressed air condensate drain.
- New "no-loss" compressed air condensate drain must continuously measure the presence of condensate and minimize the frequency and duration of condensate purge events, sufficient to prevent the unintentional purging of compressed air.
- For retrofit applications, the existing drain must be a timed or manually opened drain.
- Zero air loss condensate drains supplied with a new compressed air dryer or other new equipment packages are not eligible for these measures.
- For retrofit applications, documentation must be included with the Final Application sufficient to verify the pre-existing drain design.
- Incentive is per new drain installed.
- These measures qualify for new construction and retrofit applications.

Pressure Sensing Vortex Vacuum Generator (CA209)

Requirements:

- This measure is available for installing a pressure sensing vortex vacuum generator.
- For retrofit applications, the existing vacuum generator must be a conventional vortex vacuum generator.
- The new pressure sensing vortex vacuum generator must:
  - Be equipped with a pressure sensor and check valve, allowing the compressed air flow to stop when the desired pressure is achieved.
  - Be used on an application that can seal (e.g. a suction cup).
  - Be utilized in a production environment where the production cell operates at least 4,000 hours per year.
- Documentation must be included with the Final Application sufficient to verify the following:
  - New pressure sensing vortex vacuum generator:
    - Model number.
    - Rated capacity (CFM).
    - Application.
    - Production cell operating schedule.
  - For retrofit applications, the pre-existing vacuum generator design.
- Incentive is based on the rated capacity (CFM) of the new vortex vacuum generator.
- This measure qualifies for new construction and retrofit applications.

Pneumatic Hand Tool Replaced with Corded Electric Hand Tool (Pre-Notification Required) (CA210)

Requirements:

- This measure is available for replacing an existing pneumatic hand tool, utilized in a manufacturing setting for a production related application, with a corded electric hand tool (typically 120V AC).
- Pneumatic hand tools that are eligible for this measure include a die grinder, disc sander, impact wrench, belt sander, hammer, drill, or any pneumatic hand tool that uses more than 15 CFM except for a beveler, nailer, riveter, or stapler, which are not eligible for this measure.
- Existing pneumatic hand tool must be operated at least 400 hours per year.
- Portable pneumatic hand tools, and pneumatic hand tools used for maintenance, are not eligible for this measure.
- The pneumatic hand tool compressed air branch pipe header must be demolished back to the compressed air main header.
- Documentation must be included with the Pre-Notification Application sufficient to verify the following for each existing pneumatic hand tool being replaced:
  - Type.
  - Application.
  - Compressed air usage rate (CFM).
  - Cycle Time.
  - Operating schedule.
- Documentation must be included with the Final Application sufficient to verify demolition of the replaced pneumatic hand tool compressed air branch pipe header back to the compressed air main header.
- Incentive is per existing hand tool replaced.
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Pneumatic Hand Tool Replaced with Cordless Electric Hand Tool (Pre-Notification Required) (CA211)

Requirements:

- This measure is available for replacing an existing pneumatic hand tool, utilized in a manufacturing setting for a production related application, with a cordless electric hand tool (typically 12- to 24-volt with a rechargeable battery).
- Pneumatic hand tools that are eligible for this measure include a die grinder, disc sander, impact wrench, belt sander, hammer, drill, or any pneumatic hand tool that uses more than 15 CFM except for a beveler, nailer, riveter, or stapler, which are not eligible for this measure.
- Existing pneumatic hand tool must be operated at least 400 hours per year.
- Portable pneumatic hand tools, or pneumatic hand tools used for maintenance, are not eligible for this measure.
- The pneumatic hand tool compressed air branch pipe header must be demolished back to the compressed air main header.
- Documentation must be included with the Pre-Notification Application sufficient to verify the following for each existing pneumatic hand tool being replaced:
  - Type.
  - Application.
  - Compressed air usage rate (CFM).
  - Cycle Time.
  - Operating schedule.
- Documentation must be included with the Final Application sufficient to verify demolition of the replaced pneumatic hand tool compressed air branch pipe header back to the compressed air main header.
- Incentive is per existing hand tool replaced.
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Pneumatic Motor Replaced with Electric Motor (Pre-Notification Required) (CA212)

Requirements:

- This measure is available for replacing an existing pneumatic motor, utilized in a manufacturing setting for a production related application, with an electric motor.
- The existing pneumatic motor must be operated at least 400 hours per year.
- The pneumatic motor compressed air branch pipe header must be demolished back to the compressed air main header.
- Documentation must be included with the Pre-Notification Application sufficient to verify the following for each existing pneumatic motor being replaced:
  - Application.
  - Cycle Time.
  - Operating schedule.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Rated horsepower (HP) of the new motor.
  - Demolition of the replaced pneumatic motor compressed air branch pipe header back to the compressed air main header.
- Incentive is based on the rated horsepower (HP) of the new motor.
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Low Pressure Air Blower System Replacing Compressed Air Blow-Off Application (> 80 psig) (Pre-Notification Required) (CA213)

Requirements:

- This measure is available for replacing existing compressed air blow-off nozzles or open pipe/tube assembly, used in a manufacturing production environment, with a low pressure air blower system.
- The existing air compressor(s) must be supplying compressed are at a pressure greater than 80 psig.
- The existing compressed air blow-off application nozzles and pipes must be utilized for at least 1,000 hours per year.
- The compressed air branch pipe header to the replaced blow-off nozzle or open pipe/tube assembly must be demolished back to the compressed air main header.
- The new low pressure blower system must supply air at a pressure less than 15 psig.
- Documentation must be included with the Pre-Notification Application sufficient to verify the following for the existing compressed air blow-off nozzles or open pipe/tube assembly:
  - Type.
  - Application.
  - Cycle Time.
  - Operating schedule.
  - Compressed air pressure (psig).
- Documentation must be included with the Final Application sufficient to verify the following:
  - Rated horsepower (HP) of the new low pressure blower system.
  - Air discharge pressure (psig) of the new low pressure blower system.
  - Demolition of the replaced compressed air blow-off nozzle or open pipe/tube assembly compressed air branch pipe header back to the compressed air main header.
- The incentive is based on the rated horsepower (HP) of the new low pressure blower system.
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Compressed Air Engineered Nozzles (≥ 1,000 hrs./yr.) (Pre-Notification Required) (CA214)

Requirements:

- This measure is available for replacing existing open pipe/tube assembly with engineered compressed air nozzles or installing engineered compressed air nozzles on a new system.
- The new engineered compressed air nozzles must:
  - Be between 1/8 and 1/2 inches in diameter.
  - Be utilized for at least 1,000 hours per year.
  - Have an air flow rating (SCFM) @ 80 psig less than or equal to those listed in Table 3 below.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the design of the existing compressed air blow-off equipment.
- Documentation must be included with the Final Application sufficient to verify the annual hours of operation for the new nozzles.
- Incentive is per new engineered nozzle installed.
- This measure qualifies for new construction and retrofit applications.

Table 3: Qualifying Maximum SCFM ratings @ 80 psig

Size	1/8	1/4	3/8	1/2
SCFM	10	18	35	60

Miscellaneous Electric

General Requirements

- Must be a Consumers Energy electric customer.
- Specifications (e.g. specification sheet) must be included with the Incentive Application for all new measure related products and equipment.
- Unless otherwise noted, incentives are not available for backup and redundant equipment and systems (see definition under "Project Requirements - Project and equipment types that are NOT eligible for incentives..." on page 8 of this Catalog).

Power Management

Advanced Power Strips (Tier 1) (ME101)

Requirements:

- This measure is available for utilizing new surge protectors (power strips) with built-in plug-load detection and control capabilities that will turn controlled devices that are plugged into the power strip on or off (e.g. printers, monitors) based on whether the primary device is on or off (e.g. computer).
- The surge protector (power strip) must include at least one uncontrolled socket, which would be a primary device.
- The intelligent power strip may also contain sockets for devices that require a constant supply of power that will not be affected by the primary device.
- Incentive is per new advanced power strip utilized.
- This measure qualifies for new construction and retrofit applications.

Network Power Management Software (ME102)

Requirements:

- This measure is available for installing power management software for control of desktop computers for a new installation where none previously existed, to upgrade an existing operating system, or for other network support software where the desktop computer power management function did not previously exist.
- Installation must allow centralized control, at the server level, of the power management settings (sleep mode and shutdown) for desktop computers on a distributed network.
- The software must have a reporting feature that allows monitoring and validation of energy savings.
- This measure is not applicable for the control of laptop computers and laptop docking stations.
- The following must be included with the Final Application:
  - A copy of the software license agreement.
  - Report (print-out) directly from the network power management software showing the location of the software on the network server and the number of desktop computers being controlled by the system.
- Incentive is per PC controlled.
- This measure qualifies for new construction and retrofit applications.

Beverage Vending Machine Miser (ME103)

Requirements:

- This measure is available for installing an occupancy-based control unit (miser) on a beverage vending machine.
- Miser must include a passive infrared occupancy sensor to turn off lights and other vending machine systems when the surrounding area is unoccupied for 15 minutes or longer.
- The control logic should power up the machine a minimum of once every two hours to maintain product temperature and provide compressor protection.
- For refrigerated beverage machines located indoors, backlighting lamps and ballasts should be removed to obtain additional energy savings.
- Incentive is per new beverage vending machine miser installed.
- This measure qualifies for new construction and retrofit applications.

Engine Block Heater Controller (ME104)

Requirements:

- This measure is available for installing an engine block heater controller for commercial, industrial, and agricultural engine block heater applications.
- Engine block heater controller must be outdoor rated or cold weather resistant, should be set to turn on heater no more than two hours prior to engine start-up time, and should contain a thermostat that turns off the heater if ambient air temperature is warmer than a preset temperature.
- Incentive is per new engine block heater controller installed.
- This measure qualifies for new construction and retrofit applications.

Drinking Water Cooling Miser (ME105)

Requirements:

- This measure is available for installing an occupancy-based control unit (miser) on a water-cooling machine such as a water/drinking fountain.
- Miser must include a passive infrared occupancy sensor to turn off refrigeration systems when the surrounding area is unoccupied for 15 minutes or longer.
- Incentive is per new drinking water cooling miser installed.
- This measure qualifies for new construction and retrofit applications.

Snack Vending Machine Miser (ME106)

Requirements:

- This measure is available for installing an occupancy-based control unit (miser) on a non- cooled snack vending machine (e.g. candy machines).
- Miser must include a passive infrared occupancy sensor to turn off the machine's lighting systems and any other vending machine electrical systems when the surrounding area is unoccupied for 15 minutes or longer.
- Incentive is per new snack vending machine miser installed.
- This measure qualifies for new construction and retrofit applications.

Miscellaneous

High-Efficiency Electric Hand Dryers (ME107)

Requirements:

- This measure is available for installing high-efficiency electric hand dryers.
- To be eligible for this measure, the new electric hand dryers must have an electric demand rating less than or equal to 1,500 Watts and a cycle time of 15 seconds or less.
- Replacement of existing high-efficiency hand dryers is not eligible for this measure.
- This measure is only available for facilities that do not use paper towel dispensers or other non-electric hand drying methods available in the affected restrooms.
- Documentation must be included with the Final Application sufficient to verify the following:
  - There are no non-electric hand drying methods available in the affected restroom.
  - For retrofit applications, the following for the pre-existing hand dryer:
    - Electric demand rating (W).
    - Cycle time.
- Incentive is per new high-efficiency hand dryer installed.
- This measure qualifies for new construction and retrofit applications.

Cogged V-Belt Drives (≤ 500 HP) (ME108, ME109)

Requirements:

- These measures are available for installing cogged (notched) V-belt drives for motors.
- Motor must operate at least 1,200 hours per year.
- For retrofit applications, existing drives must be straight V-belt drives.
- Motors rated greater than 500 HP are not eligible for these measures, however they may be eligible for a custom incentive.
- For a single drive with multiple V-belts, the horsepower (HP) must be divided by the number of belts.
- Documentation must be included with the Final Application sufficient to verify the following:
  - » Motor rated horsepower (HP).
  - » Motor operating schedule.
  - » For retrofit applications, the design of the pre-existing belt drives.
- Incentive is based on the rated horsepower (HP) of the affected motor, and the incentive rate is higher for motors rated 1 to 25 HP vs. 26 to 500 HP.
- These measures qualify for new construction and retrofit applications.

High-Efficiency Rectifiers for Data Center, Telecom, and Computer Room Applications (≤ 200 amps) (Pre-Notification Required) (ME110 - ME113)

Requirements:

- These measures are available for installing high-efficiency rectifiers for data center, telecom, and computer room applications.
- For retrofit applications, the existing rectifier must have the following energy efficiency ratings:
  - » Less than 94% in energy saver mode.
  - » Less than 90% in normal mode.
- The new rectifier must have an energy efficiency rating of at least 94% in normal mode.
- Facility must operate 24 hours per day and 7 days per week (24/7).
- Rectifier rated amperage must be 200 amps or less.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify existing rectifier energy efficiency rating in energy saver and normal mode.
- Documentation must be included with the Final Application sufficient to verify the following:
  - » Facility type.
  - » Facility operating schedule.
  - » Site measured load (kW).
  - » Energy efficiency rating of the new rectifier in normal mode.
  - » If applying for ME110 or ME112, that the CRAC has an economizer.
- Incentive is based on site measured load (kW), and the incentive rate varies depending on the efficiency rating of the new rectifier and whether the associated air conditioning system (CRAC) has an economizer.
- These measures qualify for new construction and retrofit applications.

High-Efficiency Pumps: Pump Energy Index (PEI) (≤ 50 HP) (Pre-Notification Required) (ME114)

Requirements:

- These measures are available for installing high-efficiency pumps with motors rated less than or equal to 50 HP.
- The new pump PEI value must be less than the baseline values in Tables 4 & 5.
- Pumps may be constant load/constant speed (PEI-CL) or variable load/variable speed (PEI-VL), which includes the drive.
- Eligible pump classes are:
  - » End Suction Frame Mounted (ESFM).
  - » End Suction Close Coupled (ESCC).
  - » In-Line (IL).
  - » Radially Split Multi-Stage Vertical In-Line (RSV).
  - » Vertical Turbine - Submersible (VTS).
- Irrigation pumps are not eligible for the higher incentive Standard Hours (ME114a) measure, however they may be eligible for the lower incentive Low Hours (ME114b) measure.
- Pump motors rated greater than 50 HP are not eligible for these measures, however they may be eligible for a custom incentive.
- PEI values for qualified pumps are found at the Hydraulic Institute - Energy Rating website, which lists over 5,000 pumps (**er.pumps.org/ratings/search**).
- The baseline and efficient pump PEI values must be for the same system type as follows:

- For retrofit applications:
  - If the existing pump has variable speed controls, then the new pump must also have variable speed controls and PEI-VL values are to be used for both the baseline and efficient pump for this measure.
  - If the existing pump is constant speed:
    - PEI-CL values are to be used for both the baseline and efficient pump for this measure.
    - If the new pump will be variable speed, constant load to variable load conversion savings is to be captured through a companion prescriptive variable frequency drive measure, integrated variable speed motor measure, or a custom incentive; if eligible for a custom incentive, a completed Variable Frequency Drive Information Worksheet (see Appendix of this Catalog) must be included with the custom incentive Pre-Notification Application, and must complete the pre- (if applicable) and post-retrofit power monitoring specified on the VFD Information Worksheet and include the data (kW) with the custom incentive Final Application.
- For new construction applications:
  - If variable speed control is required by code, the new pump must be variable speed and PEI-VL values are to be used for both the baseline and efficient pump for this measure.
  - If variable speed control is not required by code:
    - PEI-CL values are to be used for both the baseline and efficient pump for this measure.
    - If the new pump will be variable speed, constant load to variable load conversion savings is to be captured through a companion prescriptive variable frequency drive or integrated variable speed motor measure, or a custom incentive; if eligible for a custom incentive, a completed Variable Frequency Drive Information Worksheet (see Appendix of this Catalog) must be included with the custom incentive Pre-Notification Application, and must complete the pre- (if applicable) and post-retrofit power monitoring specified on the VFD Information Worksheet and include the data (kW) with the custom incentive Final Application.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the current control strategy for the existing pump.
- Documentation must be included with the Final Application sufficient to verify the following for the new pump and motor:
  - Model number.
  - Rated horsepower (HP).
  - Operating schedule.
- Incentive is based on the reduced power consumption (kWh), and the incentive rate is higher if the new pump operates at least 2,000 hours per year.
- These measures qualify for new construction and retrofit applications.

Table 4: PEI-CL baseline (Constant Load)

Pump Class*	Constant Load PEI-CL baseline
ESCC1800	1.000
ESCC,3600	0.960
ESFM,1800	0.980
ESFM,3600	0.990
IL,1800	0.990
IL,3600	0.980
RSV,1800	0.980
RSV,3600	0.980
VT-S,1800	0.960
VT-S,3600	0.960

*1800/3600 is the nominal speed of the tested pump

Table 5: PEI-VL baseline (Variable Load)

	Variable Load - PEI-VL baseline			
Pump Class	1 - 1.9 HP	2 - 3 HP	3.1 - 5.9 HP	6 - 50 HP
ESCC,1800	0.55	0.53	0.51	0.49
ESCC,3600	0.57	0.55	0.54	0.51
ESFM,1800	0.55	0.53	0.52	0.49
ESFM,3600	0.58	0.55	0.51	0.51
IL,1800	0.54	0.55	0.51	0.49
IL,3600	0.56	0.57	0.54	0.51
RSV,1800	0.56	0.55	0.52	0.50
RSV,3600	0.56	0.55	0.52	0.50
VT-S,1800	0.66	0.63	0.60	0.60
VT-S,3600	0.66	0.63	0.60	0.60

Manufacturing

General Requirements

- Must be a Consumers Energy electric and/or natural gas customer as indicated for each measure.
- Specifications (e.g. specification sheet) must be included with the Incentive Application for all new measure related products and equipment.
- Unless otherwise noted, incentives are not available for backup and redundant equipment and systems (see definition under "Project Requirements - Project and equipment types that are NOT eligible for incentives..." on page 8 of this Catalog).

Industrial Process Improvement

High-Efficiency Injection Molding Machines, All-Electric or Hybrid (Pre-Notification Required) (MA101a, MA101b)

Requirements:

- These measures are available for Consumers Energy electric customers installing a new hybrid (MA101b) or all-electric (MA101a) injection molding machine.
- Hybrid injection molding machines use an electric motor to directly drive the main screw and servo motor driven hydraulic pumps for other functions such as clamping and ejection.
- For retrofit applications, the existing injection molding machine must be an all-hydraulic injection molding machine that uses fixed speed hydraulic motors to drive the main screw as well as for other functions, such as clamping and ejection.
- An injection molding machine that uses a VSD or servo motor controlled hydraulic pump to drive the main screw is not eligible for these measures, however it may be eligible for one of the High-Efficiency Injection Molding Machines, VSD or Servo Hydraulic (MA101c, MA101d, MA101e) measures.
- The new injection molding machine must be screw-type and the main screw must be directly driven by an electric motor; electric motors or servo motor driven hydraulic pumps may be used for other functions such as clamping and ejection.
- The new injection molding machine must operate at least 4,000 hours per year.
- Replacement of existing all-electric, hybrid, VSD hydraulic or servo hydraulic injection molding machines is not eligible for these measures.
- Auxiliary hydraulic core puller packages are considered separate from the injection molding machine and are allowable for both the all-electric (MA101a) and hybrid (MA101b) injection molding machine measures.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the design of the existing injection molding machine.
- Documentation must be included with the Final Application sufficient to verify the following for the new injection molding machine:
  - Model Number
  - Operating schedule.
  - Annual production rate (lb./yr.).
- Incentive is based on the clamp rating in metric tons for the new injection molding machine (if clamp rating is in standard tons, divide by 1.1023 to convert to metric tons).
- These measures qualify for new construction and retrofit applications.

High-Efficiency Injection Molding Machines, VSD or Servo Hydraulic (≥ 400 lb./yr./machine ton) (Pre-Notification Required) (MA101c, MA101d, MA101e)

Requirements:

- These measures are available for Consumers Energy electric customers installing a new hydraulic injection molding machine with variable speed hydraulic pumps for the main screw as well as other functions such as clamping and ejection, or retrofitting an existing fixed speed hydraulic injection molding machine with variable speed drives (VSD) or servo motors to vary the speed of all the hydraulic pumps.
- These measures cannot be combined with either of the hybrid (MA101b) or the all-electric (MA101a) injection molding machine measures.
- The new injection molding machine must:
  - Operate at least 4,000 hours per year.
  - Have a minimum annual production rate of 400 pounds per year per machine ton.

- For retrofit applications:
  - Existing injection molding machine must be an all-hydraulic injection molding machine that uses fixed speed hydraulic motors to drive the main screw as well as for other functions, such as clamping and ejection.
  - The new VSDs or servo motors must be automatically controlled, or programmed, to reduce pump speed during periods of less pressure or a decrease in the hydraulic oil flow rate.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the design of the existing injection molding machine.
- Documentation must be included with the Final Application sufficient to verify the following:
  - If a new injection molding machine was installed, the model number.
  - Operating schedule of the new or retrofitted injection molding machine.
  - Annual production rate (lb./yr.) of the new or retrofitted injection molding machine.
  - If retrofitting an existing hydraulic injection molding machine with VSDs or servo motors, the control strategy for the new VSDs or servo motors.
- Incentive is based on the clamp rating in metric tons (if clamp rating is in standard tons, divide by 1.1023 to convert to metric tons) for the new or retrofitted injection molding machine, and the incentive rate varies depending on the annual production rate per metric ton of rated clamping force (lb./yr./ton) of the new machine.
- These measures qualify for new construction and retrofit applications.

Fiber Laser Cutting Equipment (Pre-Notification Required) (MA102)

Requirements:

- This measure is available for Consumers Energy electric customers installing a new fiber laser cutting machine.
- To be eligible for this measure, the laser must be cutting stock 0.2 inches (5.08 millimeters) or less most of the time.
- The new fiber laser cutting machine must:
  - Operate at least 2,500 hours per year
  - Be mechanically cooled year-round.
- For retrofit applications:
  - The existing cutting machine must:
    - Be a carbon dioxide (CO_2) laser cutting machine.
    - Be mechanically cooled year-round.
    - Be operated on at least a two-shift schedule.
  - Documentation must be included with the Pre-Notification Application sufficient to verify the following for the existing cutting machine:
    - Equipment type.
    - Cooling method.
    - Operating schedule.
- Documentation must be included with the Final Application sufficient to verify the following for the new fiber laser cutting machine:
  - Model number.
  - Cycle time.
  - Operating schedule.
  - Cooling method.
  - Power output (kW).
- Incentive is based on the new fiber laser cutting machine power output (kW), and the incentive rate is higher if the new machine is operated at least 4,000 hours per year (baseline CO_2 machine operated on a three-shift or greater schedule).
- This measure qualifies for new construction and retrofit applications.

Process Dryer Flow Rate Control with Relative Humidity Sensor (≥ 150°F) (Natural Gas) (Pre-Notification Required) (MA103)

Requirements:

- This measure is available for Consumers Energy natural gas customers installing a relative humidity sensor within the exhaust stream of an existing industrial process dryer (e.g. paint drying) together with controls that will vary the exhaust air volume flow rate based on the measured relative humidity, or installing a new process dryer with these features and capabilities.
- The process dryer must operate at least 4,000 hours per year.
- The process dryer exit air temperature must be at least 150 degrees Fahrenheit.
- This measure may be combined with a VFD or integrated variable speed motor (e.g. ECM) measure for the process dryer fan(s).
- An operational performance verification (complete post-construction air volume flow rate (CFM) and exit temperature testing for a minimum of seven continuous days) must be performed by a certified testing, adjusting and balance (TAB) agent to be eligible for this measure; TAB agent shall be an independent testing, adjusting, and balancing professional services provider certified by either AABC (Associated Air Balance Council) or NEBB (National Environmental Balancing Bureau).
- If retrofitting an existing process dryer with relative humidity sensors and controls:

- Existing process dryer fans must be constant speed.
- Baseline process dryer exhaust air volume flow rate (CFM) may be based on the nameplate volume flow rate if the existing equipment is operating "like new" and has not been altered since original installation, otherwise an instantaneous exhaust air volume flow rate reading under normal operating conditions obtained by a certified (AABC or NEBB) Testing, Adjusting and Balance (TAB) Agent is required to be eligible for this measure; TAB agent shall be an independent testing, adjusting, and balancing professional services provider certified by either AABC (Associated Air Balance Council) or NEBB (National Environmental Balancing Bureau).

- If retrofitting an existing process dryer with relative humidity sensor and controls, the following must be included with the Pre-Notification Application for the existing process dryer fan(s):
  - Documentation sufficient to verify the control strategy.
  - Baseline exhaust air volume flow rate (CFM) obtained as specified above.
- The following must be included with the Final Application:
  - Post-construction operational performance verification report prepared by a certified TAB agent as specified above.
  - Documentation sufficient to verify the new or retrofitted process dryer operating schedule.
- Incentive is based on the average reduction in exhaust air volume flow rate (CFM).
- This measure qualifies for new construction and retrofit applications.

Dew Point Sensor Control for Desiccant Column Plastic Pellet Dryer (Pre-Notification Required) (MA104)

Requirements:

- This measure is available for Consumers Energy electric customers retrofitting an existing desiccant column plastic pellet dryer with dew point monitoring-based controls, or installing a new desiccant column plastic pellet dryer that includes these controls, for process (non-HVAC) or manufacturing applications.
- The control strategy must include a feature that switches the column into regeneration only upon saturation of the drying media.
- Desiccant wheels are not eligible for this measure.
- This measure may be combined with a VFD or integrated variable speed motor (e.g. ECM) measure for the blower fan.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the current control strategy for the existing desiccant column plastic pellet dryer.
- Documentation must be included with the Final Application sufficient to verify the following:
  - The model number of the new plastic pellet dryer or installation of dew point monitoring-based controls on an existing plastic pellet dryer.
  - Rated electrical draw (kW) of the process heater and regeneration dryer heating elements.
- Incentive is based on the rated electrical draw (kW) of the new or retrofitted process heater and regeneration dryer heating elements combined.
- This measure qualifies for new construction and retrofit applications.

Process Ventilation Reduction

Process Ventilation Reduction (Retrofit) (Pre-Notification Required) (MA105 - MA107)

Requirements:

- These measures are available for Consumers Energy natural gas (MA105) and/or electric (MA106, MA107) customers who are permanently reducing their current heating season manufacturing or process (non-HVAC) ventilation volume flow rates through facility or process improvements.
- The reduced volume flow rate must exceed 5,000 CFM and serve conditioned (heated) spaces.
- Significant changes of operational use (e.g. manufacturing space transformed into a warehouse operation) are not eligible for these measures.
- Systems designed to allow the carbon dioxide (CO_2) levels in occupied spaces to exceed 1,200 ppm are not eligible for these measures.
- The reduced volume flow rate levels must also comply with the requirements of the local and/or state authority having jurisdiction.
- Decreases in ventilation rates of HVAC systems must be authorized by a Professional Engineer (PE) licensed in the State of Michigan, or a Certified Industrial Hygienist (CIH).
- Customers with both a Consumers Energy natural gas and electric account (or combo account) may combine measures MA105 and MA106 (natural gas and electric incentives per CFM reduced).
- These measures cannot be combined with any VFD or integrated variable speed motor (e.g. ECM) measures.
- Heating season operational performance verification (complete pre- and post-construction volume flow rate testing) by a certified Testing, Adjusting and Balance (TAB) Agent is required to be eligible for these measures; TAB agent shall be an independent testing, adjusting, and balancing professional services provider certified by either AABC (Associated Air Balance Council) or NEBB (National Environmental Balancing Bureau).
- The following must be included with the Pre-Notification Application:

  - One-page narration of the proposed scope of work.
  - The current control strategy for the existing process ventilation system.
  - If applying for measure MA107 (electric incentive per HP reduced), documentation sufficient to verify the existing motor horsepower (HP).
- An operational performance verification report prepared by a certified TAB agent as specified above must be included with the Final Application.
- For Consumers Energy natural gas customers, the incentive is based on the reduction in the average heating season outside air volume flow rate (CFM) that is directly conditioned (MA105).
- For Consumers Energy electric customers, the incentive is based on the reduction in the average heating season outside air volume flow rate (CFM) that is directly conditioned (MA106) or the motor horsepower (HP) reduction (must choose one or the other).
- These measures qualify for retrofit applications, but do not qualify for new construction applications.

Process Oven Exhaust Flow Rate Reduction (Pre-Notification Required) (MA108 - MA111)

Requirements:

- These measures are available for Consumers Energy natural gas (MA108, MA109) or electric (MA110, MA111) customers installing controls on existing process ovens, with constant speed exhaust fans, that will reduce and/or modulate the exhaust air volume flow rate, or installing a new process oven that features these capabilities.
- If retrofitting an existing process oven:
  - Existing process oven fans must be constant speed.
  - Baseline process oven exhaust air volume flow rate (CFM) may be based on the nameplate volume flow rate if the existing equipment is operating "like new" and has not been altered since original installation, otherwise an instantaneous exhaust air volume flow rate reading under normal operating conditions obtained by a certified (AABC or NEBB) Testing, Adjusting and Balance (TAB) Agent is required to be eligible for these measures; TAB agent shall be an independent testing, adjusting, and balancing professional services provider certified by either AABC (Associated Air Balance Council) or NEBB (National Environmental Balancing Bureau).
- An installation coupled with the means to automatically control and modulate the exhaust air volume flow rate (e.g. VFD) or a fixed speed reduction is eligible for these measures.
- These measures may be combined with a qualifying VFD or integrated variable speed motor (e.g. ECM) measure for the exhaust fan.
- Oven must operate at least 4,000 hours per year to be eligible for these measures.
- An operational performance verification (complete post-construction exhaust air volume flow rate and exit temperature testing) must be performed by a certified testing, adjusting and balance (TAB) agent to be eligible for these measures; TAB agent shall be an independent testing, adjusting, and balancing professional services provider certified by either AABC (Associated Air Balance Council) or NEBB (National Environmental Balancing Bureau).
- If retrofitting an existing process oven with controls, documentation must be included with the Pre-Notification Application sufficient to verify the following:
  - Baseline process oven exhaust air volume flow rate (CFM) as specified above.
  - Current control strategy for the existing process oven fan.
- The following must be included with the Final Application:
  - Documentation sufficient to verify the following:
    - Process oven heat source.
    - Process oven operating schedule.
  - Post-construction operational performance verification report prepared by a certified TAB agent as specified above.
- Incentive is based on the average reduction of the exhaust air volume flow rate (CFM), and the incentive rate varies depending on the source of heat (Consumers Energy natural gas or electricity) and the average oven exhaust temperature.
- These measures qualify for new construction and retrofit applications.

Process Energy Recovery

Recuperative or Regenerative Thermal Oxidizer (RTO) (Pre-Notification Required) (MA112, MA113)

Requirements:

- These measures are available for Consumers Energy natural gas customers installing a new Recuperative or Regenerative Thermal Oxidizer system (RTO).
- Replacement of an existing RTO is not eligible for these measures.
- The new RTO must operate at least 4,000 hours per year.
- RTO applications that do not meet the requirements of this prescriptive measure may be eligible for a custom incentive.
- For retrofit applications, the existing thermal oxidizer (TO):

- Must have an exhaust temperature of at least 1,400 degrees Fahrenheit while in operation.
- Cannot already have any heat recovery capabilities.
- The new RTO must:
  - Have a minimum heat recovery efficiency of 85%.
  - Have an exhaust temperature less than or equal to 400 degrees Fahrenheit while in operation.
- If the facility is upgrading an existing TO to a larger RTO:
  - The existing TO capacity will be incentivized at the retrofit rate.
  - The increase in capacity will be incentivized at the new construction rate.

- For new construction applications, the new RTO must be a regenerative thermal oxidizer and have a minimum heat recovery efficiency of at least 85%.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the following for the existing TO:
  - Rated volume flow rate (CFM).
  - Exhaust temperature while in operation.
  - Whether it has any heat recovery capabilities.
- Documentation must be included with the Final Application sufficient to verify the following for the new RTO:
  - Model number.
  - Rated volume flow rate (CFM).
  - Operating schedule.
  - For retrofit applications, the exhaust temperature while in operation.
- Incentive is based on the new RTO's rated volume flow rate (CFM), and the incentive rate varies depending on the type of application (retrofit or new construction) and the number of shifts the new RTO will operate.
- Measure MA112 qualifies for retrofit applications (replacement of an existing TO with no heat recovery capabilities with a new recuperative or regenerative TO) and measure MA113 qualifies for new construction applications (installation of a new regenerative TO that is not a replacement for an existing TO).

Miscellaneous Industrial Electric

Smart Battery Charging Stations (Pre-Notification Required) (MA114)

Requirements:

- This measure is available for Consumers Energy electric customers installing new 3-phase high frequency smart battery charging stations for charging forklifts and other electric vehicles not intended for use on public roadways.
- New chargers must:
  - Have a minimum power conversion efficiency of 92%.
  - Be servicing equipment that is operational (intermittently or continuously) a minimum of one shift per day, five days per week (2,000 hours per year).
- For retrofit applications, the existing battery charger must be a ferroresonant or silicon-controlled rectifier (SCR) charger.
- Documentation must be included with the Pre-Notification Application sufficient to verify the design of the existing battery charging station.
- Documentation must be included with the Final Application sufficient to verify the following for the new battery charging station:
  - Model number.
  - Operating schedule.
- Incentive is per new smart battery charging station installed, and the incentive rate varies depending on the number of shifts the new smart battery charging station is operated per day.
- This measure qualifies for new construction and retrofit applications.

Barrel Wrap Insulation for Injection Molders and Extruders (Retrofit) (Pre-Notification Required) (MA115)

Requirements:

- This measure is available for Consumers Energy electric customers installing insulated blankets around barrels of existing plastic extrusion or injection molding machines.
- Insulation blankets must be installed on previously uninsulated barrels, per manufacturer recommendations.
- Documentation must be included with the Pre-Notification Application sufficient to verify the barrels of the existing machines are currently uninsulated.
- Documentation must be included with the Final Application sufficient to verify the surface area (ft^2) of the barrels wrapped with insulation.
- Incentive is based on the surface area (ft^2) of the barrels wrapped with insulation.
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Inverter Welding Machines (Pre-Notification Required) (MA116)

Requirements:

- This measure is available for Consumers Energy electric customers installing a new inverter welding machine.
- The welding machine must operate a minimum of 1,000 hours per year and be in "Arc Mode" for at least 15% of the operational period.
- For retrofit applications, the existing welding machine must be a transformer-rectifier power source welding machine.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the design of the existing welding machine.
- Documentation must be included with the Final Application sufficient to verify the following for the new welding machine:
  - Model number.
  - Operating schedule.
  - Percent of time the machine will operate in "Arc Mode".
- Incentive is per new welding machine installed.
- This measure qualifies for new construction and retrofit applications.

Heat Recovery for 100% OA MAU

Process Waste Heat Recovery for 100% Outside Air Makeup Air Heating (Pre-Notification Required) (MA201, MA202)

Requirements:

- These measures are available for Consumers Energy natural gas customers installing a new waste heat recovery system featuring a water-to air or air-to-air heat exchanger to transfer waste heat from a process (non-HVAC application) to the supply air stream for an existing or new 100% outside air direct- (MA201) or indirect-fired (MA202) natural gas makeup air unit (MAU).
- Heat exchanger must provide 100% of heat for incoming supply air stream. No auxiliary burners or electric resistance heat may be used on the MAU.
- For retrofit applications, the existing MAU cannot have any heat recovery capabilities.
- The MAU utilizing the waste heat recovery system must utilize an energy source that would otherwise be vented outside to the environment prior to the installation of the new heat exchanger.
- MAU must operate continuously during occupied mode.
- A load match analysis must be performed, or at least a 25 degrees Fahrenheit increase in supply air temperature must be shown, to verify proper utilization of waste heat.
- Projects that require waste heat recovery by code (consult ASHRAE 90.1-2013) are not eligible for these measures.
- Facility must operate at least two production shifts.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the following for the existing MAU:
  - Operating schedule.
  - Whether it has any heat recovery capabilities.
- The following must be included with the Final Application for the new or retrofitted MAU:
  - Specification that includes the following:
    - Type of MAU (direct- or indirect-fired).
    - Inlet temperatures.
    - Outlet temperatures.
    - Flow rates for both inlet and outlet makeup air streams during design conditions.
  - Operating schedule.
  - Load match analysis report or other documentation sufficient to verify at least a 25 degrees Fahrenheit increase in MAU supply air temperature.
- Incentive is based on the rated volume flow rate (CFM) of the MAU (if the supply and exhaust air volume flow rates are not the same, the smaller of the two values will be used), and the incentive rate varies depending on whether the MAU is direct- or indirect-fired and the number of shifts the new MAU will operate.
- These measures qualify for retrofit applications and may qualify for new construction applications if waste heat recovery is not required by code (consult ASHRAE 90.1-2013).

HVAC Equipment

General Requirements

- Must be a Consumers Energy electric and/or natural gas customer as indicated for each measure.
- Specifications (e.g. specification sheet) must be included with the Incentive Application for all new measure related products and equipment.
- Unless otherwise noted, incentives are not available for backup and redundant equipment and systems (see definition under "Project Requirements - Project and equipment types that are NOT eligible for incentives..." on page 8 of this Catalog).
- 1 MBH = 1,000 Btu/hr.

Air Conditioning

Unitary (e.g. RTU) and Split Air Conditioning Systems (including Heat Pumps) (HV101)

Requirements:

- This measure is available for Consumers Energy electric customers installing new unitary single package (e.g. RTU) or split air conditioning systems, including heat pumps.
- The new system or unit must meet or exceed the applicable qualifying cooling efficiency shown in Table 6.
- The efficiency of split systems is based on the Air-Conditioning, Heating and Refrigeration Institute (AHRI) reference number.
- Water-cooled systems and evaporative coolers are not eligible for this measure, however they may be eligible for a custom incentive.
- All unitary single package (e.g. RTU) and split system cooling equipment must meet AHRI standards (210/240, 320 or 340/360), be UL listed and use a minimally ozone-depleting refrigerant (e.g. HCFC or HFC).
- Cannot be combined with Ductless Air Conditioning or Air-Source Heat Pump Systems (HV106) measure.
- Documentation must be included with the Final Application sufficient to verify the following for the new unit:
  - » Model number.
  - » Nameplate (nominal) cooling capacity (tons) of the new unit/ system.
- Incentive is based on the nameplate (nominal) cooling capacity (tons) of the new unit/system.
- This measure qualifies for new construction and retrofit applications.

Table 6: Qualifying Minimum Cooling Efficiencies for Split and Unitary Air Conditioning Systems

Size Category	Minimum Efficiency
< 5.4 tons	Split: 14.3 SEER2 (15.0 SEER) Unitary: 15.2 SEER2 (16.0 SEER)
≥ 5.4 to < 11.25 tons	12.0 EER and 19.0 IEER
≥ 11.25 to < 20 tons	12.0 EER and 16.8 IEER
≥ 20 to < 63 tons	12.5 EER and 15.5 IEER
≥ 63 tons	10.2 EER

Table 7: Qualifying Minimum Efficiencies for CRAC Units

Equipment Type	Rating Condition	Minimum SCOP
Air Cooled	Class 1	2.20
Water Cooled	Class 1	2.51
Glycol Cooled	Class 1	2.08
Air Cooled	Class 2	2.78
Water Cooled	Class 2	2.97
Glycol Cooled	Class 2	2.53
Air Cooled	Class 3	2.82
Water Cooled	Class 3	2.73
Glycol Cooled	Class 3	2.47

High-Efficiency Data Center, Telecom or Computer Room Air Conditioning Systems (CRAC) (HV102)

Requirements:

- This measure is available for Consumers Energy electric customers installing new, air cooled, high-efficiency air conditioning systems for computer room, data center and telecom applications (CRAC).
- The new CRAC system must meet or exceed the applicable qualifying cooling efficiency shown in Table 7, which represents a 10% increase over ASHRAE 90.1-2016 minimum efficiency requirements (see Table 8 for definitions of the new CRAC system equipment class rating conditions listed in Table 7).
- Return air temperature cannot exceed 95 degrees Fahrenheit.

- The new CRAC unit must have a Sensible Heat Ratio of at least 90%; standard HVAC cooling.
- Documentation must be included with the Final Application sufficient to verify the following for the new CRAC:
  - Model number.
  - Nameplate (nominal) heat rejection capacity (MBH).
- Incentive is based on the nameplate (nominal) heat rejection capacity (MBH) of the new CRAC unit.
- This measure qualifies for new construction and retrofit applications.

Table 8: Equipment Class by Return Air Temperature

Equipment Class	Operating Return Air Temperature
1	Temperature ≤ 75°F
2	Temperature > 75°F to ≤ 85°F
3	Temperature > 85°F to ≤ 95°F

Data Room Hot/Cold Aisle Configuration Air Conditioning Systems (CRAC) (Retrofit) (Pre-Notification Required) (HV103)

Requirements:

- This measure is available for Consumers Energy electric customers optimizing an existing data room air conditioning system (CRAC) to create a hot-aisle/cold-aisle configuration.
- The new configuration must result in an increase in the return air temperature to the CRAC unit of at least 5 degrees Fahrenheit resulting from reducing the average cooling air flow rate to optimize equipment heat rejection and eliminate supply air "short circuiting".
- Return air temperature cannot exceed 95 degrees Fahrenheit.
- The specific measure that is applicable to your project (HV103a – HV103l) is determined by the cooling system design (air-cooled or glycol-cooled), pre-retrofit equipment class (see Table 8 for equipment class definitions), and the return air temperature increase (≥ 5°F and < 10°F, or ≥ 10°F).
- Must complete seven continuous days of pre- and post-retrofit return air temperature monitoring.
- The following must be included with the Final Application:
  - Seven continuous days of pre- and post-retrofit return air temperature monitoring data.
  - Documentation sufficient to verify the nameplate (nominal) heat rejection capacity (MBH) of the optimized system.
- Incentive is based on nameplate (nominal) heat rejection capacity (MBH) of the CRAC unit, and the incentive rate is higher if optimized system achieves at least a 10 degrees Fahrenheit increase in the return air temperature (HV103g – HV103l).
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Packaged Terminal Air Conditioners (PTAC) and Heat Pumps (PTHP) (≤ 2 Tons) (HV104, HV105)

Requirements:

- These measures are available for Consumers Energy electric customers installing through-the-wall self-contained PTAC (HV104) and PTHP (HV105) units that have a nameplate (nominal) capacity of 2 tons (24,000 Btu/hr.) or less.
- Units must meet the following efficiencies:
  - < 7,000 Btu/hr. = 13.1 EER.
  - 7,000 Btu/hr. to 15,000 Btu/hr. = 11.8 EER.
  - > 15,000 Btu/hr. = 10.5 EER.
  - All EER values must be rated at 95 degrees Fahrenheit outdoor dry-bulb temperature.
- Documentation must be included with the Final Application sufficient to verify the following for the new unit:
  - Model number.
  - Unit type (PTAC or PTHP).
  - Nameplate (nominal) cooling and/or heating capacity (tons).
- Incentive is per new unit installed, and the incentive rate varies depending on the type (PTAC or PTHP) and nameplate (nominal) cooling and/or heating capacity (tons) of the unit.
- These measures qualify for new construction and retrofit applications.

Ductless Air Conditioning or Air-Source Heat Pump Systems (HV106)

Requirements:

- This measure is available for Consumers Energy electric customers installing new ductless air conditioning or air-source heat pump systems (e.g. mini split system).
- For retrofit heating applications, the existing heating system must be an electric baseboard system, ducted air-source heat pump system, or other electricity sourced heating system.
- For air conditioning applications, new ductless air conditioning or air-source heat pump system cooling efficiency must equal or exceed 20 SEER2 or 21 SEER.
- For heating applications, ductless air-source heat pump system heating efficiency must equal or exceed 8.4 HSPF2 or 10 HSPF.
- Cannot be combined with Unitary (e.g. RTU) and Split Air Conditioning Systems and Heat Pumps (HV101) measure.
- Documentation must be included with the Final Application sufficient to verify the following:

- The model number of the new system.
- The cooling (SEER2/SEER) and heating (HSPF2/HSPF) efficiency of the new system.
- Nameplate (nominal) cooling capacity of the new system (tons).
- For retrofit heating applications, the pre-existing heating system design.

- Incentive is per new system installed.
- This measure qualifies for new construction and retrofit applications.

Ground-Loop Heat Pump Systems (GLHP) (Brine to Air) (< 135,000 Btu/hr.) (HV201)

Requirements:

- This measure is available for Consumers Energy electric customers installing a new closed loop brine to air (e.g. glycol) ground loop heat pump system (GLHP).
- For retrofit heating applications, existing heating system must be an electric strip system or ducted air-source heat pump system.
- New GLHP system with a nameplate (nominal) cooling capacity greater than 135,000 Btu/hr. (11.25 tons) is not eligible for this measure, however it may be eligible for a Custom Incentive.
- New ground loop heat pump system must have an EER of at least 17 for air conditioning applications.
- New ground loop heat pump system must have a COP of at least 3.5 for heating applications.
- Cannot be combined with Unitary (e.g. RTU) and Split Air Conditioning Systems and Heat Pumps (HV101) measure.
- All equipment must meet Air Conditioning and Refrigeration Institute (AHRI) standards (325 or 330) and be UL listed.
- Documentation must be included with the Final Application sufficient to verify the following:
  - The model number of the new system.
  - The cooling (EER) and heating (COP) efficiency of the new system.
  - Nameplate (nominal) cooling capacity of the new system (tons).
  - For retrofit heating applications, the pre-existing heating system design.
- The incentive is based on the nameplate (nominal) cooling capacity (tons) and efficiency of the new system (EER or COP) and the total incentive is determined by summing the qualifying base incentive per ton, a fixed incentive for reaching the minimum qualifying efficiency, and the incremental incentive per efficiency increase above the minimum required; EER rating will be based on an entering water temperature of 77 degrees Fahrenheit for air conditioning applications, and COP rating will be based on an entering water temperature of 32 degrees Fahrenheit for heating applications, in accordance with ASHRAE 90.1-2013.
- This measure qualifies for new construction and retrofit applications.

Ultrasonic Humidifiers (Retrofit) (Pre-Notification Required) (HV202)

Requirements:

- This measure is available for Consumers Energy electric customers replacing existing electric steam humidifiers with ultrasonic humidifiers in data centers, large office buildings and hospitals.
- The humidifier must operate a minimum of 2,000 hours annually.
- The space conditioned must maintain a minimum winter relative humidity level of at least 25%.
- Existing natural gas driven steam humidification systems are not eligible for this measure.
- Existing HVAC system for the space must be heated with natural gas; HVAC systems with electric resistance heating are not eligible for this measure.
- Special water treatment may be required for hospital applications to prevent water scale buildup or micro-organism development.
- Documentation must be included with the Pre-Notification Application sufficient to verify the following:
  - Existing humidifier design.
  - Existing heating system design for the humidified space.
  - Size of the area served (ft^2), including a scaled floor plan indicating the humidified space.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Model number of the new humidifier.
  - Winter relative humidity level setpoint.
  - Operating schedule for the new humidifier.
- Incentive is based on the size of the area served (ft^2).
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Chillers

High-Efficiency Air- and Water-Cooled Chillers (HV203 - HV205)

Requirements:

- These measures are available for Consumers Energy electric customers installing new high-efficiency air- (HV203) or water-cooled (HV204, HV205) chillers.
- The new chiller must have a rated kW/ton Full Load Value (FLV) and Integrated Part Load Value (IPLV) below the minimum efficiencies shown in Table 9 (ASHRAE 90.1-2013) for HVAC and process applications.
- The chiller efficiency ratings must be based on AHRI Standard 550/590-2011.
- The chiller must meet AHRI Standard 550/590-2011 requirements, be UL listed and use a minimally ozone-depleting refrigerant (e.g. HCFC or HFC).
- The AHRI net capacity value should be used to determine the chiller rated cooling capacity (tons).
- The addition of a VFD to an existing chiller is not eligible for these measures, however it may be eligible for a custom incentive; if eligible for a custom incentive, a completed Variable Frequency Drive Information Worksheet (see Appendix of this Catalog) must be included with the custom incentive Pre-Notification Application, and must complete the pre- (if applicable) and post-retrofit power monitoring specified on the VFD Information Worksheet and include the data (kW) with the custom incentive Final Application.
- The following must be included with the Final Application:
  - » Chiller specifications that include FLV and IPLV energy efficiency ratings (kW/ton or COP).
  - » Documentation sufficient to verify the following:
    - Model number of the new chiller.
    - Rated (see basis above) cooling capacity (tons) of all chillers in the chiller plant.
    - Peak facility or process cooling demand (tons).
- The incentive is based on the rated (see basis above) cooling capacity (tons) and efficiency (FLV and IPLV) of the new chiller and the total incentive is determined by summing the qualifying base incentive per ton, a fixed incentive for reaching the minimum qualifying efficiency (higher for water- vs. air-cooled chillers), and the incremental incentive per efficiency increase above the minimum required(same incentive rate for both air- and water-cooled chillers), and is calculated as the maximum incremental incentive between Path A or Path B for every 0.01 kW/ton FLV or IPLV reduction from the minimum required.
- This measure qualifies for new construction and retrofit applications.

Table 9: Qualifying Minimum Efficiencies for Air- and Water-Cooled Chillers

Equipment Type	Size (A)	Unit	Path A		Path B	
			FLV	IPLV	FLV	IPLV
All Air-Cooled Chillers	< 150 Tons	kW/ Ton	1.19	0.88	1.24	0.76
	≥ 150 Tons	kW/ Ton	1.19	0.86	1.24	0.75
Water Cooled Positive Displacement (Screw) Chillers	< 75 ton	kW/ Ton	0.75	0.6	0.78	0.5
	≥ 75 ton and < 150 ton	kW/ Ton	0.72	0.56	0.75	0.49
	≥ 150 ton & < 300 ton	kW/ Ton	0.66	0.54	0.68	0.44
	≥ 300 ton & < 600 ton	kW/ Ton	0.61	0.52	0.63	0.41
	≥ 600 ton	kW/ Ton	0.56	0.5	0.59	0.38
Water Cooled Centrifugal Chillers	< 150 ton	kW/ ton	0.61	0.55	0.7	0.44
	≥ 150 ton & < 300 ton	kW/ ton	0.61	0.55	0.64	0.4
	≥ 300 ton & < 400 ton	kW/ ton	0.56	0.52	0.6	0.39
	≥ 400 ton & < 600 ton	kW/ ton	0.56	0.5	0.59	0.38
	≥ 600 ton	kW/ ton	0.56	0.5	0.59	0.38

Industrial Fans

High-Volume Low-Speed Fans (Electric) (Pre-Notification Required) (HV301)

Requirements:

- This measure is available for Consumers Energy electric customers installing horizontal, ceiling mounted, high-volume low-speed (HVLS) fans to replace multiple non-HVLS fans (including pedestal fans) or where no fans currently exist.
- The new HVLS fan must have at least a 16-foot diameter.
- Customers with both a Consumers Energy natural gas and electric account (or combo account) may combine this measure with the Destratification Fans (HV302) measure.
- Documentation must be included with the Final Application sufficient to verify there are no fans other than the new HVLS fan in the affected space.
- Incentive is per new HVLS fan installed.
- This measure qualifies for new construction and retrofit applications.

Destratification Fans (Natural Gas) (Pre-Notification Required) (HV302)

Requirements:

- This measure is available for Consumers Energy natural gas customers who are optimizing their building heating system by adding a destratification fan to reduce the temperature gradient from the thermostat to the roof.
- The area served must be a conditioned space greater than 5,000 square feet (ft^2) with a floor-to-ceiling distance of at least 20 feet.
- Affected area cannot exceed building or room area served by the destratification fan.
- For ceiling fan diameters larger than 16 feet, affected area may be calculated as five times the fan diameter. Example:
  - 20-foot fan diameter
  - 5 x 20 feet = 100 feet
  - Area = π x $diameter^2$ / 4 = 3.14 x 100^2 / 4 = 7,850 ft^2
- For ceiling fan diameters smaller than 16 feet, the destratification effectiveness will be validated by taking air temperature readings before and after construction under the same ventilation rate.
- Spaces served by forced air HVAC systems (e.g. RTU) that are required to operate continuously during occupied periods (to meet indoor air quality requirements) are not eligible for this measure.
- Customers with both a Consumers Energy natural gas and electric account (or combo account) may combine this measure with the High-Volume, Low-Speed Fans (HV301) measure.
- The temperature gradient with the fan not running between the thermostat (5 feet above finished floor) and the bottom of the ceiling must be at least 15 degrees Fahrenheit (e.g. 68°F at thermostat height, 83°F at ceiling height).
- The temperature gradient in the area affected must be proven to decrease by at least 10 degrees Fahrenheit, or minimum air velocity of 100 feet per minute perpendicular to the floor at an elevation of 5 feet must be validated.
- Documentation must be included with the Pre-Notification Application sufficient to verify the following:
  - Size of the conditioned space (ft^2).
  - Ceiling height of the conditioned space (ft).
  - If the affected space is served by a forced air HVAC system (e.g. RTU), the current control strategy for the existing HVAC system.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Temperature gradient without the fan running.
  - Minimum measure savings requirements specified above have been met (temperature gradient or air velocity).
- Incentive is based on the size of the area served (ft^2).
- This measure qualifies for new construction and retrofit applications.

Space and Process Heating

High-Efficiency HVAC Hydronic Boilers (HV303, HV304)

Requirements:

- These measures are available for Consumers Energy natural gas customers installing a high-efficiency space heating hydronic boiler.
- Boilers must modulate their firing rate and have a sealed combustion unit.
- Note that high-efficiency condensing boilers will provide the rated efficiency only if return water is cold enough to condense the flue gases. If the heating system cannot meet that requirement, a non-condensing boiler may be a better choice.
- Qualifying efficiencies are shown in Table 10 below. The efficiency should be given as AFUE (Annual Fuel Utilization Rate) for units < 300 MBH, thermal efficiency for units ≥ 300 MBH and ≤ 2,500 MBH, and combustion efficiency for units > 2,500 MBH.
- The following must be included with the Final Application:
  - Boiler specifications including steady state boiler input and output ratings (must be defined per ANSI Standard Z21.13 and use supply and return water temperatures).
  - Documentation sufficient to verify the following:
    - Model number of the new boiler.
    - Rated heat input capacity (MBH) of all boilers in the boiler plant.
    - Peak facility heating demand (MBH).
- Incentive is based on the rated heat input capacity of the qualified new boiler (MBH), and the incentive rate is higher for Level 2 qualified boilers (see Table 10).
- These measures qualify for new construction and retrofit applications.

Table 10: Qualifying Efficiency Requirements for Natural Gas Space Heating Hydronic Boilers

Incentive Level	Minimum Efficiency
Level 1	≥ 0.88 and < 0.90
Level 2	≥ 0.90

High-Efficiency HVAC Steam (> 300 MBH), Process Steam, or Process Hydronic Boilers (HV305 - HV307)

Requirements:

- These measures are available for Consumers Energy natural gas customers installing a high-efficiency HVAC steam (HV306), process steam (HV305), or process hydronic (HV307) boiler.
- HVAC steam boilers must meet a minimum thermal efficiency of 82% and have a rated heat input capacity greater than 300 MBH, as specified by the manufacturer.
- Process steam and process hydronic boilers must meet a minimum combustion efficiency of 82%, as specified by the manufacturer.
- Hospitals or universities whose boiler operates year-round may be eligible for one of the higher incentive rate process boiler measures (HV305, HV307).
- Documentation must be included with the Final Application sufficient to verify the following:
  - Model number of the new boiler.
  - Rated heat input capacity (MBH) of all boilers in the boiler plant.
  - Peak facility or process heating demand (MBH).
- Incentive is based on the rated heat input capacity of the new boiler (MBH), and the incentive rate varies depending on the type of boiler and its application.
- These measures qualify for new construction and retrofit applications.

High-Efficiency Pool Water Heaters (HV308)

Requirements:

- This measure is available for Consumers Energy natural gas customers installing a high-efficiency pool water heater (PWH).
- New PWH must:
  - Have a thermal efficiency rating greater than or equal to 84%.
  - Have a heat input capacity between 500 MBH and 2,000 MBH.
  - Have an on/off switch.
  - Have no pilot light.
  - Not be used as a backup for solar water heating.
- Documentation must be included with the Final Application sufficient to verify the following for the new PWH:
  - Model number.
  - Rated heat input capacity (MBH).
- Incentive is based on the rated heat input capacity of the new PWH (MBH).
- This measure qualifies for new construction and retrofit applications.

High-Efficiency Unit Heaters (HV309, HV310)

Requirements:

- These measures are available for Consumers Energy natural gas customers installing high-efficiency unit heaters for space heating applications.
- New unit heater must have a sealed combustion chamber and thermal efficiency rating greater than or equal to 92% AFUE (Annual Fuel Utilization Efficiency).
- Direct-fired air handling units are not eligible for these measures, however they may be eligible for the Direct-Fired Makeup Air Handling Unit (HV311) measure.
- Equipment purchased for backup or redundancy is not eligible for these measures.
- Documentation must be included with the Final Application sufficient to verify the following for the new unit heater:
  - Model number.
  - Rated heat input capacity (MBH).
- Incentive is based on the rated heat input capacity of the new unit heater (MBH), and the incentive rate is higher for AFUE greater than or equal to 95%.
- These measures qualify for new construction and retrofit applications.

Direct-Fired Makeup Air Handling Units (HV311)

Requirements:

- This measure is available for Consumers Energy natural gas customers installing a direct-fired makeup air handling unit.
- For retrofit applications, the existing equipment must be standard efficiency, forced-air, space heating equipment (e.g. indirect fired natural gas unit heater, steam air handling unit, 80/20 makeup air handling unit, etc. that is less than 84% efficient).
- Projects resulting in an increase in outside air mechanically provided to, or removed from, the space are not eligible for this measure.
- This measure may be combined with ventilation reduction measures.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Model number of the new direct-fired makeup air handling unit.
  - Rated heat input capacity (MBH) of the new direct-fired makeup air handling unit.
  - For retrofit applications, the pre-existing heating equipment design.
- Incentive is based on the rated heat input capacity of the new direct-fired MAU (MBH).
- This measure qualifies for new construction and retrofit applications.

High-Efficiency Unitary Single Package Heating Units (e.g. RTU) (HV312)

Requirements:

- This measure is available for Consumers Energy natural gas customers installing high-efficiency unitary single package units (e.g. RTU) for space heating applications.
- New RTU must have a sealed combustion chamber and a thermal efficiency rating greater than or equal to 92% AFUE (Annual Fuel Utilization Efficiency).
- Disposal of condensed liquid (condensate) must comply with state and local codes and ordinances. The condensate cannot be discharged directly onto the roof or into roof drains.
- Direct-fired air handling units are not eligible for this measure, however they may be eligible for the Direct-Fired Makeup Air Handling Unit (HV311) measure.
- Replacement of existing condensing RTUs is not eligible for this measure.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Model number of the new RTU.
  - Rated heat input capacity (MBH) of the new RTU.
  - For retrofit applications, the pre-existing heating equipment design.
- Incentive is based on the rated heat input capacity of the new rooftop unit (MBH).
- This measure qualifies for new construction and retrofit applications.

Infrared Heaters (Natural Gas) (Pre-Notification Required) (HV313, HV314)

Requirements:

- These measures are available for Consumers Energy natural gas customers installing natural gas infrared heaters for space heating applications.
- For retrofit applications, existing heating system must be forced air based (e.g., unit heaters, furnaces, etc.).
- The setpoint temperature of the new infrared heating system must be at least 5 degrees Fahrenheit below the current or baseline heating system setpoint temperature.
- Both high-intensity and low-intensity natural gas infrared heaters are eligible for these measures.
- Infrared heaters must be installed per manufacturer's recommendations.
- Replacement of an existing infrared heater is not eligible for these measures.
- These measures may be combined with the Programmable Thermostats (BA202) or Smart Thermostats with Intrinsic Occupancy Sensor Control (BA203) measures.
- The following must be included with the Pre-Notification Application:
  - For retrofit applications, documentation of the existing heating system design.
  - Drawing showing the proposed locations of the new infrared heaters; for retrofit applications, the drawing must also show the existing heating units or system.
- The following must be included with the Final Application:
  - Documentation sufficient to verify the following for the new infrared heaters:
    - Model number.
    - Rated heat input capacity (MBH).
  - Signed Affidavit (see Appendix of this Catalog) stating the new infrared heating system setpoint temperature will be at least 5 degrees Fahrenheit below the previous or baseline setpoint temperature.
- Incentive is based on the rated heat input capacity of the new infrared heaters (MBH), and the incentive rate is higher for customers with both a Consumers Energy electric and natural gas (or combo) account.
- These measures qualify for new construction and retrofit applications.

High-Efficiency Furnaces (HV315 - HV318)

Requirements:

- These measures are available for Consumers Energy natural gas customers installing high-efficiency natural gas furnaces for space heating applications.
- New furnace must have a sealed combustion unit and thermal efficiency rating greater than or equal to 92% AFUE (Annual Fuel Utilization Efficiency).
- Direct-fired air handling units are not eligible for these measures, however they may be eligible for the Direct-Fired Makeup Air Handling Unit (HV311) measure.
- For retrofit applications, chimney liners must be installed if the new condensing natural gas furnace replaces atmospherically drafted equipment that was vented through the same flue as a gas water heater; flue closure protocol must be used when a high-efficiency furnace is installed, and the chimney is no longer in use.
- Equipment purchased for backup or redundancy is not eligible for these measures.
- Documentation must be included with the Final Application sufficient to verify the following for the new furnace:
  - Model number.
  - Rated heat input capacity (MBH).
- Incentive is per new furnace installed, and the incentive rate varies depending on the AFUE and rated heat input capacity (MBH) of the new furnace.
- These measures qualify for new construction and retrofit applications.

Domestic Water Heating

High-Efficiency Domestic Water Heating Boilers (> 75 MBH) (HV401)

Requirements:

- This measure is available for Consumers Energy natural gas customers installing high-efficiency domestic water heating boiler systems (DWHB) for commercial applications.
- The new DWHB must have a thermal efficiency rating greater than or equal to 94%.
- DWHBs typically utilize a separate hot water storage tank.
- Only DWHBs with a rated heat input capacity greater than 75 MBH are eligible for this measure.
- Boilers used for space heating are not eligible for this measure.
- Documentation must be included with the Final Application sufficient to verify the following for the new DWHB:
  - Model number.
  - Rated heat input capacity (MBH).
- Incentive is based on the rated heat input capacity of the new DWHB (MBH).
- This measure qualifies for new construction and retrofit applications.

High-Efficiency Tank-Style Domestic Water Heaters (Natural Gas) (HV402 - HV403)

Requirements:

- These measures are available for Consumers Energy natural gas customers installing high-efficiency natural gas tank-style domestic water heaters (DWH).
- New DWH must meet the efficiency requirements listed in Table 11.
- Documentation must be included with the Final Application sufficient to verify the following for the new tank-style DWH:
  - Model number.
  - Rated heat input capacity (MBH).
  - Tank capacity (gal).
- Incentive is per new DWH installed, and the incentive rate varies depending on the tank capacity (gal), rated heat input capacity (MBH) and energy efficiency of the DWH.
- These measures qualify for new construction and retrofit applications.

Table 11: Qualifying Efficiencies for Natural Gas Tank-Style Domestic Water Heaters:

Storage Capacity	Heat Input	Minimum Efficiency
≤ 55 gallons	≤ 75 MBH	0.64 to 0.679 Uniform Energy Factor
≤ 55 gallons	≤ 75 MBH	≥ 0.68 Uniform Energy Factor
> 55 gallons	≤ 75 MBH	≥ 0.80 Uniform Energy Factor
≤ 140 gallons	> 75 MBH	≥ 94% Thermal Efficiency

High-Efficiency Tankless Domestic Water Heaters (HV404)

Requirements:

- This measure is available for Consumers Energy electric or natural gas customers installing high-efficiency tankless (e.g. “demand”, “instantaneous”) electric (HV404a) or natural gas (HV404b) domestic water heaters (DWH).
- For retrofit applications:
  - Existing DWH cannot be tankless.
  - New tankless DWH must have the same heat source as the existing DWH (e.g. existing electric tank-style DWH being replaced with a new electric tankless DWH).
- New tankless electric DWHs must have a UEF (Uniform Energy Factor) of at least 0.95.
- New tankless natural gas DWHs must have a UEF of at least 0.87.
- Replacement of existing tankless DWH is not eligible for this measure.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Model number of the new tankless DWH.
  - For retrofit applications:
    - Heat source of the pre-existing DWH.
    - The design of the pre-existing DWH
- Incentive is per new tankless DWH installed, and the incentive rate varies depending on the heat source for the new tankless DWH (electric or natural gas).
- This measure qualifies for new construction and retrofit applications.

Building Automation Systems

General Requirements

- All controls upgrades must be capital improvement projects; controls upgrades included in service or maintenance contracts, for any length of time, are not eligible for incentives.
- Must be a Consumers Energy electric and/or natural gas customer as indicated for each measure.
- Specifications (e.g. specification sheet) must be included with the Incentive Application for all new measure related products and equipment.
- Unless otherwise noted, incentives are not available for backup and redundant equipment and systems (see definition under "Project Requirements - Project and equipment types that are NOT eligible for incentives..." on page 8 of this Catalog).

HVAC System Automation

Web-Based Building Automation Systems (BAS) (Temperature Setback in Non-Occupied Periods) (Retrofit) (Electric) (Pre-Notification Required) (BA101)

Requirements:

- This measure is available for Consumers Energy electric customers installing a web-based building automation system (BAS), with temperature setback in non-occupied periods, for existing buildings that currently have no digital automated HVAC controls or outdated pneumatic control systems with inoperable time control functions.
- Existing HVAC control systems cannot have time of day scheduling (including 7-day programmable thermostats); upgrading obsolete HVAC Energy Management System (EMS) with inoperable time clock functions will be reviewed on a case-by-case basis for incentive eligibility.
- New control system must be fully programmable (i.e., ability to be programmed with complex sequence of operation for central heating/cooling plants, custom AHUs, etc.) and be able to display fully customizable graphical overviews that depict actual equipment operation.
- Buildings upgrading existing digital HVAC EMS with operable time clock functions are not eligible for this measure.
- HVAC BAS must be new and include:
  - » Central time clock control.
  - » Web-based interface with PC-based controls and graphics.
  - » Open-protocol architecture control system consisting of either LonTalk (ANSI/CEA 709.1) or BACNet (ASHRAE/ANSI 135) protocol being used between all controlled and controlling devices and every node on the network, unless granted a pre-approved exception.
  - » A minimum total unoccupied (setback/setup) period exceeding 2,200 hours per year.
  - » A minimum setback/setup space temperature of at least 5 degrees Fahrenheit in heating and air conditioning (cooling) mode.
- New control systems must be entirely direct digital controlled (DDC), however exceptions may be granted for large pneumatic actuators.
- A BAS controlling one piece of equipment is considered standalone controls and is not eligible for this measure, however it may be eligible for another controls measure.
- Buildings must have more than 10,000 square feet (ft^2) of controlled air conditioned (cooled) space to be eligible for the Air Conditioning (BA101a) measure.
- Heated school areas that are not air conditioned and have more than 10,000 square feet (ft^2) of controlled heated space may be eligible for the BAS Non-A/C Schools (BA101b) measure based on shutting off fan motors and pumps during non-occupied periods, except when periodically needed to maintain unoccupied space temperature setpoint.
- Building automation systems for manufacturing facilities are not eligible for this measure, however they may be eligible for another controls measure.
- It is recommended that the HVAC BAS include:
  - » Real-time outside air damper positioning.
  - » Whole building real-time power and energy monitoring capability.
  - » At least three "enhanced" control strategies, (e.g. critical zone hydronic heating supply temperature reset, AHU fan control, exhaust fan control, etc.).
  - » If incorporated with Demand Control Ventilation, real-time carbon dioxide monitoring at the operator interface.
  - » All hardware and software programming tools required to make changes and/or additions to new control system, which should be provided to the owner, including training.

- The following must be included with the Pre-Notification Application:
  - Documentation of existing HVAC controls.
  - Proposed BAS sequence of operations.
  - Scaled floor plan of building with area(s) proposed to be controlled identified.
  - Specifications for the proposed BAS.
  - Estimated cost for the proposed BAS.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Equipment controlled by the BAS.
  - Setback/setup schedule.
  - Temperature setpoints.
- The incentive is calculated per square foot (ft^2) of area controlled, and the maximum incentive available is $75,000 per facility.
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Light Commercial Building Automation Systems (LC-BAS) (Temperature Setback in Non-Occupied Periods) (Retrofit) (Electric) (Pre-Notification Required) (BA102)

Requirements:

- This measure is available for Consumers Energy electric customers adding HVAC Building Automation Systems (BAS) to existing packaged HVAC units (e.g. RTUs) and/or split systems for light commercial buildings.
- Incentive is intended for web-based or cloud-based BAS. BAS that is fully programmable and based on Niagara Framework (e.g. Jace Controller) is not eligible for this measure, however it may be eligible for another controls measure.
- If the facility has an existing HVAC control system, the existing HVAC control system cannot have time-of-day scheduling, including 7-day programmable thermostats.
- Upgrading an existing digital HVAC Energy Management System (EMS) with operable time clock functions is not eligible for this measure.
- Upgrading obsolete HVAC Energy Management System (EMS) with inoperable time clock functions will be reviewed on a case-by-case basis for incentive eligibility.
- HVAC LC-BAS must be new and include:
  - Central time clock control.
  - Web-based or cloud-based controls.
  - Real-time analytics allowing equipment issues to be found via system created graphs and trend logs.
  - Remote monitoring and alarming capability.
  - A minimum total unoccupied period (setback/setup) exceeding 2,200 hours per year.
  - Open-protocol architecture control system consisting of either LonTalk (ANSI/CEA 709.1) or BACNet (ASHRAE/ANSI 135) protocol being used between all controlled and controlling devices and every node on the network, unless granted a pre-approved exception.
  - A minimum setback/setup space temperature of at least 5 degrees Fahrenheit in heating and air conditioning (cooling) mode.
  - Ability for customers to determine if points or specific pieces of equipment are in an overridden state (i.e., points/equipment "in-hand").
  - New control systems must be entirely direct digital controlled (DDC).
- It is recommended that the HVAC LC-BAS include:
  - Real-time outside air damper positioning.
  - If incorporated with Demand Control Ventilation, real-time carbon dioxide monitoring at the operator interface.
  - Monitoring of amp draw through compressor or fan motors for preventive maintenance.
  - All hardware and software programming tools required to make changes and/or additions to new control system, which should be provided to the owner, including training.
- A LC-BAS controlling one piece of equipment is considered standalone controls and is not eligible for this measure, however it may be eligible for another controls measure.
- The LC-BAS measure is intended for building automation systems that are not fully programmable (i.e., only configurable) and do not have customizable graphics.
- Web-based (smart) thermostats are not eligible for this measure.
- The following must be included with the Pre-Notification Application:
  - Documentation sufficient to verify existing HVAC controls.
  - Proposed LC-BAS sequence of operations
  - Scaled floor plan of building with area(s) proposed to be controlled identified.
  - Specifications of proposed LC-BAS.
  - Estimated cost for the proposed LC-BAS.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Equipment controlled by the LC-BAS.
  - Setback/setup schedule.
  - Temperature setpoints.
- The incentive is calculated per square foot (ft^2) of area controlled, and the maximum incentive available is $35,000 per facility.
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Optimal Start on Air Handling Units (AHU) (Retrofit) (Pre-Notification Required) (BA103)

Requirements:

- This measure is available for Consumers Energy electric and/or natural gas customers adding an optimal start control strategy to control forced air space heating and cooling equipment for an existing building utilizing the sequence of operation specified below.
- The HVAC sequence of operation shall be written to utilize the existing and/or new building automation system (BAS) and/or on-board HVAC unit control system to determine the length of time required to bring each zone from current unoccupied temperature to within 2 degrees Fahrenheit of the occupied setpoint temperature right before occupied mode is initiated, in as short of time as possible. This shall be accomplished by using the difference between the actual zone temperature and occupied setpoint temperature, as well as the outdoor air (OA) temperature and humidity. These differences are then compared with historical performance of how quickly the zone has been able to warm up or cool down to determine when the system needs for morning warm-up or cool-down.
- During optimal start morning warm-up or cool-down, the supply fan shall run continuously and the heating or cooling shall be energized, but the OA damper shall remain closed unless in economizer mode.
- Existing building automation systems and HVAC equipment on-board control systems with optimal start capability are not eligible for this measure.
- System must have a minimum of five days per week of unoccupied (setback/setup) periods
- Occupied and unoccupied temperature setpoints cannot be the same.
- Documentation must be included with the Pre-Notification Application sufficient to verify the following:
  - » Existing HVAC control strategies.
  - » The size (ft^2) of the area proposed to be controlled, including a scaled floor plan of building with area(s) proposed to be controlled identified.
- Documentation must be included with the Final Application sufficient to verify the following:
  - » Implementation of optimal start control strategy as specified above, including sequence of operation.
  - » Equipment controlled.
  - » Setback/setup schedule.
  - » Temperature setpoints.
- The incentive is calculated per square foot (ft^2) of area controlled, and the incentive rate varies depending on whether customer has a Consumers Energy electric account, natural gas account, or both/combo account; maximum incentive available is $50,000 per facility.
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Building Automation System (BAS) for Manufacturing HVAC Fans (Pre-Notification Required) (BA104)

Requirements:

- This measure is available for Consumers Energy electric customers implementing controls that will shut off HVAC equipment during unoccupied periods, except when required to cycle on to maintain unoccupied heating temperature setpoint, in non-air conditioned (mechanically cooled) manufacturing facilities.
- For retrofit applications, the existing HVAC equipment must not have time of day scheduling controls (e.g. 7-day programmable thermostats) and be running 24/7.
- The manufacturing facility must have at least 2,000 hours per year of unoccupied periods during which the HVAC equipment can be shut off.
- As part of the new control system the owner should receive all hardware and software programming tools required for system changes and/or additions.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the current control strategy for the existing HVAC equipment.
- Documentation must be included with the Final Application sufficient to verify the following:
  - » Rated horsepower (HP) of the controlled motors.
  - » HVAC equipment setback schedule.
  - » Implementation of HVAC equipment setback control as specified above, including sequence of operation.
- The incentive is based on the original nameplate rated horsepower (HP) of the HVAC equipment fan motor(s).
- This measure qualifies for new construction and retrofit applications.

Parking Garage Exhaust Fan Carbon Monoxide (CO) Control (Pre-Notification Required) (BA105)

Requirements:

- This measure is available for adding carbon monoxide (CO) control for mechanical ventilation systems serving enclosed parking garages by modulating fan speed.
- Total design exhaust air volume flow rate must be greater than or equal to 10,000 CFM.
- The parking garage must be open 24 hours per day and 7 days per week (24/7).
- For retrofit applications, the existing ventilation system fan(s) must be constant speed and operate continuously year-round (24/7).
- The occupied ventilation rate must be at least 1.5 CFM/ft^2.
- The new control system must automatically detect contaminant level and disable fans during periods of little use, provided acceptable contaminant level is maintained.
- New controls must feature variable speed capabilities.

- This measure cannot be combined with any VFD or integrated variable speed motor (e.g. ECM) measures.
- Typically, CO concentration at all sensors is maintained below 25 parts per million (ppm) and one sensor is required per 5,000 square feet (ft^2); if the sensor is capable of NO_2 detection, typically the NO_2 cannot exceed 3 ppm.
- The ventilation system is typically required to maintain the garage at negative or neutral pressure relative to occupied spaces adjoining the garage when the garage is scheduled for occupancy.
- The ventilation control system must comply with all local and/or state authorities having jurisdiction.
- It is recommended to confirm with the blower manufacturer that the increased fan cycling will not result in unforeseen motor damage.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the current control strategy for the existing ventilation system.
- Documentation must be included with the Final Application sufficient to verify the following for the new or retrofitted ventilation system:
  - Design exhaust air volume flow rate.
  - Occupied period ventilation rate (CFM/ft^2).
  - Rated horsepower (HP) of controlled fan motor(s).
  - Implementation of CO control strategy as specified above, including variable speed fan control and sequence of operation.
- The incentive is based on the rated horsepower (HP) of the controlled fan motor(s).
- This measure qualifies for new construction and retrofit applications.

Hydronic HVAC Pump Control (Retrofit) (Pre-Notification Required) (BA106)

Requirements:

- This measure is available for adding a control strategy for existing hydronic heating, chilled water or condenser water pumping systems for HVAC applications that will disable one or more pumps during periods of minimal load.
- Pumping systems currently operating with operable time clock or outside air sensor controls/lockouts are not eligible for this measure.
- Pumping system must operate continuously at a constant pumping volume flow rate for at least 6,000 hours per year prior to control strategy implementation.
- One or more pumps must be disabled for at least 3,000 hours per year after control strategy implementation.
- Upgrades must include hardware installation for new DDC controls.
- The total area of the conditioned space must be at least 10,000 square feet (ft^2).
- Documentation must be included with the Pre-Notification Application sufficient to verify the following:
  - Current pumping system control strategy.
  - Current pumping system annual hours of operation.
  - The size (ft^2) of the conditioned space, including a scaled building floor plan with areas proposed to be controlled identified.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Rated horsepower (HP) of the pump motor(s) that will be periodically disabled.
  - The annual hours the pump(s) will be disabled.
  - Hardware installation for new DDC controls.
  - Implementation of pump control strategy as specified above, including sequence of operation.
- The incentive is based on the rated horsepower (HP) of the pump motor(s) that will be periodically disabled.
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Critical Zone Supply Air Reset Control Strategy (Retrofit) (Pre-Notification Required) (BA107)

Requirements:

- This measure is available for Consumers Energy electric customers converting an existing multi-zone variable air volume (VAV) air handling system, with fixed static pressure setpoint control, into a VAV air handling system with critical zone static pressure setpoint reset control.
- The area served by the air handling system must be a fully conditioned space (both heated and air conditioned) and be controlled by an operational energy management system (EMS).
- At a minimum, the control system upgrade must include the ability to read actual airflow at each VAV box and the controls sequence specified in ASHRAE 90.1-2013, Section 6.5.3.2 or a similar alternate control strategy approved by program management.
- Single zone VAV air handling systems are not eligible for this measure.
- Documentation must be included with the Pre-Notification Application sufficient to verify the current control strategy for the existing air handling system that serves the affected spaces.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Nameplate (nominal) cooling capacity (tons) of the retrofitted air handling system.
  - Implementation of the control strategy specified above, including sequence of operation and mechanical drawings.
- The incentive is based on the nameplate (nominal) cooling capacity (tons) of the retrofitted air handling system.
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Air-Side Economizer (Retrofit) (Pre-Notification Required) (BA108)

Requirements:

- This measure is available for retrofitting existing rooftop units (RTUs), air handling units (AHUs), split direct-expansion (DX) systems, or unit ventilators (UVs), which were designed without an economizer or which have inoperable economizer controls with new economizer controls, including replacement of malfunctioning or inoperable damper actuators if applicable.
- The area served must be air conditioned (cooled) space.
- At a minimum, existing system must be retrofitted with new damper actuators and controls and be properly calibration by a certified professional.
- Documentation must be included with the Pre-Notification Application sufficient to verify the following:
  - » Whether the area served is an air conditioned (cooled) space.
  - » Whether the air conditioning system has a functioning economizer.
- Documentation must be included with the Final Application sufficient to verify the following:
  - » Nameplate (nominal) cooling capacity (tons) of the air conditioning system.
  - » Calibration by a certified professional.
  - » Implementation of economizer control strategy, including sequence of operation.
- The incentive is based on the nameplate (nominal) cooling capacity (tons) of the air conditioning system.
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Chilled Water Plant Controls

Chilled Water Reset Control Strategy (Retrofit) (Pre-Notification Required) (BA109)

Requirements:

- This measure is available for adding a chilled water reset control strategy to an existing chilled water system for HVAC and process applications.
- The chilled water reset control strategy must allow the chilled water supply temperature (CWS) to increase by at least 5 degrees Fahrenheit based on zone demand or outside air temperature (OA) (e.g. at an OA = 80°F, CWS = 45°F; at an OA = 55°F, CWS = 55°F).
- If more than one chilled water valve on the terminal equipment is 100% open, the chilled water supply temperature should be decreased.
- The chilled water temperature setpoint reset schedule should be calibrated for each site based on internal relative humidity.
- Reset schedules with a chiller(s) in economizing mode (free cooling) are not eligible for this measure.
- Documentation must be included with the Pre-Notification Application sufficient to verify the following:
  - » Nameplate (nominal) cooling capacity (tons) of all chillers in the chiller plant.
  - » Peak facility or process cooling demand (tons).
  - » Current control strategy for the chilled water system.
- Documentation must be included with the Final Application sufficient to verify implementation of the chilled water reset control strategy as specified above, including the chilled water temperature setpoint reset schedule and sequence of operation.
- The incentive is based on the nameplate (nominal) cooling capacity (tons) of the controlled chiller(s) excluding backup and redundant chillers (see Building Automation System – General Requirements for definition), and the incentive rate is higher for a 10 degrees vs. 5 degrees Fahrenheit chilled water temperature setpoint reset schedule.
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Optimized Chiller Plant Sequencing (Retrofit) (Pre-Notification Required) (BA110)

Requirements:

- This measure is available for customers to implement optimized chiller sequencing for existing chiller plants for HVAC and qualified process (see requirements below) applications, where the existing chillers currently operate with stand-alone controls.
- Process chiller plants are eligible for this measure if they operate (are enabled) at least 4,000 hours per year (these are operating hours, not full-load hours).
- The chiller plant incorporating the optimal sequencing must consist of at least two chillers that are required to run in parallel to meet the peak facility cooling demand (tons).
- All chillers must be monitored and controlled, at a minimum, as follows: sequenced and staged, both enabled and disabled, in a manner to optimize their operation as recommend by the chiller manufacturer.
- The chiller plant controller must be fully automated and programmed with each chiller's unique operating characteristics to optimize both full-load and part-load performance.
- Chillers with good part load efficiency (e.g. VSD drives) must be utilized as trim chillers.
- The control strategy for water-cooled chiller plants must also optimize the corresponding cooling towers and condenser water pumps.
- Documentation must be included with the Pre-Notification Application sufficient to verify the following:

- » Nameplate (nominal) cooling capacity (tons) of all chillers in the chiller plant.
- » Peak facility or process cooling demand (tons).
- » Current chiller plant control strategy.
- » Chiller plant operating schedule.

- Documentation must be included with the Final Application sufficient to verify implementation of the optimized chiller plant sequencing control strategy as specified above, including sequence of operation.
- The incentive is based on the combined nameplate (nominal) cooling capacity (tons) of the controlled chillers excluding backup and redundant chillers (see Building Automation System – General Requirements for definition).
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Advanced Single Zone RTU Control

Enhanced Ventilation Control (EVC) for Single Zone Packaged HVAC Units (e.g. RTUs) (Pre-Notification Required) (BA111)

Requirements:

- This measure is available for Consumers Energy electric and/or natural gas customers adding enhanced ventilation control (EVC) to existing or new single zone packaged heating, ventilation, and air conditioning (HVAC) units (e.g. RTUs).
- For retrofit applications, the existing system:
  - » Must be in good working order.
  - » Cannot have a variable speed supply fan.
  - » Cannot have CO_2 sensors installed.
- Factory provided controls on a new RTU are not eligible for this measure unless documentation is provided sufficient to verify the control system includes all the requirements specified below.
- The control system must include the following:
  - » An advanced digital economizer controller (ADEC) that will identify and report problems with sensors, dampers and other components to ensure consistent and reliable economizer operation.
  - » Demand Control Ventilation Control Strategy (DCV) that will reduce the amount of ventilation during periods of low occupancy, typically achieved through utilization of a CO_2 sensor(s); must be integrated with the ADEC.
  - » Variable Speed Drive (VSD) integrated with the ADEC that will automatically modulate the supply fan (evaporator) motor speed based on CO_2 levels and other variable parameters, including reducing the air flow rate to the minimum required ventilation air flow rate when in ventilation-only mode.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the following for the existing RTU:
  - » Unit is in good working order.
  - » Current control strategy.
- This measure cannot be combined with any Demand Control Ventilation (DCV), VFD/VSD, and/or Economizer measures.
- Documentation must be included with the Final Application sufficient to verify the following:
  - » Nameplate (nominal) cooling capacity (tons) of the RTU.
  - » Implementation of the ADEC, DCV and VSD control strategies and requirements specified above, including sequence of operation.
- Incentive is based on the nameplate (nominal) cooling capacity (tons) of the RTU, and the incentive rate varies depending on whether customer has a Consumers Energy electric account, natural gas account, or both/combo account.
- These measures qualify for retrofit applications and may qualify for new construction applications if demand control ventilation and/or variable speed control is not required by code (consult ASHRAE 90.1-2013).

Unitary HVAC Controls

Hotel Guest Room Occupancy Sensors (Natural Gas Heat) (Pre-Notification Required) (BA201a)

Requirements:

- This measure is available for Consumers Energy natural gas customers installing occupancy sensors that control natural gas heating units for individual hotel guest rooms.
- Sensors controlled by a front desk system are not eligible for this measure.
- Sensors must be automatic occupancy detectors.
- Key cards that indicate occupancy are eligible for this measure.
- Replacing, retrofitting, or upgrading existing occupancy-based controls is not eligible for this measure.
- It is recommended that during unoccupied periods, the default setting for controlled units differs by at least 8 degrees Fahrenheit from the occupied setpoint.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the current control strategy for the existing HVAC equipment.
- Documentation must be included with the Final Application sufficient to verify the following:
  - » Number of guest rooms controlled, including a floor plan showing the room layout and location of sensors.
  - » Temperature setpoints.
  - » Source of heat (electricity or natural gas).
- The incentive is per guest room controlled, not per sensor, and is available for each room controlled in a multi-room suite if a sensor is installed in each room.
- This measure qualifies for new construction and retrofit applications.

Hotel Guest Room Occupancy Sensors (Electric Heat) (Pre-Notification Required) (BA201b)

Requirements:

- This measure is available for Consumers Energy electric customers installing occupancy sensors that control heat pumps and other electric heating units for individual hotel guest rooms.
- Sensors controlled by a front desk system are not eligible for this measure.
- Sensors must be controlled by automatic occupancy detectors
- Key cards that indicate occupancy are eligible for this measure.
- Replacing, retrofitting, or upgrading existing occupancy-based controls is not eligible for this measure.
- It is recommended that during unoccupied periods, the default setting for controlled units differs by at least 8 degrees Fahrenheit from the occupied setpoint.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the current control strategy for the existing HVAC equipment.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Number of guest rooms controlled, including a floor plan showing the room layout and location of sensors.
  - Temperature setpoints.
  - Source of heat (electricity or natural gas).
- The incentive is per guest room controlled, not per sensor, and is available for each room controlled in a multi-room suite if a sensor is installed in each room.
- This measure qualifies for new construction and retrofit applications.

Programmable Thermostats (Retrofit) (Pre-Notification Required) (BA202)

Requirements:

- This measure is available for installing a programmable thermostat, to control existing HVAC equipment, that has the capability of enabling the user to set one or more time periods each day when a comfort setpoint temperature needs to be maintained, and one or more time periods each day when an energy-saving setpoint temperature needs to be maintained.
- The new programmable thermostat must:
  - Have a minimum setback period of 2,000 hours per year.
  - Have a minimum space temperature setback of at least 5 degrees Fahrenheit in occupied heating or cooling mode (as applicable).
- Thermostats for new HVAC equipment are not eligible for this measure.
- Hotel guest rooms are not eligible for this measure.
- The area served by the new programmable thermostat must be a conditioned space.
- Existing HVAC controls cannot have time of day scheduling capability (e.g. 7-day programmable thermostats).
- Documentation must be included with the Pre-Notification Application sufficient to verify the existing HVAC controls.
- Documentation must be included with the Final Application sufficient to verify the following:
  - The installed thermostat is serving a conditioned space.
  - Setback/setup schedule.
  - Temperature setpoints.
- Incentive is per new thermostat installed, and the incentive rate varies depending on whether customer has a Consumers Energy electric account, natural gas account, or both/combo account.
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Occupancy Sensor Control for Smart Thermostat (Pre-Notification Required) (BA203)

Requirements:

- This measure is available for customers who install single zone smart thermostats, with an intrinsic or external occupancy sensor, that will reset the space temperature when the individual zone is unoccupied.
- The area served by the new smart thermostat and occupancy sensor must be a single zone conditioned space.
- Hotel guest rooms are not eligible for this measure.
- Must have a minimum setback space temperature of at least 5 degrees Fahrenheit in heating and/or cooling mode (as applicable).
- Cannot be combined with the Demand Control Ventilation (DCV) for HVAC System (BA204) measure.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the existing HVAC controls.
- Documentation must be included with the Final Application sufficient to verify the following:
  - The installed thermostat and occupancy sensor is serving a single zone conditioned space.
  - Temperature setpoints.
  - The size (ft^2) of the controlled area(s), including a scaled floor plan with controlled area(s) and thermostat and occupancy sensor location(s) identified.
- The incentive is calculated per square foot (ft^2) of area controlled, and the incentive rate varies depending on whether customer has a Consumers Energy electric account, natural gas account, or both/combo account
- This measure qualifies for new construction and retrofit applications.

Ventilation Controls

Demand Control Ventilation (DCV) for HVAC System (Natural Gas) (Pre-Notification Required) (BA204)

Requirements:

- This measure is available for Consumers Energy natural gas customers installing building ventilation controls that use carbon dioxide (CO_2) levels to measure occupancy and modify the percentage of outside air based on variable levels, known as demand control ventilation (DCV).
- Only buildings with space heating applications are eligible for this measure.
- Conditioned spaces must be kept between 65 degrees Fahrenheit and 75 degrees Fahrenheit during occupied hours.
- For retrofit applications, the current fresh air requirements must be greater than or equal to 10% of supply air requirements.
- CO_2 sensors must:
  - Be installed in conjunction with fully functioning air-side economizers.
  - Control the outside air dampers.
- Dual-temperature air-side economizers with zone-level CO_2 sensors for rooftop units are eligible for this measure.
- Return system CO_2 sensors are required for built-up HVAC systems.
- Controlled space must meet the minimum requirements of the current ASHRAE 62 standard as well as all state and local building code and manufacturer's recommendations.
- This measure is not available for new construction applications if DCV is required by code (consult ASHRAE 90.1-2013).
- This measure cannot be combined with the Occupancy Sensor Control for HVAC System (BA205) measure nor the Occupancy Sensor Control for Smart Thermostat (BA203) measure, however the project may be eligible for the Demand Control Ventilation (DCV) and Occupancy Sensor Control for HVAC System (BA206) measure instead of this measure if both types of controls are being installed.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the following:
  - Existing HVAC Controls.
  - Current fresh air requirements for the affected space.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Temperature setpoints.
  - Setback/setup schedule.
  - The size of the area controlled (ft^2), including a scaled floor plan with controlled areas identified.
  - Implementation of DCV control strategy as specified above, including sequence of operation.
- The incentive is calculated per square foot (ft^2) of space controlled.
- These measures qualify for retrofit applications and may qualify for new construction applications if demand control ventilation is not required by code (consult ASHRAE 90.1-2013).

Occupancy Sensor Control for HVAC System (Pre-Notification Required) (BA205)

Requirements:

- This measure is available for installing occupancy sensors to automatically switch the heating, ventilation, and air conditioning (HVAC) systems in zone specific spaces (e.g. classrooms, offices, health care, etc.) from occupied to unoccupied mode when these areas are not in use.
- The HVAC terminal equipment (e.g. unit ventilators or constant volume AHUs) controlled by the occupancy sensors must be capable of reducing to zero flow during periods of no occupancy.
- This measure cannot be combined with the Demand Control Ventilation (DCV) for HVAC System (BA204) measure, however the project may be eligible for the Demand Control Ventilation (DCV) and Occupancy Sensor Control for HVAC System (BA206) measure instead of this measure if both types of controls are being installed.
- The space controlled by the HVAC occupancy sensor must:
  - Be a conditioned space.
  - Prove intermittent occupancy during scheduled occupied periods .
- Data logging may be required to validate HVAC occupancy sensor control system performance.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the existing HVAC controls.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Implementation of occupancy sensor control strategy as specified above, including sequence of operation.
  - Temperature setpoints.
  - Intermittent occupancy during scheduled occupied periods, including logged data if required.
  - Size of the controlled area (ft^2), including a scaled floor plan with controlled areas identified.
- The incentive is calculated per square foot (ft^2) of area controlled, and the incentive rate varies depending on whether customer has a Consumers Energy electric account, natural gas account, or both/combo account.
- This measure qualifies for new construction and retrofit applications.

Demand Control Ventilation (DCV) and Occupancy Sensor Control for HVAC System (Pre-Notification Required) (BA206)

Requirements:

- This measure is available for installing both demand control ventilation (DCV) and occupancy sensor control for an HVAC system.
- Must meet the individual requirements of the Demand Control Ventilation (DCV) for HVAC System (BA204) and Occupancy Sensor Control for HVAC System (BA205) measures.
- The incentive is calculated per square foot (ft^2) of area controlled, and the incentive rate varies depending on whether customer has a Consumers Energy electric account, natural gas account, or both/combo account.
- These measures qualify for retrofit applications and may qualify for new construction applications if demand control ventilation is not required by code (consult ASHRAE 90.1-2013).

Occupancy Sensor Controlled Restroom Exhaust Fans (Retrofit) (Pre-Notification Required) (BA207)

Requirements:

- This measure is available for installing occupancy sensors for existing restroom exhaust fans.
- The occupancy sensor must automatically shut off the exhaust fan or close the exhaust damper, after a specific period of time, when no occupancy is detected.
- No existing controls other than a manual switch may be present (e.g. fans cannot be controlled by an existing Building Automation System (BAS) or a manual timer).
- Exhaust fan motor cannot be an ECM (electrically commutated motor).
- Documentation must be included with the Pre-Notification Application sufficient to verify the following for the exhaust fan:
  - Motor design.
  - Control strategy.
- Documentation must be included with the Final Application sufficient to verify implementation of occupancy sensor control strategy as specified above.
- Incentive is per fan controlled.
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Boiler Controls

Optimized Boiler Plant Sequencing (Pre-Notification Required) (BA301)

Requirements:

- This measure is available for installing new HVAC (BA301a) or process (BA301b) boilers with built-in boiler sequencing controls or retrofitting existing boilers with boiler sequencing controls.
- This measure is available for heating systems with at least two boilers, isolated from one another, and independently feeding a common header.
- Hospitals or universities that have a year-round heating demand that exceeds the capacity of one boiler may be eligible for the higher incentive rate process boiler (BA301b) measure.
- All boilers in the boiler plant shall be monitored and controlled, at a minimum, as follows: sequenced and staged, both enabled and disabled in a manner that optimizes their operation in an energy efficient manner, as recommended by the boiler manufacturer.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the current boiler controls.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Rated heat input capacity (MBH) of all boilers in the boiler plant.
  - Winter and summer (if applicable) peak facility and/or process heating demand (MBH).
  - Implementation of the optimized boiler plant sequencing control strategy as specified above, including sequence of operation.
- Incentive is based on the total rated heat input capacity (MBH) of all the boilers in the boiler plant, and the incentive rate is higher for process boilers.
- This measure qualifies for new construction and retrofit applications.

Boiler Modulating Burner Control (Pre-Notification Required) (BA302)

Requirements:

- This measure is available for HVAC (BA302a) or process (BA302b) applications for installing a new steam or non-condensing hydronic boiler, or retrofitting an existing steam or hydronic boiler with a new burner(s), with modulating burner control.
- The turndown ratio capability of the new burner(s) must be at least 5:1.
- For retrofit applications, the turndown ratio capability of the existing burner(s) must be less than the turndown ratio capability of the new burner(s).
- HVAC boilers must operate (be enabled) a minimum of 3,000 hours per year (these are operating hours, not full-load hours).

- Process boilers must operate (be enabled) a minimum of 4,000 hours per year (these are operating hours, not full-load hours).
- New condensing boilers are not eligible for this measure.
- Hospitals or universities whose boiler operates year-round may be eligible for the higher incentive rate process boiler (BA302b) measure.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the turndown ratio capability of the existing burner(s).
- Documentation must be included with the Final Application sufficient to verify the following:
  - » Rated heat input capacity (MBH) of all boilers in the boiler plant.
  - » Peak facility or process heating demand (MBH).
  - » Boiler operating schedule.
- Incentive is based on the rated heat input capacity (MBH) of the new or retrofitted boiler, and the incentive rate is higher for process boilers.
- This measure qualifies for retrofit applications, and for new construction applications for new steam and non-condensing hydronic boilers.

Boiler Oxygen Trim Burner Control (Pre-Notification Required) (BA303)

Requirements:

- This measure is available for HVAC (BA303a) or process (BA303b) applications for installing a new steam or non-condensing hydronic boiler, or retrofitting an existing steam or hydronic boiler, with oxygen trim burner control.
- HVAC boilers must operate (be enabled) a minimum of 3,000 hours per year (these are operating hours, not full-load hours).
- Process boilers must operate (be enabled) a minimum of 4,000 hours per year (these are operating hours, not full-load hours).
- Hospitals or universities whose boiler operates year-round may be eligible for the higher incentive rate process boiler (BA303b) measure.
- New condensing boilers are not eligible for this measure.
- This measure cannot be combined with the Boiler Linkageless (Parallel Positioning) Burner Controls (BA304) measure, however the project may be eligible for the Boiler Combination Linkageless and Oxygen Trim Burner Controls (BA305) measure instead of this measure if both types of controls are being installed.
- If implementation of oxygen trim burner control is being undertaken to comply with environmental or other regulations or code, the new or retrofitted boiler is not eligible for this measure.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the current burner controls.
- Documentation must be included with the Final Application sufficient to verify the following:
  - » Rated heat input capacity (MBH) of all boilers in the boiler plant.
  - » Peak facility or process heating demand (MBH).
  - » Boiler operating schedule.
- Incentive is based on the rated heat input capacity (MBH) of the new or retrofitted boiler, and the incentive rate is higher for process boilers.
- This measure qualifies for retrofit applications, and for new construction applications for new steam and non-condensing hydronic boilers.

Boiler Linkageless (Parallel Positioning) Burner Controls (Pre-Notification Required) (BA304)

Requirements:

- This measure is available for process applications (BA304b) for installing a new steam or non-condensing hydronic boiler, or retrofitting an existing HVAC (BA304a) or process (BA304b) steam or hydronic boiler, with linkageless (parallel positioning) burner controls.
- HVAC boilers must operate (be enabled) a minimum of 3,000 hours per year (these are operating hours, not full-load hours).
- Process boilers must operate (be enabled) a minimum of 4,000 hours per year (these are operating hours, not full-load hours).
- Hospitals or universities whose boiler operates year-round may be eligible for the higher incentive rate process boiler (BA304b) measure.
- This measure cannot be combined with Boiler Oxygen Trim Burner Control (BA303) measure, however the project may be eligible for the Boiler Combination Linkageless and Oxygen Trim Burner Controls (BA305) measure instead of this measure if both types of controls are being installed.
- New condensing boilers are not eligible for this measure.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the current burner controls.
- Documentation must be included with the Final Application sufficient to verify the following:
  - » Rated heat input capacity (MBH) of all boilers in the boiler plant.
  - » Peak facility or process heating demand (MBH).
  - » Boiler operating schedule.
- Incentive is based on the rated heat input capacity (MBH) of the new or retrofitted boiler, and the incentive rate is higher for process boilers.
- This measure qualifies for retrofit applications, and for new construction applications for new process (non-HVAC) steam and non-condensing hydronic boilers.

Boiler Combination Linkageless and Oxygen Trim Burner Controls (Pre-Notification Required) (BA305)

Requirements:

- This measure is available for HVAC (BA305a) or process (BA305b) applications for installing a new steam or non-condensing hydronic boiler, or retrofitting an existing steam or hydronic boiler, with both linkageless and oxygen trim burner controls.
- Must meet the individual requirements of Boiler Linkageless (Parallel Positioning) Burner Controls (BA304) and Boiler Oxygen Trim Burner Control (BA303) measures except for new construction application eligibility, which is specified below.
- Hospitals or universities whose boiler operates year-round may be eligible for the higher incentive rate process boiler (BA305b) measure.
- Incentive is based on the rated heat input capacity (MBH) of the new or retrofitted boiler, and the incentive rate is higher for process boilers.
- This measure qualifies for retrofit applications, and for new construction applications for new steam and non-condensing hydronic boilers.

Boiler Outdoor Reset Control (Retrofit) (Pre-Notification Required) (BA306)

Requirements:

- This measure is available for adding outdoor air temperature reset or cutout control to existing hydronic boiler plants for space heating applications.
- A new boiler with outdoor reset control is not eligible for this measure.
- The system must be set so that the minimum temperature is not more than 10 degrees Fahrenheit above manufacturer's recommended minimum return water temperature.
- This measure is available for one outdoor air reset controller per boiler plant.
- Facilities with existing outdoor air reset or cutout control on existing boiler loops (i.e., primary) or existing building heating loops (i.e., secondary) are not eligible for this measure.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the current boiler controls.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Rated heat input capacity (MBH) of all boilers in the boiler plant.
  - Peak facility heating demand (MBH).
  - Implementation of outdoor reset control strategy as specified above, including sequence of operation.
- Incentive is based on the total rated heat input capacity (MBH) of the controlled boilers excluding backup and redundant boilers (see Building Automation System – General Requirements for definition).
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Basic Snow/Ice Melt Controls (Retrofit) (Pre-Notification Required) (BA307)

Requirements:

- This measure is available for adding a snow/ice melt controller to existing natural gas hydronic boiler heated systems used to melt snow and ice on exterior surfaces like walkways, driveways, ramps, bridges, and parking lots.
- Existing snow/ice melt system must maintain the slab temperature at 40 degrees Fahrenheit or above during idle periods.
- Snow/ice melt systems already controlled by operable moisture sensors are not eligible for this measure.
- Snow/ice melt systems must be operated the entire winter period.
- The new snow/ice melt system controller must be controlled by both exterior temperature and moisture sensors located in the concrete slab.
- In idle mode, the slab temperature is to be maintained at approximately 32 degrees Fahrenheit.
- During a moisture event, as identified by the moisture sensor located in the slab, the slab temperature is to be raised to approximately 40 degrees Fahrenheit.
- Care must be taken when locating the moisture sensor in the concrete slab to avoid "false positive" moisture events like spilled fluids, wet feet, or low areas prone to water ponding.
- New snow/ice melt systems are not eligible for this measure.
- Documentation must be included with the Pre-Notification Application sufficient to verify the current control strategy for the existing snow/ice melt system.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Area of the controlled space (ft^2).
  - Implementation of the snow/ice melt control strategy as specified above.
- The incentive is based on the area of the controlled space (ft^2).
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Enhanced Snow/Ice Melt Controls (Pre-Notification Required) (BA308)

Requirements:

- This measure is available for adding an enhanced snow/ice melt controller to an existing or new natural gas hydronic boiler heated system used to melt snow and ice on exterior surfaces like walkways, driveways, ramps, bridges, and parking lots.
- For retrofit applications, the existing snow/ice melt system must maintain the slab temperature at 40 degrees Fahrenheit or above during idle periods.
- The proposed snow/ice melt system must be controlled by both exterior temperature and moisture sensors located in the concrete slab and be programmed to turn off completely, not idled, when precipitation is not present.
- BAS must gather weather forecast information and engage snow/ice melt system to maintain an idle mode slab temperature of approximately 32 degrees Fahrenheit for approximately eight hours before the predicated precipitation event hours.
- During a moisture event, as identified by the moisture sensor located in the slab, the slab temperature is to be raised to approximately 40 degrees Fahrenheit.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the current control strategy for the existing snow/ice melt system.
- Documentation must be included with the Final Application sufficient to verify the following:
  - » Area of the controlled space (ft^2).
  - » Implementation of the snow/ice melt control strategy as specified above.
- The incentive is based on the area of the controlled space (ft^2).
- This measure qualifies for new construction and retrofit applications.

Makeup Air Handling Unit Controls

Modulating Burner on Makeup Air Handling Unit (Pre-Notification Required) (BA309)

Requirements:

- This measure is available for installing a new direct-fired burner with modulating burner control in an existing 100% outside air direct- or indirect-fired natural gas makeup air handling unit (MAU), or installing a new MAU with these features and capabilities.
- For retrofit applications, the existing 100% outside air makeup air handling unit (MAU) must have a burner modulation ratio less than or equal to 3:1.
- The new burner must have a modulation ratio greater than or equal to 10:1.
- Only MAUs serving manufacturing processes (non-HVAC) or commercial kitchens in hotels, schools, or hospitals are eligible for this measure.
- In commercial kitchen applications, the MAU must be coupled to an exhaust hood.
- For process applications, the facility must be primarily heated with 100% outside air MAUs (not unit heaters or through other means); buildings that use other space heating equipment (e.g. unit heaters, rooftop units, boilers, infrared heaters) are not eligible for this measure.
- Commercial kitchens that have a demand-controlled ventilation (DCV) system are not eligible for this measure.
- The retrofitted or new MAU must monitor and be controlled by the discharge air temperature (not the space temperature thermostat).
- The MAU must have a minimum operating time of 50 hours per week during the heating season.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the existing makeup air handling unit (MAU) burner design.
- Documentation must be included with the Final Application sufficient to verify the following:
  - » For process applications, no space heating equipment is being utilized other than a 100% outside air MAU(s).
  - » For commercial kitchen applications, the MAU is coupled to an exhaust hood and DCV is not present.
  - » Rated heat input capacity (MBH) of the new burner.
  - » Heating season operating time (hours/week) of the new burner.
  - » The new burner is controlled as specified above.
- The incentive is based on the rated heat input capacity of the MAU (MBH), and the incentive rate varies depending on the operating hours per week.
- This measure qualifies for new construction and retrofit applications.

Advanced Air Distribution and Energy Recovery

General Requirements

- Must be a Consumers Energy electric and/or natural gas customer as indicated for each measure.
- Specifications (e.g. specification sheet) must be included with the Incentive Application for all new measure related products and equipment.
- Unless otherwise noted, incentives are not available for backup and redundant equipment and systems (see definition under "Project Requirements - Project and equipment types that are NOT eligible for incentives..." on page 8 of this Catalog).

Advanced Air Distribution Systems

Convert Air Handling System from Constant Volume (CV) to Variable Air Volume (VAV) Control (Pre-Notification Required) (AE101)

Requirements:

- This measure is available for converting existing constant volume air handling systems serving conditioned spaces (both heated and air conditioned) into variable air volume (VAV) air handling systems.
- At a minimum, variable frequency drives must be installed on all fans in the system and VAV boxes with hydronic reheat must be added to a minimum of four zones; adding a VFD and controls to a constant volume AHU without adding VAV boxes with hydronic reheat is not eligible for this measure.
- Controls must be added or modified for the new VAV operating conditions and all zone sensors must be upgraded to digital controls.
- This measure cannot be combined with any VFD/VSD measures for HVAC Fans or HVAC Pumps for VFDs/VSDs required to be installed on fans and pumps to enable the CV to VAV conversion.
- Existing single zone air handling equipment is not eligible for this measure (e.g. classroom unit ventilators, fan coil units, etc.).
- Documentation must be included with the Pre-Notification Application sufficient to verify the following:
  - » Size of the controlled area (ft^2), including a scaled floor plan with controlled areas identified.
  - » Existing air handling system design.
  - » Current air handling system control strategy.
- Documentation must be included with the Final Application sufficient to verify implementation of VAV air handling system control strategy as specified above, including sequence of operation and mechanical drawings.
- The incentive is calculated per square foot (ft^2) of area controlled, and the incentive rate varies depending on whether customer has a Consumers Energy electric account, natural gas account, or both/combo account.
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

HVAC Energy Recovery

Enthalpy Wheel Energy Recovery Units (Natural Gas) (Pre-Notification Required) (AE102)

Requirements:

- This measure is available for Consumers Energy natural gas customers installing an enthalpy-based energy recovery unit (e.g. enthalpy wheel) to recover waste energy out of the exhaust air stream and utilize it to temper the incoming outside air stream before it is mechanically heated.
- The area served must be heated with Consumers Energy natural gas.
- The new energy recovery unit:
  - » Must have a minimum of 70% total winter outside air wheel effectiveness, or the highest air volume flow rate through the enthalpy wheel must have a total winter effectiveness above 70%.
  - » Should be equipped with an air stream bypass to operate in economizer mode, when applicable.
  - » Must have a design supply fan air volume flow rate between 250 and 50,000 CFM; the design supply fan air volume flow rate is the supply air volume flow rate being introduced into the space, as defined in AHRI Standard 1060-2005.
- For new construction applications, the new energy recovery unit is not eligible for this measure if energy recovery is required by code (consult ASHRAE 90.1-2013).
- Documentation must be included with the Final Application sufficient to verify the following for the new energy recovery unit:
  - » Model number.
  - » Design supply fan air volume flow rate (CFM).

- The incentive is based on the system's design supply fan air volume flow rate (CFM).
- This measure qualifies for retrofit applications and may qualify for new construction applications if energy recovery is not required by code (consult ASHRAE 90.1-2013 and local building codes).

Fixed-Plate Air-to-Air Energy Recovery Units (Natural Gas) (Pre-Notification Required) (AE103)

Requirements:

- This measure is available for Consumers Energy Natural gas customers installing a fixed-plate air-to-air energy recovery unit to recover waste heat out of the exhaust air stream(sensible heat only) and utilize it to temper the incoming makeup outside air stream before it is mechanically heated.
- The area served must be heated with Consumers Energy natural gas.
- The new energy recovery unit:
  - Must have a minimum of 55% sensible winter effectiveness (temperature transfer efficiency).
  - Should be equipped with an air stream bypass to operate in economizer mode, when applicable.
  - Must have a design supply fan air volume flow rate between 250 and 50,000 CFM; the design supply fan air volume flow rate is the supply air volume flow rate being introduced into the space, as defined in AHRI Standard 1060-2005.
- For new construction applications, the new energy recovery unit is not eligible for this measure if energy recovery is required by code (consult ASHRAE 90.1-2013).
- Documentation must be included with the Final Application sufficient to verify the following for the new energy recovery unit:
  - Model number.
  - Design supply fan air volume flow rate (CFM).
- The incentive is based on the system's design supply fan air volume flow rate (CFM).
- This measure qualifies for retrofit applications and may qualify for new construction applications if energy recovery is not required by code (consult ASHRAE 90.1-2013 and local building codes).

Dust Collector Exhaust Air Energy Recovery (Natural Gas) (Pre-Notification Required) (AE104)

Requirements:

- This measure is available for Consumers Energy natural gas customers installing an advanced filtration system for air exhausted from dust collectors and other particulate-heavy processes and recirculating filtered air, that was previously exhausted directly outside, within the facility.
- Existing mist collectors/eliminators, and existing or new welding fume hoods, are also eligible for this measure.
- The exhaust air volume flow rate reduction must exceed 1,000 CFM.
- The recovered and recirculated exhaust air must serve a space heated with Consumers Energy natural gas and result in a corresponding decrease in the amount of fresh air being brought into the facility.
- Reductions in general exhaust (such as roof-mounted, non-ducted exhaust fans) are not eligible for this measure, however it may be eligible for another prescriptive measure or a custom incentive.
- For new construction applications, mist collectors/eliminators and air filtration/recirculation systems that are required to be installed by state or local code are not eligible for this measure.
- It is the customer's responsibility to ensure that the air reintroduced to the heated space meets air quality standards for the intended purpose; changes to the building's airflow must comply with the requirements of the local and/or state authority having jurisdiction.
- If documentation sufficient to verify the exhaust air volume flow rate has been reduced to zero cannot be provided, post-construction operational performance verification (complete post-construction volume flow rate testing) by a certified Testing, Adjusting and Balance (TAB) Agent is required to be eligible for these measures; TAB agent shall be an independent testing, adjusting, and balancing professional services provider certified by either AABC (Associated Air Balance Council) or NEBB (National Environmental Balancing Bureau).
- For retrofit applications:
  - The affected area must always utilize 100% outside air prior to installation of the filtration system.
  - If the existing ventilation system fan is controlled by a VFD, pre-retrofit operational performance verification (minimum of seven continuous days of complete pre-construction volume flow rate testing) by a certified Testing, Adjusting and Balance (TAB) Agent is required to be eligible for these measures; TAB agent shall be an independent testing, adjusting, and balancing professional services provider certified by either AABC (Associated Air Balance Council) or NEBB (National Environmental Balancing Bureau).

- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify whether the affected area currently always utilizes 100% outside air.
- The following must be included with the Final Application:
  - Documentation sufficient to verify the fan rated air volume flow rate (CFM).
  - Documentation sufficient to verify the post-construction exhaust air volume flow rate has been reduced to zero or a post-construction operational performance verification report prepared by a certified TAB agent as specified above.
  - For retrofit applications, if the existing fan is VFD controlled, pre-retrofit operational performance verification report prepared by a certified TAB agent as specified above.
- The incentive is based on the measured exhaust air volume flow rate reduction (CFM) of the dust collector or other device; reduction cannot exceed the rated air volume flow rate of the equipment (CFM).
- This measure qualifies for retrofit applications and may qualify for new construction applications if installation of an air filtration/recirculation system is not required by code (consult ASHRAE 90.1-2013 and local building codes).

Boiler Efficiency Improvements

Boiler Stack Economizer (Pre-Notification Required) (AE105, AE106)

Requirements:

- These measures are available for HVAC (AE105) or process (AE106) applications to install an economizer on the exhaust stack of boilers to recover waste heat to preheat the boiler's feedwater.
- Both traditional and condensing stack economizers are eligible for these measures.
- HVAC boilers must operate (be enabled) a minimum of 3,000 hours per year (these are operating hours, not full-load hours).
- Process boilers must operate (be enabled) a minimum of 4,000 hours per year (these are operating hours, not full-load hours).
- Hospitals or universities whose boiler operates year-round may be eligible for the higher incentive rate process boiler (AE106) measure.
- Cannot be combined with the Waste Heat Recovery for Steam Boiler Makeup, Domestic, and Process Water Heating (AE107) measure.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Rated heat input capacity (MBH) of all boilers in the boiler plant.
  - Peak facility or process heating demand (MBH).
  - Boiler operating schedule.
  - Flue gas temperature at full firing rate, at the inlet and outlet of the economizer or pre- and post-retrofit, with the percent excess air held constant.
- The incentive is based on the boiler's primary application (HVAC or process), rated heat input capacity (MBH), and the achieved flue gas temperature decrease.
- These measures qualify for new construction and retrofit applications.

Waste Heat Recovery for Steam Boiler Makeup, Domestic, and Process Water Heating (Pre-Notification Required) (AE107)

Requirements:

- This measure is available for the installation of equipment (e.g. heat exchanger or steam condensate recovery equipment) to transfer waste heat to steam boiler makeup, domestic and/or process (non-HVAC) water.
- The waste heat source must be discarded heat that would otherwise remain unused, not a fired or powered heater.
- Cannot be combined with either of the Boiler Stack Economizer (AE105, AE106) measures.
- For retrofit steam boiler makeup water applications, the following must be included with the Pre-Notification Application:
  - One year of makeup water usage data (gal).
  - One year of boiler inlet water temperature measurement data.
- The following must be included with the Final Application:
  - One week of post-installation storage tank and/or heat exchanger inlet and outlet water temperature measurement data, as appropriate
  - One week of post-installation flow measurement data (GPM).
- The incentive is based on the amount of energy recovered per year (MMBtu/yr.) per the following formula:

$$Q_{recovered} = C_1 \times V \times (T_{outlet} - Ti_{nlet}) / (n_{boiler})$$

Where:

$Q_{recovered}$ = amount of energy recovered in units of 1,000,000 Btu/yr., or MMBtu/yr.

C_1 = conversion constant, 8.34 lb./gal.

V = annual water volume flow rate. gal./yr.

T_{outlet} = outlet water temperature, °F

T_{inlet} = inlet water temperature, °F

n_{boiler} = water heating system efficiency, 80%

- This measure qualifies for new construction and retrofit applications.

Automatic Boiler Blow-Down Reduction (Pre-Notification Required) (AE108)

Requirements:

- This measure is available for the installation of equipment that results in reduced blow-down for a steam boiler.
- Project must not result in boiler water impurity concentration being raised to levels that will cause scaling.
- Simple changes in flow rate without capital expenditure (e.g. system modifications, changes in chemical treatment, and blow-down reductions resulting from improved condensate recovery) are not eligible for this measure.
- For retrofit applications, the following must be included with the Pre-Notification Application:
  - One year of boiler makeup water usage data (gal).
  - One year's average of water tests, provided by the site water treatment service, measuring parameters used to obtain the cycles of concentration (ratio of blow-down conductivity to make up water conductivity).
- The following must be included with the Final Application:
  - One week of post-installation boiler makeup water usage data (GPM).
  - One week of post-installation cycles of concentration data provided by the site water treatment service.
- Incentive is based on the annual volume of reduced blow-down (gal./yr.) per the following formula:

  VReduction = M × {1 - [(Cp × (Cx-1)] / [Cx × (Cp-1)]}

  Where:

  VReduction = Annual boiler blow-down volume flow reduced, gal./yr.

  M = Metered annual make-up water volume flow rate before upgrade, gal./yr.

  Cx = Cycles of concentration before upgrade (annual average)

  Cp = Cycles of concentration after upgrade
- This measure qualifies for new construction and retrofit applications.

Grocery Store Refrigeration Equipment Condenser Waste Heat Recovery

Grocery Store Refrigeration Equipment Condenser Waste Heat Recovery (Pre-Notification Required) (AE109, AE110)

Requirements:

- This measure is available for installing new waste heat recovery equipment on condensers for grocery store refrigeration equipment (e.g. case coolers, freezers, open dairy/meat cases, walk-in coolers, etc.) to recover waste heat and utilize it reduce natural gas use for space heating (HVAC) (AE110) or domestic water heating (DWH) (AE109).
- The recovered waste heat must be transferred to the domestic water heating or HVAC system. In either case, there must be sufficient need for this waste heat, and it must result in a decrease in natural gas use.
- To be eligible for these measures, at least 30% of the refrigeration system's waste heat must be utilized for space heating (HVAC) or domestic water heating (DWH) and the waste heat recovery heat exchanger must be designed to accommodate at least 70% of the recoverable refrigeration load.
- The condenser from which waste heat is proposed to be recovered must be located where the heat is not used for building heat (typically outside) or other purposes (i.e., greater than 95% wasted).
- The waste heat recovery system shall include a new heat exchanger, installed in the HVAC duct or the cold water supply to the domestic water heating system, to reclaim the heat from the refrigeration system condenser.
- For domestic water heating applications, the installation of pre-heat tanks is expected, which is recommended to be located before the domestic water heater to better utilize the waste heat, especially when there is low demand for hot water.
- Implementation of these measures must result in a decrease in natural gas use (must be a Consumers Energy natural gas customer).
- Documentation must be included with the Pre-Notification Application sufficient to verify the following:
  - System proposed to utilize the waste heat, including heating load.
  - Location of the existing or proposed condenser.
- Documentation must be included with the Final Application sufficient to verify the nameplate (nominal) cooling capacity (tons) of the condenser.
- Incentive is based on the nameplate (nominal) cooling capacity (tons) of the condenser, and the incentive rate is higher for DWH vs. HVAC applications.
- These measures qualify for retrofit applications and may qualify for new construction applications if condenser heat recovery is not required by code (consult ASHRAE 90.1-2013).

CRAC Air-Side Economizer

Table 12: Equipment Class by Return Temperature

Equipment Class	Proposed or Actual Operating Return Temperature
1	Temperature ≤ 75°F
2	Temperature > 75°F to ≤ 85°F
3	Temperature > 85°F to ≤ 95°F

Glycol Economizer for Data Center, Telecom and Computer Room Applications (CRAC) (Pre-Notification Required) (AE201)

Requirements:

- This measure is available for installing a glycol "free cooling" economizer for mechanically DX cooled data center, telecom, and computer room applications (CRAC) to cool the space with "free cooling" fluid and eliminate DX cooling during periods with milder outside conditions.
- Installing new DX CRAC units or retrofitting existing DX CRAC units, with a glycol economizer, is eligible for this measure.
- CRAC return air temperature cannot exceed 95 degrees Fahrenheit.
- Reference Table 12 for definitions of equipment classes by return temperature applicable to specific measures (AE201a - AE201c).
- For retrofit applications, the existing DX CRAC unit cannot have an economizer, regardless of whether it is functional.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify whether the existing DX CRAC unit has an economizer.
- Documentation must be included with the Final Application sufficient to verify the following:
  - » Nameplate (nominal) cooling capacity of the CRAC unit (MBH).
  - » Implementation of economizer control strategy as specified above.
- Incentive is based on the nameplate (nominal) cooling capacity (MBH) of the CRAC unit.
- This measure qualifies for retrofit applications and may qualify for new construction applications if an economizer is not required by code (consult ASHRAE 90.1-2013).

Fresh Air Economizer for Data Center, Telecom and Computer Room Applications (CRAC) (Pre-Notification Required) (AE202)

Requirements:

- This measure is available for installing a fresh air "free cooling" economizer for mechanically DX cooled data center, telecom, and computer room applications (CRAC) to draw in outside air to cool the space directly with fresh air and eliminate DX cooling during periods with milder outside conditions.
- Installing new DX CRAC units or retrofitting existing DX CRAC units, with a fresh air economizer, is eligible for this measure.
- Applications where high humidity control is required are not eligible for this measure.
- CRAC return air temperature cannot exceed 95 degrees Fahrenheit.
- Reference Table 12 for definitions of equipment classes by return temperature applicable to specific measures (AE202a - AE202c).
- For retrofit applications, existing DX CRAC unit cannot have an economizer, regardless of whether it is functional.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify whether the existing DX CRAC has an economizer.
- Documentation must be included with the Final Application sufficient to verify the following:
  - » Nameplate (nominal) cooling capacity of the CRAC unit (MBH).
  - » Implementation of economizer control strategy as specified above.
- Incentive is based on the nameplate (nominal) cooling capacity (MBH) of the CRAC unit.
- This measure qualifies for retrofit applications and may qualify for new construction applications if an economizer is not required by code (consult ASHRAE 90.1-2013).

Pumped Refrigerant Economizer for Data Center, Telecom and Computer Room Applications (CRAC) (Pre-Notification Required) (AE203)

Requirements:

- This measure is available for installing a pumped refrigerant "free cooling" economizer for mechanically DX cooled data center, telecom, and computer room applications (CRAC) to cool the space with "free cooling" fluid and eliminate DX cooling during periods with milder outside conditions.
- Installing new DX CRAC units or retrofitting existing DX CRAC units, with a pumped refrigerant economizer, is eligible for this measure.
- CRAC return air temperature cannot exceed 95 degrees Fahrenheit.
- Reference Table 12 for definitions of equipment classes by return temperature applicable to specific measures (AE203a - AE203c).
- For retrofit applications, the existing DX CRAC unit cannot have an economizer, regardless of whether it is functional.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify whether the existing DX CRAC has an economizer.
- Documentation must be included with the Final Application sufficient to verify the following:

  - » Nameplate (nominal) cooling capacity of the CRAC unit (MBH).
  - » Implementation of economizer control strategy as specified above.
- Incentive is based on the nameplate (nominal) cooling capacity (MBH) of the CRAC unit.
- This measure qualifies for retrofit applications and may qualify for new construction applications if an economizer is not required by code (consult ASHRAE 90.1-2013).

Air-to-Air Heat Exchanger Economizer for Data Center, Telecom and Computer Room Applications (CRAC) (Pre-Notification Required) (AE204)

Air-to-air heat exchanger economizers do not have the potential humidification penalties associated with directly using outside air to cool a space.

Requirements:

- This measure is available for installing an air-to-air heat exchanger "free cooling" economizer for mechanically DX cooled data center, telecom, and computer room applications (CRAC) to draw in outside air to indirectly cool the space with outside air and eliminate DX cooling during periods with milder outside conditions.
- The new heat exchanger sensible effectiveness must be at least 55%.
- Installing new DX CRAC units or retrofitting existing DX CRAC units, with an air-to-air heat exchanger economizer, is eligible for this measure.
- For retrofit applications, existing DX CRAC unit cannot have an economizer, regardless of whether it is functional.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify whether the existing DX CRAC has an economizer.
- Documentation must be included with the Final Application sufficient to verify the following:
  - » Nameplate (nominal) cooling capacity of the CRAC unit (MBH).
  - » Implementation of economizer control strategy as specified above.
- Incentive is based on the nameplate (nominal) cooling capacity (MBH) of the CRAC unit.
- This measure qualifies for retrofit applications and may qualify for new construction applications if an economizer is not required by code (consult ASHRAE 90.1-2013).

Water-Side Economizer

Water-Side Economizer (Pre-Notification Required) (AE205, AE206)

Requirements:

- These measures are available for installing equipment and controls to implement a water-side "free cooling" economizer control strategy for an air-cooled (AE206) or water-cooled (AE205) chiller.
- The facility must have a need for chilled water throughout the year, and the qualified chiller must be required to operate during the winter period.
- The water-side "free cooling" economizer control strategy must prevent mechanical cooling (e.g. chiller's compressor) from operating when the outside air temperature is below 45 degrees Fahrenheit.
- For new construction applications, only industrial process cooling and refrigerated warehouse refrigeration system applications are eligible for these measures.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the current control strategy for the affected existing chiller.
- Documentation must be included with the Final Application sufficient to verify the following:
  - » Nameplate (nominal) cooling capacity (tons) of the qualified chiller.
  - » Implementation of economizer control strategy as specified above.
  - » The facility has a need for chilled water throughout the year.
  - » The qualified chiller will operate during the winter period.
- The incentive is based on the reduction in nameplate (nominal) chiller plant cooling capacity required when the water-side economizer is active, and the incentive rate is higher for air-cooled vs water-cooled chillers.
- These measures qualify for retrofit applications, and industrial process cooling and refrigerated warehouse refrigeration systems may qualify for new construction applications if an economizer is not required by code (consult ASHRAE 90.1-2013).

HVAC and Process Equipment Condenser Waste Heat Recovery

HVAC and Process Equipment Condenser Waste Heat Recovery (Pre-Notification Required) (AE207 – AE210)

Requirements:

- These measures are available for installing air-cooled (AE207, AE209) or water-cooled (AE206, AE208) condenser heat recovery technology on HVAC or process (non-HVAC) equipment (e.g. RTU, chiller, natatorium (pool) dehumidification system) to recover waste heat and utilize it for domestic water heating.
- The heat recovery system may either be packaged within the new HVAC unit (e.g. heat recovery condenser) or may be retrofitted to existing HVAC equipment using heat exchangers, reconfigured piping, additional pumps, storage tanks and/or controls upgrades.
- The installation of domestic water pre-heat tanks is expected, which are recommended to be located before the domestic water heater to better utilize the waste heat, especially when there is low demand for hot water.

- The facility must have an adequate need for the recovered waste heat (e.g. facilities with high domestic hot water usage such as restaurants, health clubs, natatoriums (pools), hospitals, hotels, industrial processes, or office buildings greater than 100,000 ft^2).
- Incentives are only available for heat recovery capacity that will be fully utilized; oversized systems will not receive incentives for recovered waste heat that will not be utilized.
- Implementation of these measures must result in a decrease in either natural gas or electric use; additional benefits may include increased capacity in the cooling equipment.
- Grocery store refrigeration equipment condenser waste heat recovery is not eligible for these measures, however it may be eligible for one of the Grocery Store Refrigeration Equipment Condenser Waste Heat Recovery (AE109, AE110) measures.
- These measures may be combined with high-efficiency air conditioning equipment measures.
- For new construction applications, the peak chiller plant load must be less than 400 tons to be eligible for these measures.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the type of cooling for the existing condenser.
- A load match study comparing the waste heat energy proposed to be recovered and the domestic water heating load must be completed, and the report must be included with the Final Application.
- Incentive will be based on the lower of either: 1) the maximum recoverable waste heat (tons) from the cooling equipment, or 2) the maximum domestic water heating load (tons) from the load match study, and the incentive rate varies depending on whether condenser is air-cooled or water-cooled and the type of water heating system utilizing the waste heat (natural gas or electric).
- These measures qualify for retrofit applications and they may qualify for new construction applications if the peak chiller plant load is less than 400 tons and condenser heat recovery is not required by code (consult ASHRAE 90.1-2013).

Operating Room ACH Setback

Operating Room Air Changes per Hour (ACH) Setback (Retrofit) (Pre-Notification Required) (AE211, AE212)

Requirements:

- These measures are available for reducing the amount of air changes per hour (ACH) occurring within an existing hospital operating room during its unoccupied times, which is typically achieved through installation of new or upgraded controls, variable speed drives, and airflow monitoring.
- Operating room must have its amount of air changes per hour (ACH) reduced by at least 11 during unoccupied periods at the time of project completion.
- For reference, air changes per hour, ACH = Room Volume (ft^3) / (CFM x 60).
- If existing BAS is not capable of logging airflow into the operating room, operational performance verification (complete pre-construction and post-construction volume flow rate testing) by a certified Testing, Adjusting and Balance (TAB) Agent is required to be eligible for these measures; TAB agent shall be an independent testing, adjusting, and balancing professional services provider certified by either AABC (Associated Air Balance Council) or NEBB (National Environmental Balancing Bureau).
- Operating room must be unoccupied on average at least 15 hours daily and current ventilation rate must be constant, whether the space is occupied or unoccupied.
- Air handler serving the operating room must be single-zone and serve only one operating room.
- For measures AE211a, AE211b, AE212a and AE212b, space heating for operating room must be provided via Consumers Energy natural gas.
- These measures cannot be combined with an HVAC or process fan VFD or integrated variable speed motor (e.g. ECM) measure.
- Documentation must be included with the Pre-Notification Application sufficient to verify the following:
  - Operating room schedule.
  - Operating room size (ft^2).
  - Existing air handling system controls.
- Documentation must be included with the Final Application sufficient to verify the pre- and post-retrofit air changes per hour during unoccupied periods, as specified above.
- Incentive is calculated based upon the area of the operating room (ft^2), and the incentive rate varies depending on the percentage of outside air utilized for ventilation (20% or 100%) and whether customer has a Consumers Energy electric account, natural gas account, or both/combo account.
- These measures qualify for retrofit applications, but do not qualify for new construction applications.

Laboratory

General Requirements

- Must be a Consumers Energy electric and/or natural gas customer as indicated for each measure.
- Specifications (e.g. specification sheet) must be included with the Incentive Application for all new measure related products and equipment.
- Unless otherwise noted, incentives are not available for backup and redundant equipment and systems (see definition under "Project Requirements - Project and equipment types that are NOT eligible for incentives..." on page 8 of this Catalog).
- Only commercial and industrial laboratory applications (minimum 2,200 hours per year unless otherwise noted) are eligible for these measures.
- The updated system must meet all state and local codes and/or the requirements of the authority having jurisdiction, as well as the requirements of the customer's environmental, health and safety department.
- None of the following measures may be combined:
  - » Reduced/Optimized Lab Air Changes per Hour (ACH) Rate (LB102)
  - » Lab Fume Hood Ventilation Reduction (Sash Location) (LB104)
  - » VAV Lab Fume Hood Occupancy Sensor Control (w/VAV Ventilation System) (LB105)
  - » Low Flow VAV Lab Fume Hood (LB106)

Automatic VAV Lab Fume Hood Sash Closure System (Pre-Notification Required) (LB101)

Requirements:

- This measure is available for installing an automatic fume hood sash closure system for high fume density labs (i.e., hood air flow drives lab airflow rate) with a 100% outside air variable air volume (VAV) ventilation system.
- It is recommended that the automatic fume hood sash closure system have features such as: a sensor to stop sash closure before it hits any protrusion and the option to open sash based on occupancy activation of buttons (user option), or user selectable time delay, prior to sash closing; other typical features include sash positioning system with touch over-ride (up or down), failure alerts in any desired position and monitoring options.
- For measures LB101a and LB101c, space heating for lab must be provided via Consumers Energy natural gas.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the following for the existing ventilation system:
  - » System design.
  - » Control strategy.
- Documentation must be included with the Final Application sufficient to verify the following:
  - » Horizontal linear feet of sash opening.
  - » Lab operating schedule.
- Incentive is based on horizontal linear feet of sash opening, and the incentive rate varies depending on whether customer has a Consumers Energy electric account, natural gas account, or both/combo account.
- This measure qualifies for new construction and retrofit applications.

Reduced/Optimized Lab Air Changes per Hour (ACH) (Retrofit) (Pre-Notification Required) (LB102)

A standard/baseline design practice in many laboratory and vivarium spaces is for there to be 10 to 12.5 air changes per hour (ACH). In the absence of code guidance, standard practice is to use rules of thumb and legacy designs to set the air change rate. If the fume-hoods are operating safely, a lower air change rate may be able to be maintained to control spill events. More current lab standards are recommending 4 to 6 ACH, which when implemented may save large amounts of heating, cooling, and ventilation energy as compared to higher air change rates.

Requirements:

- This measure is available for installing equipment and/or controls that results in reduced air changes per hour (ACH) and a measurable reduction in ventilation air volume for existing labs with a 100% outside air variable air volume (VAV) ventilation system.
- For reference, air changes per hour, ACH = Room Volume (ft^3) / (CFM x 60).
- Decreases in ventilation rates must be stamped by a Professional Engineer licensed in the State of Michigan.
- The following must be included with the Pre-Notification Application:

- Documentation sufficient to verify the following for the existing ventilation system:
  - Operating schedule.
  - System Design.
  - Control Strategy.
  - One-page narration of the project's scope of work.
- Operational performance verification (complete pre- and post-retrofit air volume flow rate testing) by certified Testing, Adjusting and Balance (TAB) Agent is required to be eligible for this measure; TAB agent shall be an independent testing, adjusting, and balancing professional services provider certified by either AABC (Associated Air Balance Council) or NEBB (National Environmental Balancing Bureau).
- An operational performance verification report prepared by a certified TAB agent, as specified above, must be included with the Final Application.
- The incentive is based on the average annual reduction in ventilation air volume flow rate (CFM), and the incentive rate varies depending on whether customer has a Consumers Energy electric account, natural gas account, or both/combo account.
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

VAV Lab Fume Hood Sash Stops (Electric) (Pre-Notification Required) (LB103)

Sash stops prevent the fume hood sash from fully opening. The stops are typically placed at 18 inches, thus blocking the top two-fifths of the opening. In most cases the stops are designed for easy override to lift the sash out of the way during setup.

Requirements:

- This measure is available for Consumers Energy electric customers installing sash stops on fume hoods for high fume density labs (i.e., hood air flow drives lab air flow rate) with a 100% outside air variable air volume (VAV) ventilation system.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the following for the existing ventilation system:
  - System design.
  - Control strategy.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Horizontal linear feet of sash opening.
  - Lab operating schedule.
- Incentive is based on horizontal linear feet of sash opening.
- This measure qualifies for new construction and retrofit applications.

Lab Fume Hood Ventilation Reduction (Based on Sash Location) (Retrofit) (Pre-Notification Required) (LB104)

Requirements:

- This measure is available for customers who install state-of- the-art high-efficiency fume hood controls on the hood, and in the supply and exhaust air stream, to provide a constant "face velocity" while varying the air flow volumes for existing high fume density labs (i.e., hood air flow drives lab airflow rate) with a constant volume 100% outside air ventilation system.
- The control strategy must maintain a minimum 100 feet per minute (FPM) face velocity at the sash opening.
- Controls should include an audible and visual alarm if:
  - The sash is open greater than 25% and no occupancy at the hood has been detected for 15 minutes.
  - The sash is open at any position and 100 FPM minimum face velocity is not being maintained at the sash opening.
- Laboratories must have at least three fume hoods that operate a minimum of 2,600 hours per year to be eligible for this measure.
- Existing fume hoods cannot have any variable air volume controls.
- The reduced volume flow rate levels must comply with State and Local codes and/or the requirements of the authority having jurisdiction.
- This measure may be combined with applicable VFD/VSD measures.
- Existing fume hoods must be converted from constant volume exhaust to variable volume exhaust flow rate (VAV) controlled by sash positioning by retrofitting to an existing fume hood or replacing an existing fume hood with a new hood and VAV upgrade package.
- Operational performance verification (complete pre- and post-installation air volume flow rate testing), by a certified Testing, Adjusting and Balance (TAB) Agent is required to be eligible for this measure; TAB agent shall be an independent testing, adjusting, and balancing professional services provider certified by either AABC (Associated Air Balance Council) or NEBB (National Environmental Balancing Bureau).
- Documentation must be included with the Pre-Notification Application sufficient to verify the following for the existing ventilation system:
  - Operating schedule.
  - System design.
  - Control strategy.
- The following must be included with the Final Application:

- Documentation sufficient to verify the face velocity (FPM) at the sash opening.
- Operational performance verification report prepared by a certified TAB agent as specified above.

- Incentive is based on the average annual reduced ventilation air volume flow rate (CFM) (if applicable, baseline prior to VFD installation), and the incentive rate varies depending on whether customer has a Consumers Energy electric account, natural gas account, or both/combo account.
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

VAV Lab Fume Hood Occupancy Sensor Control (Pre-Notification Required) (LB105)

A hood that is unoccupied does not need the same air flow as one with a person at or near its face. Control companies offer an occupancy sensor based two-position control that reduces the face velocity from 100 feet per minute (FPM) to around 60 FPM when unoccupied. These systems are sometimes marketed as a substitute for variable air volume (VAV), but they can be combined with VAV and other technologies. The benefit is assured savings even when the hood is left open.

Requirements:

- This measure is available for installing occupancy sensors and associated controls that will automatically set back the hood face velocity during unoccupied periods for high fume density labs (i.e., hood air flow drives lab airflow rate) with a 100% outside air variable air volume (VAV) ventilation system.
- The new equipment must reduce the face velocity of a hood during unoccupied times from at least 100 feet per minute (FPM), to at most 75 FPM, and reduce the space's supply makeup air volume flow rate (CFM) accordingly (common practice is to reduce the face velocity from 100 FPM, which is a typical value required during occupied times, to 60 FPM when the hood is unoccupied).
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the following for the existing ventilation system:
  - System design.
  - Control strategy.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Horizontal linear feet of sash opening.
  - Lab operating schedule.
  - Occupied and unoccupied face velocity (FPM) at the sash opening.
  - Supply makeup air volume flow rate (CFM) reduction during unoccupied times.
- Incentive is based on horizontal linear feet of sash opening, and the incentive rate varies depending on whether customer has a Consumers Energy electric account, natural gas account, or both/combo account.
- This measure qualifies for new construction and retrofit applications.

Low Flow VAV Lab Fume Hood (Pre-Notification Required) (LB106)

Requirements:

- This measure is available for installing low flow fume hoods for high fume density labs (i.e., hood air flow drives lab airflow rate) with a 100% outside air variable air volume (VAV) ventilation system.
- Low flow fume hoods must operate with a maximum face velocity of 60 FPM.
- Proper adjustments must be made to the supply air system to maintain proper laboratory air balance resulting from the reduction in exhaust air volume flow rate (CFM).
- It is critical for the system owner to eliminate the heat effect, which occurs when the heat generation inside a hood exceeds what the volumetric rate of air (CFM) can adequately dilute and can ultimately result in the reversal of airflow through the upper by-pass opening on the hood, pushing contaminated air into the laboratory.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the following for the existing ventilation system:
  - System design.
  - Control strategy.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Horizontal linear feet of sash opening.
  - Lab operating schedule.
  - Face velocity (FPM) at the sash opening.
- Incentive is based on horizontal linear feet of sash opening, and the incentive rate varies depending on whether customer has a Consumers Energy electric account, natural gas account, or both/combo account.
- This measure qualifies for new construction and retrofit applications.

Tune-Up/Maintenance

General Requirements

- Must be a Consumers Energy electric and/or natural gas customer as indicated for each measure.
- Unless otherwise noted, incentives are not available for backup and redundant equipment and systems (see definition under "Project Requirements - Project and equipment types that are NOT eligible for incentives..." on page 8 of this Catalog).

Tune-ups

- Equipment must be installed and fully operational for at least 12 months to be eligible for a tune-up incentive.

Space Heating Boiler Tune-Up (≥ 110 MBH) (TU101)

Requirements:

- This measure is available for completing a tune-up for natural gas space-heating boilers only.
- The minimum boiler rated heat input capacity for measure eligibility is 110 MBH.
- A single boiler with multiple burners is considered one boiler.
- A boiler that is dual fuel is considered one boiler.
- This measure is available once in a 24-month period per boiler.
- The technician must complete "before" and "after" combustion efficiency tests while the boiler is operating at High Fire.
- Burner(s) must be adjusted to show an improvement in combustion efficiency.
- This measure is only available for boilers used in space heating applications; boilers used primarily for domestic hot water, pools, spas, or process (non-HVAC) load are not eligible for this measure, however they may be eligible for another tune-up measure.
- The following must be included with the Final Application:
  - » Date- and time-stamped documentation of the "after" combustion efficiency test results.
  - » Copy of the boiler tune-up checklist prepared by the technician, including documentation of the "before" combustion efficiency test results (sample checklist provided in the Appendix of this Catalog).
- The incentive is per tune-up completed, and the incentive rate varies depending on the rated heat input capacity of the boiler (MBH).

Process Boiler Tune-Up (≥ 300 MBH) (TU102)

Requirements:

- This measure is available for completing a tune-up for natural gas process (non-HVAC) boilers only.
- The minimum boiler rated heat input capacity for measure eligibility is 300 MBH.
- A single boiler with multiple burners is considered one boiler.
- A boiler that is dual fuel is considered one boiler.
- This measure is available once in a 24-month period per boiler.
- The technician must complete "before" and "after" combustion efficiency tests while the boiler is operating at High Fire.
- Burner(s) must be adjusted to show an improvement in combustion efficiency.
- Boilers used primarily for domestic hot water, pools, spas, or space heating are not eligible for this measure, however they may be eligible for another tune-up measure.
- The following must be included with the Final Application:
  - » Date- and time-stamped documentation of the "after" combustion efficiency test results.
  - » Copy of the boiler tune-up checklist prepared by the technician, including documentation of the "before" combustion efficiency test results (sample checklist provided in the Appendix of this Catalog).
- The incentive is per tune-up completed, and the incentive rate varies depending on the rated heat input capacity of the boiler (MBH).

Process Burner Tune-Up (≥ 300 MBH) (TU103)

Requirements:

- This measure is available for completing a tune-up for natural gas manufacturing process (non-HVAC) burners only.
- Direct contact water heaters are not eligible for this measure.
- A burner that is dual fuel is considered one burner.
- This measure is available once in a 24-month period per burner.
- The technician must complete “before” and “after” combustion efficiency tests while the burner is operating at High Fire.
- Burner(s) must be adjusted to show an improvement in combustion efficiency.
- The minimum burner rated heat input capacity for measure eligibility is 300 MBH.
- The following must be included with the Final Application:
  - Date- and time-stamped documentation of the “after” combustion efficiency test results.
  - Copy of the burner tune-up checklist prepared by the technician, including documentation of the "before" combustion efficiency test results (sample checklist provided in the Appendix of this Catalog).
- The burner manufacturer name and model number.
- The incentive is per tune-up completed, and the incentive rate varies depending on the rated heat input capacity of the burner (MBH).

Pool and Spa Boiler Tune-Up (≥ 300 MBH) (TU104)

Requirements:

- This measure is available for completing a tune-up for natural gas pool and spa boilers only.
- This measure is available once in a 24-month period per boiler.
- A boiler that is dual fuel is considered one boiler.
- The technician must complete “before” and “after” combustion efficiency tests while the boiler is operating at High Fire.
- Burner(s) must be adjusted to show an improvement in combustion efficiency.
- The minimum boiler rated heat input capacity for measure eligibility is 300 MBH.
- Boilers used primarily for space heating, domestic hot water, or process (non-HVAC) loads are not eligible for this measure, however they may be eligible for another tune-up measure.
- The following must be included with the Final Application:
  - Date- and time-stamped documentation of the “after” combustion efficiency test results.
  - Copy of the boiler tune-up checklist prepared by the technician, including documentation of the "before" combustion efficiency test results (sample checklist provided in the Appendix of this Catalog).
- The incentive is per tune-up completed, and the incentive rate varies depending on the rated heat input capacity of the boiler (MBH).

Domestic Water Heating Boiler Tune-Up (≥ 199 MBH) (TU105)

Requirements:

- This measure is available for completing a tune-up for natural gas boilers used for domestic water heating only.
- This measure is available once in a 24-month period per boiler.
- A boiler that is dual fuel is considered one boiler.
- The minimum water heater rated heat input capacity for eligibility is 199 MBH.
- The technician must complete “before” and “after” combustion efficiency tests while the boiler is operating at High Fire.
- Burner(s) must be adjusted to show an improvement in combustion efficiency.
- Boilers used for pool/spa, space heating, or process (non-HVAC) applications are not eligible for this measure, however they may be eligible for another tune-up measure.
- The following must be included with the Final Application:
  - Date- and time-stamped documentation of the “after” combustion efficiency test results.
  - Copy of the boiler tune-up checklist prepared by the technician, including documentation of the "before" combustion efficiency test results (sample checklist provided in the Appendix of this Catalog).
- The incentive is per tune-up completed, and the incentive rate varies depending on the rated heat input capacity of the boiler (MBH).

Forced Air Furnace, Unit Heater or Rooftop Unit (RTU) Tune-Up (≥ 40 MBH) (TU106)

Requirements:

- This measure is for completing a tune-up for natural gas forced air furnaces, unit heaters and RTUs only.
- Unit minimum rated heat input capacity for measure eligibility is 40 MBH.
- A single unit with multiple burners or modules is considered one unit. A rooftop unit is considered one unit.

- A furnace, UH or RTU that is dual fuel is considered one furnace, UH or RTU.
- This measure is available once in a 24-month period per unit.
- Direct-fired heating units are not eligible for this measure.
- The technician must complete "before" and "after" combustion efficiency tests while the unit is operating at High Fire.
- Burner must be adjusted to show an improvement in combustion efficiency.
- The following must be included with the Final Application:
  - Date- and time-stamped documentation of the "after" combustion efficiency test results.
  - Copy of the RTU/Furnace/Unit Heater tune-up checklist prepared by the technician, including documentation of the "before" combustion efficiency test results (sample checklist provided in the Appendix of this Catalog).
- The incentive is per tune-up completed, and the incentive rate varies depending on the rated heat input capacity of the unit (MBH).

Chiller Tune-Up (≥ 20 Tons) (TU201)

Requirements:

- This measure is available for completing a tune-up for air-cooled or water-cooled chillers used for space or process (non-HVAC) cooling.
- The minimum nameplate (nominal) cooling capacity for measure eligibility is 20 tons.
- This measure is available once every other cooling season.
- Each individual chiller in a multiple chiller plant is considered one chiller.
- At a minimum, chiller tune-up must include the maintenance items listed below:
  - Inspect and correct oil level and pressure at full load operation.
  - Clean the air-cooled condenser coil.
  - Check and adjust the system pressure.
  - Inspect and/or replace filter.
  - Inspect and/or replace belt.
  - Check and repair the electrical contactors.
  - Check and repair evaporator condition.
  - Validate compressor amp draw.
  - Validate supply motor amp draw.
  - Validate condenser fan(s) amp draw.
  - Check liquid line temperature.
  - Check suction pressure and temperature.
  - Check refrigerant temperature and pressure.
  - Validate low pressure controls.
  - Validate high pressure controls.
  - Validate crankcase heater operation.
  - Clean water-cooled chiller condenser tubes.
  - Clean water-cooled chiller evaporator tubes (if performance warrants).
  - Check and repair economizer operation.
  - Validate sub-cooling and superheat.
  - Validate suction temperature and pressure.
  - Lubricate all motors.
- The following must be included with the Final Application:
  - Documentation sufficient to verify the nameplate (nominal) cooling capacity of the chiller (tons).
  - A copy of the chiller tune-up checklist prepared by the service provider, which at a minimum must include all the required maintenance items specified for this measure.
- The incentive is per tune-up completed, and the incentive rate varies depending on the nameplate (nominal) cooling capacity of the chiller (tons).

Maintenance

Steam Trap Monitoring System for Space or Process Heating System (TU202, TU203)

Requirements:

- These measures are available for installing a steam trap monitoring system for a space heating or process (non-HVAC) steam system.
- Monitoring system must be installed on properly functioning steam traps serving either space heating or process heating loads.
- Monitoring system must provide real time data to identify leaking and failed steam traps.
- For retrofit applications, the facility cannot have an existing automatic steam trap monitoring system.
- Documentation must be included with the Final Application sufficient to verify the following:
  - The characteristics of the steam system, including number of steam traps, boiler efficiency, steam trap orifice size(s), operating pressure(s), application (process or space heating) and other data.
  - For retrofit applications, whether the facility had a pre-existing steam trap monitoring system.
- Incentive is per steam trap monitored, and the incentive rate is higher for a process vs. space heating steam system.
- These measures qualify for new construction and retrofit applications.

New or Repaired Outside Air Damper Assembly (Retrofit) (Pre-Notification Required) (TU204)

Requirements:

- This measure is available for repairing or replacing existing, poorly operating, motorized outside air dampers.
- If replacing existing outside air damper, new outside air damper must be motorized and ultra-low leakage; ultra-low leakage outside air dampers are defined as having a maximum leakage rate of 3 CFM/ft² at a pressure of one inch water gauge.
- To be eligible for this measure, the outside air leakage rate through the existing damper must exceed 15% of the nominal volume flow rate of the air handling unit (AHU) or rooftop unit (RTU).
- This measure is applicable to single zone HVAC systems where heating and cooling energy is supplied at the air handler (i.e., central HVAC systems serving multiple zones, where heating is supplied at the zone level, are not eligible for this measure).
- Replacing the existing whole damper assembly (TU204a), or simply changing damper seals (TU204b), is eligible for this measure.
- All existing (pre) leakage rates must be validated by a certified Testing, Adjusting and Balance (TAB) Agent. Only changing the damper seals will require both pre (greater than 15%) and post (less than 5%) validation by a TAB Agent; TAB agent shall be an independent testing, adjusting, and balancing professional services provider certified by either AABC (Associated Air Balance Council) or NEBB (National Environmental Balancing Bureau).
- Minimum non-occupied periods of the facility must exceed 2,200 hours per year (i.e., facilities continuously occupied (24/7) are not eligible for this measure).
- Customer must receive natural gas service from Consumers Energy.
- The following must be included with the Pre-Notification Application:
  - Pre-retrofit air leakage rate validation report prepared by a certified TAB agent as specified above.
  - Documentation sufficient to verify the following:
    - HVAC system design.
    - Facility operating schedule.
- The following must be included with the Final Application:
  - Documentation sufficient to verify the rated supply air volume flow rate (CFM) of the AHU or RTU.
  - If only replacing the existing damper seals, the post-retrofit air leakage rate validation report prepared by a certified TAB agent as specified above.
- Incentive will be based on the rated supply air volume flow rate (CFM) of the AHU or RTU, and the incentive rate is higher for installing a new damper assembly vs. repairing an existing damper assembly.
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Steam Trap Repair or Replacement (Failed Open) (TU205, TU206)

Requirements:

- These measures are available for repair or replacement of steam traps that have been identified as malfunctioned and leaking steam (i.e., failed open) through completion of a steam trap maintenance survey.
- A steam trap maintenance survey is required for these measures, which may be conducted by a certified contractor or a certified customer technician and is typically performed using listening and temperature devices.
- These measures are not available for steam traps that have failed closed or are plugged; for steam traps that are failed closed or plugged, or if a steam trap survey was or will not be completed, in lieu of these measures replacement steam traps and/or parts may be available at a reduced price through the Business Instant Discount Program (find participating distributors at **ConsumersEnergy.com/business/energy-efficiency/special-programs/instant-discount-program**).
- Steam traps utilized in a steam system with a steam pressure greater than 50 psig that is operated greater than 4,000 hours per year are eligible for the Process Steam Traps (TU206) measure; all other steam trap applications are eligible for the HVAC Steam Traps (TU205) measure, however TU206 may be applied instead of TU205 at the discretion of the Program.
- These measures are available once in a 24-month period per individual steam trap.
- Replacement with an orifice steam trap is not eligible for this measure.
- The following must be submitted with the Application:
  - Steam trap survey and repair work recorded using a spreadsheet with survey, repair and replacement results or the Sample Steam Trap Maintenance Survey provided in the Appendix to this Catalog, and the spreadsheet or form must be included with the Final Application.
  - For TU206, the following data for each steam trap:
    - Trap type
    - Steam pressure
    - Orifice size
    - Boiler efficiency
    - Hours of operation
- Incentive is per steam trap repaired or replaced for the HVAC Steam Traps (TU205) measure, and per MCF natural gas saved (calculated per the 2019 Illinois Statewide Technical Reference Manual for Energy Efficiency Version 7.0, Volume 2: Commercial and Industrial Measures) for the Process Steam Traps (TU206) measure.
- These measures qualify for retrofit applications, but do not qualify for new construction applications.

Refrigeration, Laundry & Kitchen

General Requirements

- Unless otherwise noted, medium temperature units (e.g. coolers) are defined as units that maintain the refrigerated space at a temperature between 33 and 50 degrees Fahrenheit and low temperature units (e.g. freezers) are defined as units that maintain the temperature at or below 32 degrees Fahrenheit.
- Must be a Consumers Energy electric customer unless otherwise noted.
- Specifications (e.g. specification sheet) must be included with the Incentive Application for all new measure related products and equipment.
- Unless otherwise noted, incentives are not available for backup and redundant equipment and systems (see definition under "Project Requirements - Project and equipment types that are NOT eligible for incentives..." on page 8 of this Catalog).

Refrigeration Compressors

Discus or Scroll Compressors for Walk-in Coolers and Freezers (Pre-Notification Required) (RL101, RL102)

Requirements:

- These measures are available for installing high-efficiency semi-hermetic discus (RL101) or scroll (RL102) compressors for walk-in coolers and freezers.
- For retrofit applications, the existing compressor must be a standard efficiency hermetic or semi-hermetic reciprocating refrigeration compressor.
- New compressors for low temperature units (freezers) must have a rated Energy Efficiency Ratio (Btu/Wh) greater than or equal to the minimum efficiencies shown in Table 13.1.
- New compressors for medium temperature units (coolers) must have a rated Energy Efficiency Ratio (Btu/Wh) greater than or equal to the minimum efficiencies shown in Table 13.2.
- Replacement of existing high-efficiency compressors is not eligible for these measures.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the design of the existing compressor (efficiency, type, etc.).
- Documentation must be included with the Final Application sufficient to verify the following:
  - The type of unit (cooler, freezer, walk-in, etc.)
  - Nameplate (nominal) cooling capacity (tons) of the refrigeration system.
- Incentive is based on the nameplate (nominal) cooling capacity (tons) of the walk-in cooler or freezer refrigeration system, and the incentive rate is higher for installing a scroll compressor vs a discus compressor.
- These measures qualify for new construction and retrofit applications.

Table 13.1: Minimum Eligible Efficiencies

Low Temperature		
Operating Conditions: Condensing Temp.: 90°F, Evaporator Temp.: -25°F		
Capacity (Btu/h)	Single Phase Min. (EER)	Three Phase Min. (EER)
4,200 - 8,399	5.05	5.37
8,400 - 12,599	5.21	5.52
12,600 - 16,799	5.48	5.70
16,800 - 20,999	5.75	5.84
21,000 - 25,199		6.06
25,200 - 29,399		6.15
29,400 - 33,599		6.39
33,600 - 37,800		6.06

Table 13.2: Minimum Eligible Efficiencies

Medium Temperature		
Operating Conditions: Condensing Temp.: 90°F, Evaporator Temp.: 20°F		
Capacity (Btu/h)	Single Phase Min. (EER)	Three Phase Min. (EER)
7,500 - 14,999	10.65	11.07
15,000 - 22,499	11.79	11.88
22,500 - 29,999	11.72	12.58
30,000 - 37,499	11.93	12.85
37,500 - 44,999	12.49	12.91
45,000 - 52,499	11.79	13.25
52,500 - 59,999	13.06	13.19
60,000 - 67,499		13.13
67,500 - 75,000		12.37

Refrigeration Condenser Floating Head Pressure Controls (Pre-Notification Required) (RL103)

Requirements:

- This measure is available for installing automatic controls to lower the condensing pressure at lower ambient temperatures in grocery store (RL103a), and industrial process cooling or refrigerated warehouse (RL103b), refrigeration systems.
- The control strategy must vary head pressure based on outdoor air temperature, have a minimum Saturated Condensing Temperature (SCT) programmed for floating head pressure control of less than or equal to 70 degrees Fahrenheit.
- At least a 20 degrees Fahrenheit variance below design head pressure should be achieved during milder weather conditions.
- This measure is only available to assist with the purchase of hardware needed to achieve lower head pressure (e.g. balanced-port expansion valves, condenser fan VFDs, etc.).
- Ice rinks are considered industrial process (non-HVAC) cooling.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the current control strategy for the existing refrigeration system.
- Documentation must be included with the Final Application sufficient to verify the following:
  - » Refrigeration capacity (tons) to which the control strategy has been applied (calculated at customer specific design conditions).
  - » Implementation of floating head pressure control strategy as specified above.
- Incentive is based on the refrigeration capacity (tons) to which the control strategy is applied (calculated at customer specific design conditions), and the incentive rate is higher for grocery store vs industrial process cooling or refrigerated warehouse applications.
- This measure qualifies for retrofit applications and may qualify for new construction applications if floating head pressure control is not required by code (consult ASHRAE 90.1-2013).

Walk-in Cooler Air-Side Economizers (≥ 1,000 ft³) (Pre-Notification Required) (RL104)

Requirements:

- This measure is available for installing air-side economizers with controls for medium temperature walk-in coolers that are at least 1,000 ft³ in size.
- Use of the air-side economizer must reduce the use of the refrigeration system compressor, and outside air and exhaust dampers must close automatically when the outside air temperature exceeds 35 degrees Fahrenheit.
- For retrofit applications:
  - » Installation of new economizer equipment must not void the warranty or UL listing for any of the facility's existing refrigeration equipment.
  - » Documentation must be included with the Pre-Notification Application sufficient to verify whether the existing refrigeration system has an economizer.
- Documentation must be included with the Final Application sufficient to verify the following:
  - » Nameplate (nominal) cooling capacity (tons) of the refrigeration system.
  - » Walk-in cooler size (ft³).
  - » Implementation of economizer control strategy as specified above.
- Incentive is based on the nameplate (nominal) cooling capacity (tons) of the walk-in cooler refrigeration system.
- This measure qualifies for retrofit applications and may qualify for new construction applications if an economizer is not required by code (consult ASHRAE 90.1-2013).

Refrigerated Space LED Lighting

Refrigerated Space LED Lighting (Refrigeration Savings) (Pre-Notification Required) (RL105 - RL107)

Requirements:

- These measures are available for the refrigeration energy savings associated with installing an LED lighting system in a space primarily used as a refrigeration area.
- The refrigerated area must contain items perishable at standard outdoor temperature and conditions and always be conditioned to between 40 and -20 degrees Fahrenheit.
- These measures are only available when combined with a qualifying interior LED lighting measure (LT101 - LT129, LT203 – LT211, LT302, LT303).
- These measures cannot be combined with the LED Lighting for Case Coolers and Freezers (RL116) measure.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the existing lighting system design.
- Documentation must be included with the Final Application sufficient to verify the temperature maintained in the refrigerated space.
- Incentive is based on the lighting system input power reduction (watts), and the incentive rate varies depending on the temperature of the refrigerated space.
- These measures qualify for new construction and retrofit applications.

Refrigeration Controls

Case Cooler or Freezer Anti-Sweat Heater Controls (Retrofit) (Pre-Notification Required) (RL108)

Requirements:

- This measure is available for installing a control device, for existing anti-sweat heaters that run continuously, that senses the relative humidity in the air outside of a case cooler or freezer and reduces or turns off the glass door (if applicable) and frame anti-sweat heaters at low-humidity conditions.
- Technologies that can turn off anti-sweat heaters based on sensing condensation on the inner glass pane are also eligible for this measure.
- Doors must never have had anti-sweat heater controls.
- Documentation must be included with the Pre-Notification Application sufficient to verify whether the doors ever had anti-sweat heater controls.
- Documentation must be included with the Final Application sufficient to verify the number of doors controlled.
- Incentive is per door controlled.
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Walk-in Cooler or Freezer Defrost Controls (Pre-Notification Required) (RL109)

Requirements:

- This measure is available for the installation of new intelligent electronic defrost controls for walk-in coolers and freezers.
- For retrofit applications, the existing system must have functioning time clock defrost controls.
- The new controls must have the ability to sense whether a defrost cycle is required or should be skipped based on evaporator coil temperature and pressure, which indicate the amount of frost buildup.
- This measure cannot be combined with either of the Walk-in Cooler or Freezer Evaporator Fan Controls with Demand Defrost (RL111, RL112) measures.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the current control strategy for the existing system.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Nameplate (nominal) cooling capacity (tons) of the refrigeration system receiving controls.
  - Type of unit (cooler, freezer, walk-in, etc.)
- Incentive is based on the nameplate (nominal) cooling capacity (tons) of the walk-in cooler or freezer refrigeration system receiving controls.
- This measure qualifies for new construction and retrofit applications.

Walk-in Cooler or Freezer Evaporator Fan Speed Controls (Pre-Notification Required) (RL110)

Requirements:

- This measure is available for the installation of a speed controller for the evaporator fans for walk-in coolers and freezers to reduce the airflow of the evaporator fans when there is no refrigerant flow.
- For retrofit applications, the existing evaporator fans must operate continuously at full speed.
- Controlled motors must have a minimum horsepower (HP) rating of 1/20 HP.
- Each new fan speed controller must control at least two motors and reduce fan motor power by at least 75% during defrost off cycle
- Replacing at least two permanent split capacitor (PSCMs) or shaded pole (SPMs) evaporator fan motors with integrated variable speed motors (e.g. ECMs) and utilizing onboard or external controls to vary the speed is eligible for measure RL110a.
- Measure RL110a may be combined with the Walk-In Cooler or Freezer Evaporator Fan Electronically Commutated Motors (ECM) (RL114) measure if replacing PSCMs or SPMs with ECMs.
- Refrigerated unit is not eligible for this measure if one or more of the following conditions applies:
  - Compressor runs all the time with high-duty cycle.
  - Evaporator fan does not run at full speed all the time.
  - Evaporator fan motor runs on poly-phase power.
  - Evaporator fan does not use off-cycle or time-off defrost.
- This measure cannot be combined with either of the Walk-in Cooler or Freezer Evaporator Fan Controls with Demand Defrost (RL111, RL112) measures.
- For new construction applications, only ECMs are eligible for this measure (RL110a).
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the following for the existing evaporator fans:
  - Operating hours.
  - Control strategy.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Type of unit (cooler, freezer, walk-in, etc.)
  - Type of evaporator fan motors being controlled (ECMs, PSCMs or SPMs).
- Incentive is per new speed controller installed, and the incentive rate varies depending on the type of evaporator fan motors being controlled (ECMs, PSCMs or SPMs).
- Measures RL110a, RL110b and RL110c qualify for retrofit applications and measure RL110a (ECMs) qualifies for new construction applications.

Walk-in Cooler or Freezer Evaporator Fan Controls with Demand Defrost (Pre-Notification Required) (RL111, RL112)

Requirements:

- These measures are available for installing evaporator controls with demand defrost for walk-in coolers (RL111) and freezers (RL112) that use sophisticated algorithms to optimize the runtimes and operation of the equipment.
- For retrofit applications:
  - The existing evaporator fan motors must operate continuously at full speed.
  - The existing system must have functioning time clock defrost controls (no existing digital defrost controls).
- The following functions must be included in the new control strategy:
  - Adaptive learning via a micro-processor or web-based controller.
  - The evaporator fans must be controlled by the system; manual control (fans being always on) is not eligible for these measures.
  - Initiation of defrost cycle based on coil temperature/ demand and termination based on temperature.
  - The controller must have the option to define the differential temperature between the space temperature setpoint and the temperature that enables the refrigeration cycle.
- These measures cannot be combined with the Walk-in Cooler or Freezer Defrost Controls (RL109) or Walk-in Cooler or Freezer Evaporator Fan Motor Speed Controls (RL110) measures.
- This measure may be combined with the Walk-In Coolers and Freezers Evaporator Fan Electronically Commutated Motors (ECM) (RL114) measure.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the following for the existing refrigerated walk-in box:
  - Current evaporator fan motor control strategy.
  - Current defrost control strategy.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Type of unit (cooler, freezer, walk-in, etc.)
  - Nameplate (nominal) cooling capacity (tons) of the refrigeration system.
- Incentive is based on the Nameplate (nominal) cooling capacity (tons) of the walk-in cooler or freezer refrigeration system, and the incentive rate is higher for freezers vs. coolers.
- These measures qualify for new construction and retrofit applications.

Evaporator Fan Motors

Walk-In or Case Cooler or Freezer Evaporator Fan Electronically Commutated Motors (ECM) (Retrofit) (Pre-Notification Required) (RL113 - RL114)

Requirements:

- These measures are available for replacing an existing standard efficiency shaded pole (SP) or permanent split capacitor (PSC) evaporator fan motor for case (RL113) and walk-in (RL114) coolers and freezers with an electronically commutated motor (ECM).
- Evaporator fan ECMs installed in new walk-in or case coolers or freezers are not eligible for these measures.
- Documentation must be included with the Pre-Notification Application sufficient to verify the following:
  - Type of unit (cooler, freezer, walk-in, case, etc.)
  - Existing evaporator fan motor type (PSCM or SPM).
- Incentive is per existing motor replaced, and the incentive rate is higher for walk-in vs. case coolers and freezers.
- These measures qualify for retrofit applications, but do not qualify for new construction applications.

Walk-In Cooler or Freezer Evaporator Fan/Motor Assembly Reduction (Retrofit) (Pre-Notification Required) (RL115)

Requirements:

- This measure is available for reducing the number of evaporator fan/motor assemblies for existing walk-in coolers and freezers.
- Must upgrade evaporator or fan housing with similar cooling capacity in conjunction with the motor reduction.
- Existing evaporator fan motor must have a horsepower (HP) rating greater than or equal to 1/20 HP and less than 1/5 HP.
- The new evaporator fan/motor assembly cannot increase the individual assembly's motor size.
- Existing evaporator fan motor must run at full speed all the time.
- Blanking off existing fan ports or reducing the rated motor horsepower (HP) of existing fans is not eligible for this measure.
- Documentation must be included with the Pre-Notification Application sufficient to verify the following for the existing evaporator fan/motor assemblies:
  - Quantity of assemblies.
  - Rated horsepower (HP) of each motor.
  - Control Strategy.
- Documentation must be included with the Final Application sufficient to verify the following:

  - Quantity of evaporator fan/motor assemblies.
  - Rated horsepower (HP) of each motor.
- Incentive is based on the number of evaporator fan/motor assemblies permanently removed.
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Refrigerated Case LED Lighting

LED Lighting for Case Coolers and Freezers (Pre-Notification Required) (RL116)

Requirements:

- This measure is available for replacing T12 or T8 fluorescent lighting in an existing case cooler or freezer (refrigerated case) with LED source illumination or installing a new refrigerated case that has LED source illumination installed.
- LED lighting product must be approved by DesignLights Consortium® (DLC®) for use as refrigeration lighting or be designed for refrigeration applications and meet the following requirements:
  - Safety Certification recognized by OSHA or the Standards Council of Canada (e.g. UL, ETL, cUL, CSA, etc.).
  - Have an IES-LM-79-08 testing report from an accredited laboratory.
  - Efficacy ≥ 95 lumens/watt.
  - CRI ≥ 80.
  - Lifetime (hours): $L_{70} \geq 50{,}000$ or $L_{90} \geq 36{,}000$.
  - Warranty ≥ 5 years.
  - CCT ≤ 6,500 kelvin.
- For retrofit applications, existing refrigerated case must have T12 or T8 fluorescent lighting.
- New refrigerated cases with an equipment specification that requires and/or includes LED lighting (i.e., cannot be purchased with T8 fluorescent lighting) are not eligible for new construction applications unless documentation is provided with the Final Application sufficient to verify that an equivalent new make and model that includes T8 fluorescent lighting was alternatively available for purchase.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the type of lighting in the existing refrigerated case.
- Incentive is based on the linear feet of new LED lighting installed.
- This measure qualifies for new construction and retrofit applications.

Occupancy Sensors for Case Cooler and Freezer LED Lighting (RL117)

Requirements:

- This measure is available for installing occupancy sensors in an existing case cooler or freezer (refrigerated case) or installing a refrigerated case that has occupancy sensors installed.
- Occupancy sensors must turn off refrigerated case lighting when no motion is detected in the vicinity of the case for a set period.
- Occupancy sensors must:
  - Monitor at least two doors each.
  - Have at least a three year warranty.
- Refrigerated case must have LED lighting that meets the following requirements:
  - Efficacy ≥ 35 lumens/watt.
  - CRI ≥ 72.
- Documentation must be included with the Final Application sufficient to verify the following:
  - The number of doors monitored.
  - Specifications for the controlled lighting.
- Incentive is per door controlled.
- This measure qualifies for new construction and retrofit applications.

Permanent Magnet Motors

Walk-in or Case Cooler or Freezer Evaporator Fan Permanent Magnet Synchronous Motors (PMSM) (RL201 - RL206)

Requirements:

- These measures are available for replacing existing standard efficiency shaded pole (SP) evaporator fan motors for walk-in and case coolers and freezers (RL201, RL202, RL203, RL204), replacing permanent split capacitor (PSC) evaporator fan motors for walk-in coolers and walk-in freezers (RL205, RL206), or installing new walk-in coolers or walk-in freezers (RL205, RL206), with permanent magnet synchronous motors (PMSM).
- PMSM evaporator fan motors installed in new case coolers or freezers are not eligible for these measures.
- PMSM evaporator fan motors installed in new walk-in coolers or walk-in freezers replacing existing walk-in units with SP evaporator fan motors are not eligible for these measures.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Pre-existing evaporator fan motor type (SPM or PSCM).
  - Refrigeration unit design (temperature and style).
- Incentive is per PMSM motor installed, and the incentive rate varies depending on refrigeration unit temperature (low or medium), refrigeration unit style (case or walk-in), and type of motor replaced.
- These measures qualify for retrofit applications and measures RL205 and RL206 qualify for new construction applications for new walk-in coolers or freezers with PMSM evaporator fan motors installed.

Reach-in Refrigerated Case Doors

Low or No Heat Case Cooler or Freezer Doors (Pre-Notification Required) (RL207)

Requirements:

- This measure is available for the replacement of existing case cooler and freezer (refrigerated case) doors with special glass doors that have no anti-sweat heater (RL207a) or a low wattage anti-sweat heater (RL207b), or for installation of new refrigerated cases that include low or no heat doors.
- For retrofit applications:
  - The existing refrigerated case must have an operable anti-sweat heater on the door or frame.
  - The existing door or frame anti-sweat heater must be permanently disabled or removed, or the entire case must be replaced.
- Both low temperature freezers and medium temperature coolers are eligible for this measure.
- New glass door must be made of two or three panes of glass that include a low conductivity filler, special coating and door seals.
- New doors must keep the outer glass warm and prevent condensation within the frame assembly.
- Cannot be combined with Case Cooler or Freezer Anti-Sweat Heater Controls (RL108) measure.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify whether the existing case door or frame has an operable ant-sweat heater.
- For door (vs. case) replacement applications, documentation must be included with the Final Application sufficient to verify that the pre-existing refrigerated case door or frame anti-sweat heater has been permanently disabled or removed.
- Incentive is per new low or no heat door installed, and the incentive rate is higher for no heat vs low heat doors.
- This measure qualifies for new construction and retrofit applications.

Adding Case Cooler Doors (33°F to 50°F) (Retrofit) (Pre-Notification Required) (RL208)

Requirements:

- This measure is available for adding new doors to an existing open (no doors) vertical or multi-deck medium temperature reach-in display case, or replacing an existing open case with a new case that has doors.
- If replacing the case, the horizontal linear length of the new case must be less than or equal to that of the existing case.
- Documentation must be included with the Pre-Notification Application sufficient to verify the horizontal linear length (ft) of the existing case, regardless of whether doors are being added or the case is being replaced.
- The incentive is based on the horizontal linear length of the case (ft), and the incentive rate varies depending on whether customer has a Consumers Energy electric account, natural gas account, or both/combo account.
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Adding Case Freezer Doors (0°F to 32°F) (Retrofit) (Pre-Notification Required) (RL209)

Requirements:

- This measure is available for adding new doors to an existing open (no doors) vertical or multi-deck low temperature reach-in display case, or replacing an existing open case with a new case that has doors.
- If replacing the case, the horizontal linear length of the new case must be less than or equal to that of the existing case.
- Documentation must be included with the Pre-Notification Application sufficient to verify the horizontal linear length (ft) of the existing case, regardless of whether doors are being added or the case is being replaced..
- The incentive is based on the horizontal linear length of the case (ft), and the incentive rate varies depending on whether customer has a Consumers Energy electric account, natural gas account, or both/combo account.
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Refrigeration Insulation & Envelope

Open Case Cooler or Freezer Night Covers (Pre-Notification Required) (RL210)

Requirement:

- This measure is available for installing night covers on open case coolers and freezers (refrigerated case) in supermarkets and grocery stores to reduce the amount of energy required to keep the product cold during facility non-operating hours.
- The store must have a minimum of six non-operating hours per day to be eligible for this measure.
- To decrease moisture build-up, it is recommended that the night covers be perforated.
- Applicant should consider using proper compressor capacity modulation and ensure the case manufacturer has no objections to use of a night cover.
- Replacement of existing night covers is not eligible for this measure.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify whether there are any existing night covers.
- Documentation must be included with the Final Application sufficient to verify the store operating schedule.
- Incentive is per linear foot of new night cover installed.
- This measure qualifies for new construction and retrofit applications.

Refrigerated Space Doorway Strip Curtains (Retrofit) (Pre-Notification Required) (RL211, RL212)

Requirements:

- These measures are available for installing new strip curtains or plastic swinging doors on doorways of existing medium temperature (1°F to 40°F) (RL211) and low temperature (≤ 0°F) (RL212) walk-in coolers, walk-in freezers or refrigerated warehouses.
- Opening between the strip curtain and bottom of doorway must be no larger than 1 inch and the strips must have an overlay greater than 1 inch.
- It is recommended that low temperature strip curtains be used on low temperature applications.
- Replacement of existing strip curtains that have remaining useful life (not missing any strips, or strips were purchased within the last four years) is not eligible for these measures.
- Documentation must be included with the Pre-Notification Application sufficient to verify the following:
  - Refrigerated space temperature.
  - Area of the doorway (ft^2).
  - Age of existing strip curtains, if applicable.
- Incentive is based on the area of the doorway (ft^2), and the incentive rate is higher for a low temperature vs. a medium temperature refrigerated space.
- These measures qualify for retrofit applications, but do not qualify for new construction applications.

Walk-in Cooler or Freezer Door Gasket Seals (Retrofit) (Pre-Notification Required) (RL213)

Requirements:

- This measure is available for replacing existing worn gasket seals on doorways for walk-in coolers and freezers.
- Documentation must be included with the Final Application sufficient to verify the linear feet of existing gasket seals replaced.
- Incentive is per linear foot of existing gasket seals replaced.
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Automatic High-Speed Doors for Refrigerated Spaces (Pre-Notification Required) (RL214)

Hydraulic or motorized automated doors provide a way to reduce infiltration of warm air into refrigerated spaces by reducing the time that rooms are exposed to each other and/or unconditioned spaces, and by providing better insulation between the divided areas.

Requirements:

- This measure is available for installing an automatic high-speed door for a commercial/industrial refrigerated space.
- Replacement of existing automatic high-speed doors is not eligible for this measure.
- For retrofit applications, replacement of existing strip curtains is eligible for this measure.
- This measure is available for Consumers Energy electric customers only.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the current method of isolating existing spaces from one another.
- Documentation must be included with the Final Application sufficient to verify the type of spaces isolated from one another by each new door.
- Incentive is based on the area (ft^2) of the doorway for which a new automated door is installed, and the incentive rate varies depending on the type of spaces being isolated from one another (freezer, cooler or dock).
- This measure qualifies for new construction and retrofit applications.

Integrated Variable Speed Motors

Integrated Variable Speed Motor (e.g. ECM) on Grocery Store Refrigeration System Exterior Condenser Fans (Retrofit) (RL215)

Requirements:

- This measure is available for equipping existing grocery store refrigeration system air-cooled condenser unit fans with an integrated variable speed motor (e.g. ECM).
- Must meet the requirements specified for the Integrated Variable Speed Motor (e.g. ECM) on Exterior Condenser Fans for RTUs and Grocery Store Refrigeration Systems (VF302) measure in the Variable Frequency Drives section of this Catalog.
- Incentive is based on the rated horsepower (HP) of the new motor.
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Laundry

Laundry Ozone-Generation System (Natural Gas) (Pre-Notification Required) (RL301)

Requirements:

- This measure is available for Consumers Energy natural gas customers installing an ozone generation system for commercial clothes washing machines in high usage operations such as hotels, hospitals, and laundry service facilities.
- Coin-operated laundry facilities are not eligible for this measure.
- The ozone-generation system must transfer ozone, via Venturi Injection or Bubble Diffusion, into an on-premises commercial laundry hot water supply system that is heated with a natural gas water heater or boiler and must reduce hot water use by at least 80%.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the type of laundry facility.
- Documentation must be included with the Final Application sufficient to verify the following:
  - » Type of laundry facility.
  - » Capacity (lbs.) of the affected clothes washing machines.
- Incentive is based on the capacity (lbs.) of the affected clothes washing machines.
- This measure qualifies for new construction and retrofit applications.

ENERGY STAR® Commercial Clothes Washers (RL302, RL303)

Requirements:

- These measures are available for Consumers Energy electric or natural gas customers installing a new ENERGY STAR® certified high-efficiency commercial clothes washer.
- For retrofit applications, the existing clothes washer must be a standard efficiency clothes washer.
- Clothes washers must be approved by ENERGY STAR® with a Modified Energy Factor (MEF) of at least 2.2.
- For retrofit applications, documentation must be included with the Final Application sufficient to verify the pre-existing clothes washer design.
- Incentive is per new clothes washer installed, and the incentive rate is higher for electric- vs. natural gas-heated clothes washer hot water supply system.
- These measures qualify for new construction and retrofit applications.

Kitchen

Commercial Kitchen Ventilation Controls (Natural Gas Water Heater) (Pre-Notification Required) (RL304)

Requirements:

- This measure is available for Consumers Energy natural gas customers installing a ventilation control system for a commercial kitchen which varies the rate of exhaust air flow by reducing the exhaust fan motor speed according to demand, as determined by demand sensors.
- For retrofit applications, the existing commercial kitchen ventilation exhaust fan must be controlled with an on/off switch or by a manually operated two-speed system.
- The new control system must automatically control the fan speed utilizing:
  - » A variable frequency drive (VFD) or integrated variable speed motor (e.g. ECM).
  - » A temperature only sensor, or temperature plus optical sensor, to monitor cooking conditions.
- This measure may be combined with an applicable VFD or integrated variable speed motor (e.g. ECM) measure.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the existing exhaust fan controls.
- Documentation must be included with the Final Application sufficient to verify the following:
  - » Total nominal exhaust air volume flow rate of all controlled ventilation fans (CFM).
  - » Implementation of ventilation control strategy as specified above.
- Incentive is based on the nominal total exhaust air volume flow rate of all controlled ventilation fans (CFM).
- This measure qualifies for new construction and retrofit applications.

Engineered Commercial Kitchen Ventilation Hoods (Natural Gas) (Pre-Notification Required) (RL305)

Requirements:

- This measure is available for Consumers Energy natural gas customers installing engineered commercial kitchen ventilation hoods that reduce ventilation rates.
- For retrofit applications, the existing hood rated exhaust air volume flow rate (CFM per linear foot of hood) may be used as the baseline.
- For new construction and end of life applications, the baseline will be the maximum allowable exhaust air volume flow rate listed in Table 14 (CFM per linear foot of hood) based on the type of hood and equipment duty rating.

Table 14: New Construction Baseline Hood Exhaust Air Volume Flow Rate (CFM per linear foot of hood)

	Light Duty Equipment	Medium Duty Equipment	Heavy Duty Equipment	Extra-Heavy Duty Equipment
Wall-mounted Canopy	175	250	300	475
Single Island Canopy	275	350	450	625
Double Island Canopy	175	250	325	525
Eyebrow	200	200	N/A	N/A
Backshelf/Passover	150	250	350	N/A

- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the existing hood rated exhaust air volume flow rate (CFM per linear foot of hood).
- Documentation must be included with the Final Application sufficient to verify the following for the new hood:
  - Duty (e.g. light, medium, heavy, or extra-heavy duty).
  - Type (e.g. wall-mounted, eyebrow, single island canopy, double island canopy, back shelf, or passover).
  - Rated exhaust air volume flow rate (CFM per linear foot of hood).
- Incentive is based on the reduction in rated hood exhaust air volume flow rate (CFM per linear foot of hood).
- This measure qualifies for new construction and retrofit applications.

Restaurant Demand Control Ventilation (Dining Room Only) (Natural Gas) (Pre-Notification Required) (RL306)

Requirements:

- This measure is available for Consumers Energy natural gas customers installing ventilation controls, for the dining room of a restaurant, that uses carbon dioxide levels to measure occupancy and modify the percentage of outside air based on variable levels.
- RTUs serving the space must have natural gas heat.
- Must meet the requirements specified for the Demand Control Ventilation (DCV) for HVAC System (BA204) measure in the Building Automation Systems section of this Catalog.
- The incentive is calculated per square foot (ft^2) of area controlled.
- This measure qualifies for new construction and retrofit applications.

ENERGY STAR® Commercial Dishwasher (Natural Gas Water Heater) (RL307)

Requirements:

- This measure is available for Consumers Energy natural gas customers installing a high-efficiency commercial dishwasher that is supplied with hot water from a natural gas water heater.
- For retrofit applications, the existing dishwasher:
  - Must be a standard efficiency commercial dishwasher.
  - Must be supplied with hot water from a natural gas water heater.
- Dishwasher types that are eligible for this measure include stationary single tank door, single tank conveyor and multiple tank conveyor units that have electric, gas, or no water temperature booster.
- The new dishwasher must meet ENERGY STAR® requirements.
- Documentation must be included with the Final Application sufficient to verify the following:
  - For retrofit applications, the pre-existing dishwasher design.
  - Dishwasher hot water source.
- Incentive is per new dishwasher installed.
- This measure qualifies for new construction and retrofit applications.

ENERGY STAR® Under Counter Dishwasher (Natural Gas Water Heater) (RL308)

Requirements:

- This measure is available for Consumers Energy natural gas customers installing a high-efficiency under counter dishwasher that is supplied with hot water from a natural gas water heater.
- For retrofit applications, the existing dishwasher:
  - Must be a standard efficiency under counter dishwasher.
  - Must be supplied with hot water from a natural gas water heater.
- Dishwashers must be under counter style and can have electric, gas, or no water temperature booster.
- The new dishwasher must meet ENERGY STAR® requirements.
- Documentation must be included with the Final Application sufficient to verify the following:
  - For retrofit applications, the pre-existing dishwasher design.
  - Dishwasher hot water source.
- Incentive is per new dishwasher installed.
- This measure qualifies for new construction and retrofit applications.

Building Envelope and Insulation

General Requirements

- Unless otherwise noted, building envelope and insulation measures are only available for buildings and pools using Consumers Energy natural gas as the primary fuel source for heating.
- Specifications (e.g. specification sheet) must be included with the Incentive Application for all new measure related products and equipment.
- Unless otherwise noted, incentives are not available for backup and redundant equipment and systems (see definition under "Project Requirements - Project and equipment types that are NOT eligible for incentives..." on page 8 of this Catalog).

Building Insulation

Wall Insulation (Retrofit) (Pre-Notification Required) (BE101)

Requirements:

- This measure is available for installing wall insulation in an existing wall separating a heated space and an unconditioned or outdoor space.
- Existing wall assembly must have an insulation rating less than R-3 to be eligible for this measure.
- Final wall assembly insulation rating must exceed R-13 and/or state and local code for the building type.
- Documentation must be included with the Pre-Notification Application sufficient to verify the insulation rating of the existing wall assembly (R-value).
- Documentation must be included with the Final Application sufficient to verify the following:
  - Insulation rating of the new wall assembly (R-value).
  - Square footage of newly installed wall insulation.
- Incentives will be paid based on the total area of newly installed wall insulation (ft^2).
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

General Requirements for Roof Insulation Measures (Retrofit) (Pre-Notification Required) (BE102, BE103)

Requirements:

- These measures are available for adding insulation to existing building roofs.
- Total roof area should be less than 500,000 square feet (ft^2).
- Roof insulation must be installed above a space that requires natural gas-fired space heating.
- All materials must be new, meet applicable state and local codes, and be installed in accordance with the manufacturer's requirements.
- The following must be included with the Pre-Notification Application:
  - Scaled floor plan of the facility's total roof area (ft^2) proposed to be insulated.
  - Roof construction detail (sketch) showing a section cut of the existing roof.
  - Roof construction detail (sketch) showing a section cut of the proposed roof.

Flat Roof Insulation (Retrofit) (Pre-Notification Required) (BE102)

Requirements:

- This measure is available for installing insulation on an existing flat roof that will result in an increase in the insulation rating of the roof.
- Post-installation roof insulation rating must be ≥ R-18.
- Projects must meet the General Requirements for Roof Insulation Measures specified separately in this section of the Catalog.
- Measures BE102a through BE102g may be combined to capture the total increase in insulation rating for incentive calculation [e.g. an increase from R-10 to R-20 would combine measures BE102a (R-10 to R-18) and BE102e (R-18 to R-20)].
- "Insulation Entirely Above Deck" and "Metal Building" roof insulation (as defined by ASHRAE 90.1-2013) is eligible for this measure only when installed between the conditioned and unconditioned areas.
- Insulation installed above dropped commercial ceilings (e.g. between the dropped ceiling and ceiling plenum) is not eligible for this measure.
- This measure is not available for roofs above areas with insulation at the drop ceiling level (i.e., between the occupied space and ceiling plenum).
- Incentives will be paid based on the total area of newly installed flat roof insulation (ft^2), and the incentive rate varies depending on the pre-existing and final insulation rating; maximum incentive available is $100,000 per facility.
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Attic Roof Insulation (Retrofit) (Pre-Notification Required) (BE103)

Requirements:

- This measure is available for installing insulation sufficient to increase the insulation rating of an existing attic roof.
- Projects must meet the General Requirements for Roof Insulation Measures specified separately in this section of the Catalog.
- "Attic and Other Roofs" insulation (as defined by ASHRAE 90.1-2013) is eligible for this measure only when it is installed between the conditioned and unconditioned areas.
- Insulation installed above dropped commercial ceilings (i.e., between the dropped ceiling and ceiling plenum) is not eligible for this measure.
- Pre-retrofit roof insulation rating must be less than R-11.
- Post-retrofit roof insulation rating must exceed R-48.
- Incentives will be paid based on the total area of newly installed attic/ceiling insulation (ft^2).
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Building Envelope

Window Reduction (Retrofit) (Pre-Notification Required) (BE104)

Requirements:

- This measure is available for replacing existing window glazing with insulation.
- All materials must be new, meet applicable state and local codes and must be installed in accordance with the manufacturer's requirements.
- Spaces with a lighting system utilizing daylight harvesting controls in the areas served by the affected windows are not eligible for this measure.
- The final thermal resistance through the new window assembly must be greater than or equal to R-13.
- The following must be included with the Pre-Notification Application:
  - A scaled plan of the facility's total window area (ft^2) being replaced.
  - A window construction detail sketch showing a section cut of the existing window with proposed insulation.
  - Pre-construction pictures showing the condition of the existing windows.
- Incentive is based on the area (ft^2) of the replaced window glazing.
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

High-Efficiency Window Film (Retrofit) (Electric) (Pre-Notification Required) (BE105)

Requirements:

- This measure is available for Consumers Energy electric customers applying a high-efficiency film to the glazing of existing windows.
- Film must be applied to an existing window assembly featuring a shading coefficient (SC) value ≥ 0.84 and a U-Value ≥ 0.72; these values are typical of a clear, double-pane window, although conditions of existing window assembly may need to be reviewed on a case-by-case basis.
- The installed window film must have a solar heat gain coefficient (SHGC) value of ≤ 0.39 and a U-value of ≤ 0.72; to convert shading coefficient (SC) to SHGC, multiply SC x 0.87.
- Windows must have:
  - An easterly, westerly, or southern exposure.
  - A minimum of 5 years remaining on their manufacturer's warranty.
- The space having window glazing upgraded with high-efficiency window film must be cooled by equipment using a vapor-compression refrigeration cycle (e.g. DX RTU or chiller); spaces cooled by evaporative cooling, an absorption chiller or an adsorption chiller are not eligible for this measure.
- This measure is available for Consumers Energy electric customers in building areas served with air conditioning only.
- The following must be included with the Pre-Notification Application:
  - A scaled plan of the facility's total window glazing area (ft^2) for the affected windows.
  - Documentation sufficient to verify the following:
    - Affected window assembly shading coefficient (SC) and U-Value without film.
    - Direction affected windows face.
    - Manufacturer's warranty for the affected windows.
    - Cooling system design for the space the affected windows serve.
    - Specifications for the proposed window film.
- Incentive is based on the area of the window glazing (ft^2) for the affected windows.
- This measure qualifies for retrofit applications, but does not qualify for new construction applications.

Window Awnings (Electric) (Pre-Notification Required) (BE106)

Requirements:

- This measure is available for Consumers Energy electric customers installing retractable or removable awnings above windows that block sunlight from entering a building during the summer but allow sunlight to enter during the winter.
- The distance between the point that the awning connects to the exterior wall and the top of the window must be no more than 0.329 times the height of the window.
- The awning must extend out from the wall at least 0.614 times the height of the window.
- This measure is available for Consumers Energy electric customers in building areas served with air conditioning only.
- Windows that have any form of film or coating that reflects sunlight are not eligible for this measure.
- Windows must be south facing +/- 20 degrees.
- Windows that are significantly blocked from the sun during the summer months due to foliage, buildings, or other obstructions are not eligible for this measure.
- The following must be included with the Pre-Notification Application:
  - A scaled plan of the facility's total window glazing area (ft^2) for the affected windows.
  - Documentation sufficient to verify the following:
    - Affected windows are not, or will not be, significantly blocked from sunlight.
    - Affected space is or will be air conditioned.
    - Direction affected windows face or will face.
    - Affected windows do not or will not have any form of film or coating that reflects sunlight.
- Incentive is based on the area of the window glazing (ft^2) for the affected windows.
- This measure qualifies for new construction and retrofit applications.

High Performance Window Glazing (Electric) (Pre-Notification Required) (BE107)

Requirements:

- This measure is available for Consumers Energy electric customers installing high performance glazing in existing windows or installing new windows that feature high performance glazing.
- Windows must face east, west, or south and have a minimum of 5 years remaining on their manufacturer's warranty.
- For retrofit applications, existing window assembly must feature a shading coefficient (SC) value ≥ 0.84 and a U-Value ≥ 0.72; these values are typical of a clear, double-pane window, although conditions of existing window assembly will need to be reviewed on a case-by-case basis.
- The new glazing must have a Solar Heat Gain Coefficient (SHGC) value of ≤ 0.39 and a U-value of ≤ 0.57; to convert Shading Coefficient (SC) to SHGC, multiply SC x 0.87.
- This measure is available for Consumers Energy electric customers in building areas served with air conditioning only.
- The following must be included with the Pre-Notification Application:
  - A scaled plan of the facility's total window glazing area (ft^2) for the affected windows.
  - Documentation sufficient to verify the following:
    - Affected space is or will be air conditioned.
    - Direction affected windows face or will face.
    - Manufacturer's warranty for the affected windows.
    - For retrofit applications, existing window assembly shading coefficient (SC) and U-Value.
- Incentive is based on the area of the window glazing (ft^2) for the affected windows.
- This measure qualifies for new construction and retrofit applications.

Cool (White) Roof (Electric) (Pre-Notification Required) (BE108)

Requirements:

- This measure is available for Consumers Energy electric customers installing a cool (white) roof.
- The new roof must have a solar absorption of < 0.3 (solar reflectance of > 0.7).
- Roof must be installed over conditioned (mechanically cooled) space.
- This measure is available for Consumers Energy electric customers for building areas served with air conditioning only.
- Documentation must be included with the Pre-Notification Application sufficient to verify the following:
  - Square footage (ft^2) of the affected roof area.
  - Whether the affected roof area is or will be over an air-conditioned space.
- Incentive is based on the area of the affected roof surface (ft^2).
- This measure qualifies for new construction and retrofit applications.

Automatic High-Speed Doors for Building Exterior (BE109)

Hydraulic or motorized automated doors provide a way to reduce infiltration of outside air from the exterior of a building into heated rooms by reducing the time that rooms are exposed to outside air, and providing better insulation between the exterior and interior of the building.

Requirements:

- This measure is available for the installation of an automatic high-speed door between a conditioned (heated) indoor space and an unconditioned exterior space.
- Replacement of existing high-speed doors is not eligible for this measure.
- Incentive is based on the area (ft^2) of the doorway for which a new automatic high-speed door is installed.
- This measure qualifies for new construction and retrofit applications.

Pool Covers

Automatic Pool Covers (BE110)

Requirements:

- This measure is available for installing a new automatic pool cover on a pool.
- Liquid pool covers are not eligible for this measure.
- New automatic pool cover (and retractable pool covers) must be:
  - At least 400 ft^2 but not greater than 10,000 ft^2 in size.
  - Motorized (both on & off).
- Incentive is per new pool cover installed, and the incentive rate varies depending on the area of the new pool cover (ft^2).
- This measure qualifies for new construction and retrofit applications.

Manual Pool Covers (BE111)

Requirements:

- This measure is available for installing a new manual pool cover on a pool.
- Liquid pool covers are not eligible for this measure.
- New manual pool cover must be least 400 ft^2 but not greater than 10,000 ft^2 in size.
- Incentive is per new pool cover installed, and the incentive rate varies depending on the area of the new pool cover (ft^2).
- This measure qualifies for new construction and retrofit applications.

Pipe and Ductwork Insulation

General Requirements

- Unless otherwise noted, pipe and ductwork insulation measures are only available for pipe and ductwork insulation retrofit projects in existing buildings using Consumers Energy natural gas as the primary fuel source for heating; if a dual-fuel system is used, or if natural gas is the backup or redundant fuel, the project will not be eligible for any prescriptive measures, however it may be eligible for a custom incentive.
- Consumers Energy Business Energy Efficiency Programs defines an unconditioned space as a space outside of the thermal envelope of the building that is not intentionally heated for occupancy.
- Unless otherwise noted, incentives are not available for backup and redundant equipment and systems (see definition under "Project Requirements - Project and equipment types that are NOT eligible for incentives..." on page 8 of this Catalog).

Pipe Insulation – Natural Gas Heat

General Requirements for Pipe Insulation Measures (Pre-Notification Required) (IN101 – IN113)

Requirements:

- Only existing uninsulated bare piping is eligible for these measures.
- Replacement of existing insulation is not eligible for these measures.
- New or recently repaired piping is not eligible for these measures.
- Unless otherwise noted, the bare pipe size must be between ½ and 2½ inches nominal diameter, however piping that has nominal diameter of 3 or more inches may be eligible for a custom incentive.
- A minimum of 10 linear feet of pipe must be insulated.
- For HVAC and domestic hot water applications, these measures are limited to a maximum of 500 linear feet per boiler system.
- Insulation used for pipes should be high-density fiberglass insulation or closed-cell elastomeric foam insulation, shaped for pipes, and must have a minimum insulation rating of R-4 (approximately 1-inch thick).
- Non-conditioned and unconditioned spaces are defined as spaces that are not temperature controlled.
- Unless otherwise noted, conditioned spaces must be heated.
- The following must be included with the Pre-Notification Application:
  - Insulation specifications that include
    - Manufacturer's name.
    - Type of material.
    - Material insulation rating (K-value or R-value).
  - Documentation sufficient to verify the condition and age of the affected piping.
- Pipe insulation measures qualify for retrofit applications, but do not qualify for new construction applications.

Hydronic or Steam Space Heating (unconditioned space) and Space Heating Steam Condensate Pipe Insulation (Pre-Notification Required) (IN101 - IN103)

Requirements:

- These measures are available for adding insulation, where none currently exists, to existing hydronic space heating piping located in unconditioned spaces for systems operating at a minimum design supply water temperature of 180 degrees Fahrenheit (IN103), steam space heating system steam piping located in unconditioned spaces (IN101), and steam space heating system condensate piping located in conditioned or unconditioned spaces (IN102).
- Implementation of these measures must result in a decrease in natural gas use.
- Projects must meet the General Requirements for Pipe Insulation Measures specified separately in this section of the Catalog.
- The following must be included with the Pre-Notification Application:
  - » Documentation specified under "General Requirements for Pipe Insulation Measures" above.
  - » Documentation sufficient to verify the following:
    - Location of the affected piping (conditioned or unconditioned space).
    - For hydronic space heating system applications, the minimum design supply water temperature.
- Documentation must be included with the Final Application sufficient to verify the linear feet of new pipe insulation installed.
- Incentive is per linear foot of new pipe insulation installed, and the incentive rate varies depending on whether the piping carries steam, condensate or hot water for space heating.

Domestic Hot Water Pipe Insulation (Natural Gas Water Heater) (Pre-Notification Required) (IN104)

Requirements:

- This measure is available for adding insulation, where none currently exists, to existing domestic hot water supply and return piping systems operating at a minimum of 120 degrees Fahrenheit supply temperature.
- Implementation of this measure must result in a decrease in natural gas use.
- Projects must meet the General Requirements for Pipe Insulation Measures specified separately in this section of the Catalog.
- The following must be included with the Pre-Notification Application:
  - » Documentation specified under "General Requirements for Pipe Insulation Measures" above.
  - » Documentation sufficient to verify the following:
    - Domestic hot water supply temperature.
    - Location of the affected piping (conditioned or unconditioned space).
- Documentation must be included with the Final Application sufficient to verify the linear feet of new pipe insulation installed.
- Incentive is per linear foot of new pipe insulation installed, and the incentive rate is higher for piping located in an unconditioned vs. a conditioned space.

Process Steam (≥ 5 psig) Pipe Insulation (Pre-Notification Required) (IN105)

Requirements:

- This measure is available for adding insulation, where none currently exists, to existing process (non-HVAC) saturated steam piping systems operating at a minimum of 5 psig steam pressure.
- Implementation of this measure must result in a decrease in natural gas use.
- Projects must meet the General Requirements for Pipe Insulation Measures specified separately in this section of the Catalog.
- The following must be included with the Pre-Notification Application:
  - » Documentation specified under "General Requirements for Pipe Insulation Measures" above.
  - » Documentation sufficient to verify the following:
    - System steam pressure (psig).
    - Location of the affected piping (conditioned or unconditioned space).
- Documentation must be included with the Final Application sufficient to verify the linear feet of new pipe insulation installed.
- Incentive is per linear foot of new pipe insulation installed, and the incentive rate varies depending on whether the piping is located in a conditioned or unconditioned space and whether the customer has a Consumers Energy electric account, natural gas account, or both/combo account.

Process Steam (≥ 5 psig) Condensate Pipe Insulation (Pre-Notification Required) (IN106)

Requirements:

- This measure is available for adding insulation, where none currently exists, to existing process (non-HVAC) steam condensate piping for existing process saturated steam systems operating at a minimum of 5 psig system pressure.
- Only condensate return piping is eligible for this measure; condensate piping extending to a drain is not eligible for this measure.
- Implementation of this measure must result in a decrease in natural gas use.
- Projects must meet the General Requirements for Pipe Insulation Measures specified separately in this section of the Catalog.
- The following must be included with the Pre-Notification Application:
  - » Documentation specified under "General Requirements for Pipe Insulation Measures" above.
  - » Documentation sufficient to verify the following:
    - System steam pressure (psig).
    - Whether the affected piping extends to a drain.
    - The location of the affected piping (conditioned or unconditioned space).
- Documentation must be included with the Final Application sufficient to verify the linear feet of new pipe insulation installed.
- Incentive is per linear foot of new pipe insulation installed, and the incentive rate is higher for piping located in an unconditioned vs. a conditioned space.

PEX Pipe Insulation

PEX Pipe Insulation (Pre-Notification Required) (IN107- IN109)

Requirements:

- These measures are available for adding insulation, where none currently exists, to existing hydronic HVAC water PEX piping systems located in unconditioned spaces (IN108), and domestic hot water PEX piping systems located in conditioned (IN109) or unconditioned (IN107) spaces.
- For hydronic HVAC applications, water temperature must be greater than or equal to 180 degrees Fahrenheit for water supply piping, and greater than or equal to 165 degrees Fahrenheit for water return piping.
- For domestic hot water applications, system supply temperature must be at least 120 degrees Fahrenheit and a domestic hot water recirculation pump must be employed.
- The bare PEX pipe size must be between 3/8 and 2½ inches nominal diameter, however PEX piping that has a nominal diameter of 3 or more inches may be eligible for a custom incentive.
- All hot surfaces should be insulated.
- The surface temperature of the bare, uninsulated PEX piping must be recorded on the application.
- Inspection by program staff is required prior to installation of insulation to verify and document the following:
  - » The affected piping is not insulated, new or recently repaired.
  - » The nominal diameter of the affected piping.
  - » The surface temperature of the affected piping.
  - » The temperature of the hot water carried by the affected piping.
  - » The location of the affected piping (conditioned or unconditioned space).
  - » For domestic hot water applications, whether a domestic hot water recirculation pump is being employed.
- Hydronic HVAC supply and return systems must operate during the heating season.
- Implementation of these measures must result in a decrease in natural gas use.
- Projects must meet the General Requirements for Pipe Insulation Measures specified separately in this section of the Catalog.
- Documentation specified under "General Requirements for Pipe Insulation Measures" above must be included with the Pre-Notification Application.
- Documentation must be included with the Final Application sufficient to verify the linear feet of new pipe insulation installed.
- Incentive is per linear foot of new pipe insulation installed, and the incentive rate varies depending on the hot water application and location of the piping.

Pipe Insulation - Electric

Domestic Hot Water Pipe Insulation (Electric Heater) (Pre-Notification Required) (IN110)

Requirements:

- This measure is available for Consumers Energy electric customers adding insulation, where none currently exists, to existing electrically heated domestic hot water supply and return piping systems operating at a minimum of 120 degrees Fahrenheit supply temperature.
- Implementation of this measure must result in a decrease in electrical use.
- Projects must meet the General Requirements for Pipe Insulation Measures specified separately in this section of the Catalog.
- The following must be included with the Pre-Notification Application:

- Documentation specified under "General Requirements for Pipe Insulation Measures" above.
- Documentation sufficient to verify the following:
  - Domestic hot water supply temperature.
  - Location of the affected piping (conditioned or unconditioned space).
- Documentation must be included with the Final Application sufficient to verify the linear feet of new pipe insulation installed.
- Incentive is per linear foot of new pipe insulation installed, and the incentive rate is higher for piping located in an unconditioned vs. a conditioned space.

Refrigerant Piping Insulation (Electric) (Pre-Notification Required) (IN111 - IN113)

Requirements:

- These measures are available for Consumers Energy electric customers adding insulation, where none currently exists, to refrigeration piping, two inches or less in diameter, serving data center air conditioning systems and located in conditioned or semi-conditioned spaces (IN111), or serving medium (IN112) or low (IN113) temperature refrigeration systems and located in conditioned (may be heated utilizing any fuel source), semi-conditioned or unconditioned spaces.
- Implementation of these measures must result in a decrease in electrical use.
- Projects must meet the General Requirements for Pipe Insulation Measures specified separately in this section of the Catalog.
- The following must be included with the Pre-Notification Application:
  - Documentation specified under "General Requirements for Pipe Insulation Measures" above.
  - Documentation sufficient to verify the following:
    - Application of the affected piping (e.g. data center, refrigeration and temperature, etc.).
    - Location of the affected piping (conditioned or unconditioned space).
- Documentation must be included with the Final Application sufficient to verify the linear feet of new pipe insulation installed.
- Incentive is per linear foot of new pipe insulation installed, and the incentive rate varies depending on the use of the space being conditioned (data center air conditioning, medium temperature refrigeration or low temperature refrigeration) and whether the piping is located in a conditioned or unconditioned space.

Ductwork Insulation

Ductwork Insulation (Pre-Notification Required) (IN114 - IN117)

Requirements:

- These measures are available for installing insulation around existing non-insulated HVAC ductwork in an unconditioned (IN114, IN115) or exterior (IN116, IN117) space.
- Insulation must have an insulating value greater than or equal to R-3.3 (e.g. 1½-inch thick fiberglass).
- Both the supply air and return air ductwork is eligible for these measures.
- Exhauster venting ductwork is not eligible for these measures.
- Insulation must be added to existing non-insulated ductwork that is not new or recently repaired.
- A minimum of 10 linear feet of exposed ductwork must be insulated.
- It is recommended that all ductwork be sealed before it is insulated; please note that sealing and insulating leaking ductwork in damp building crawlspaces may exacerbate the existing moisture issues, thus it is recommended to address the moisture concerns before installing insulation (e.g. repair leaking water pipes, confirm rain gutters are properly discharging into storm drains or away from the building, etc.).
- Implementation of these measures must result in a decrease in natural gas use.
- The following must be included with the Pre-Notification Application:
  - Insulation specifications that include:
    - Manufacturer's name.
    - Type of material.
    - Material insulation rating (K-value or R-value).
  - Documentation sufficient to verify the following for the affected ductwork:
    - Whether it is uninsulated, insulated, new or recently repaired.
    - It's application (supply or return air).
    - It's location (unconditioned or external space).
    - It's condition and age.
- Documentation must be included with the Final Application sufficient to verify the surface area (ft^2) of ductwork insulated.
- Incentive is per square foot of ductwork insulated, and the incentive rate varies depending on the application (supply or return air) and location (unconditioned or exterior space) of the affected ductwork.
- These measures qualify for retrofit applications, but do not qualify for new construction applications.

Agricultural

General Requirements

- Must be a Consumers Energy electric and/or natural gas customer as indicated for each measure.
- Specifications (e.g. specification sheet) must be included with the Incentive Application for all new measure related products and equipment.
- Unless otherwise noted, incentives are not available for backup and redundant equipment and systems (see definition under "Project Requirements - Project and equipment types that are NOT eligible for incentives..." on page 8 of this Catalog).

Farm Energy Audit

Farm Energy Audit (AG101)

Requirements:

- This measure is available for completing a Type 2 Energy Audit as defined by the US Department of Agriculture.
- Facility must operate primarily as an agricultural business.
- The energy audit report must be included with the Final Application.

Grain

Grain Dryers (Pre-Notification Required) (AG102, AG103)

Requirements:

- These measures are available for permanently installing a new grain dryer where none previously existed (AG102) or replacing an existing grain dryer (AG103).
- New grain dryer must:
  - » Be natural gas heated
  - » Be permanently installed
  - » Have a minimum grain dryer efficiency of 1,590 Btu/lb. water.
- For retrofit applications, existing grain dryer:
  - » Must be in good condition
  - » Must be at least 10 years old.
  - » Cannot be utilizing heat recovery.
- The following must be included with the Pre-Notification Application:
  - » Specifications for the proposed new grain dryer that include:
    - Manufacturer's name
    - Model number
    - Operating efficiency.
  - » For retrofit applications, documentation sufficient to verify the following for the existing grain dryer:
    - Condition.
    - Age (years).
    - Whether it utilizes heat recovery.
- Documentation must be included with the Final Application sufficient to verify the annual volume of grain to be processed by the new grain dryer (bushels/ year).
- Incentive is based on the annual volume of grain to be processed by the new grain dryer (bushels/ year), and the incentive rate is higher for installing a new grain dryer vs. retrofitting an existing grain dryer.
- Measure AG103 qualifies for retrofit applications and measure AG102 qualifies for new construction applications.

Grain Storage Temperature and Moisture Management Controllers (Pre-Notification Required) (AG104)

Requirements:

- This measure is available for installation of a grain storage temperature and moisture management controller for a natural gas heated receptacle.
- The new control system must include the following:
  - » Multiple temperature and/or moisture sensors hung within the grain storage receptacle.
  - » Outdoor air temperature and relative humidity sensors.
  - » Temperature and moisture management controller; grain, outside air temperature and outside air relative humidity data must be sent to the controller to evaluate the internal bin conditions for control of the aeration fans.
- For retrofit applications, the existing grain storage aeration fans must:

- Be constant speed.
- Be uncontrolled.
- Operate a minimum of 1,000 hours per year.

- Data sensors must be digital; analog sensors are not eligible for this measure.
- Replacement of existing grain storage temperature and moisture management controllers is not eligible for this measure.
- Bi-Weekly bin inspection is still recommended after system installation.
- Aeration fans equipped with VFDs are not eligible for this measure.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the following for the existing grain storage aeration fans:
  - Control strategy.
  - Annual hours of operation.
- Documentation must be included with the Final Application sufficient to verify the rated horsepower (HP) of the controlled aeration fan motors.
- Incentive is based on the rated horsepower (HP) of the controlled aeration fan motors.
- This measure qualifies for new construction and retrofit applications.

Greenhouse

Greenhouse Heat Curtains (Pre-Notification Required) (AG105)

Requirements:

- This measure is available for installing heat curtains to retain heat in a natural gas heated commercial growing greenhouse for agricultural use.
- Curtains must have been designed by the manufacturer to be a heat curtain.
- For retrofit applications, the existing heat curtain cannot be functional.
- All heat curtains must have a natural gas savings rate of 40% or better and have a warranty or an effective product life of five years.
- Installation must allow the curtain(s) to be automatically or manually moved into place.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify whether the existing heat curtain is functional.
- Documentation must be included with the Final Application sufficient to verify the square footage of the affected greenhouse space.
- Incentive is based on greenhouse floor area (ft^2).
- This measure qualifies for new construction and retrofit applications.

Greenhouse Infrared (IR) Polyethylene Film (Pre-Notification Required) (AG106, AG107)

Requirements:

- These measures are available for installing infrared (IR), anti-condensate, polyethylene film on an existing or new natural gas heated greenhouse with a double–inflated (double-layer) polyethylene roof (AG107), or replacing an existing single-layer roof with a double-layer roof of infrared (IR), anti-condensate, polyethylene film (AG106).
- Infrared coating must be applied via the factory to the film; coatings applied on site to existing film are not eligible for these measures.
- The new infrared, anti-condensate, polyethylene film must have a minimum thickness of 6 millimeters and have a useful life of at least four years.
- For retrofit applications:
  - Both replacement of existing regular polyethylene film with no IR coating, and replacement of existing polyethylene film with IR coating that is past it's useful life (greater than or equal to four years old), is eligible for these measures.
  - If the existing greenhouse roof is single-layer, it must be upgraded to a double-inflated (double-layer) roof.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the following:
  - Whether the existing roof is single-layer or double-layer.
  - If existing film has IR coating, age of existing polyethylene film.
- Documentation must be included with the Final Application sufficient to verify the square footage of the affected greenhouse space.
- Incentive is based on greenhouse floor area (ft^2), and the incentive rate is higher for replacing an existing single-layer roof with a double-layer roof (AG106) vs. installing a new, or replacing an existing, double-layer roof (AG107).
- These measures qualify for retrofit applications and measure AG107 qualifies for new construction applications (install double-layer roof).

Greenhouse Environmental Controls (Pre-Notification Required) (AG108)

Requirements:

- This measure is available for installing an automated environmental control system for a natural gas heated greenhouse space.
- For retrofit applications, the temperature for the existing greenhouse space must not be automatically or manually set back.
- The automated environmental control system must, at the very least, control greenhouse space temperature setpoints with an hourly control configuration and a minimum temperature setback of at least 5 degrees Fahrenheit.

- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the current temperature control strategy for the existing greenhouse space.
- Documentation must be included with the Final Application sufficient to verify the following:
  - » Square footage of the affected greenhouse space.
  - » Temperature setpoints.
  - » Temperature setback schedule.
- Incentive is based on greenhouse floor area (ft^2).
- This measure qualifies for new construction and retrofit applications.

Greenhouse Floor or Bench Heating Systems (Pre-Notification Required) (AG109, AG110)

Installation of a floor or bench hydronic heating loop for agricultural greenhouse applications will achieve savings by creating a micro-climate around the plant instead of fully conditioning the entire environment of the structure. If the plant's root temperature is maintained at 67 degrees Fahrenheit, the air temperature surrounding the plant may be allowed to decrease 10 to 12 degrees Fahrenheit, down to approximately 55 degrees Fahrenheit, without affecting plant health.

Requirements:

- These measures are available for installing a floor or bench hydronic heating loop, either within the concrete or direct contact, for natural gas heated agricultural greenhouse applications.
- For retrofit applications, the existing heating system must be a forced air heating system (e.g. unit heaters) and may be retained for secondary, supplemental, or backup heating, however it may not be utilized as the primary source of heat.
- The boiler system serving the new hydronic heating loop must have a minimum thermal efficiency of 90%, and the temperature sensor(s) serving the system must be located within the growing media.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the existing heating system design.
- Documentation must be included with the Final Application sufficient to verify the following:
  - » Square footage of the affected greenhouse space.
  - » Thermal efficiency of the new boiler system.
  - » Location of the temperature sensors.
  - » Whether functional heat curtains are being utilized.
  - » For retrofit applications, the status of the pre-existing heating system.
- The incentive is based on the area of the greenhouse floor or bench served by the hydronic heating system (ft^2), and the incentive rate is higher for a greenhouse space without heat curtains vs. with heat curtains.
- These measures qualify for new construction and retrofit applications.

Ventilation

Agricultural Circulation, Exhaust and Ventilation Fans (Pre-Notification Required) (AG111)

Requirements:

- This measure is available for installing high speed agricultural circulation, exhaust, and ventilation fans.
- Fans must meet the criteria listed in Table 15.
- Incentive is per fan installed, and the incentive rate varies depending on the diameter of the fan blade.
- This measure qualifies for new construction and retrofit applications.

Table 15: Qualifying Minimum Efficiencies for Agricultural Fans

Fan Diameter	Exhaust Fan Minimum Efficiency	Circulation Fan Minimum Efficiency
24 - 35 inches	14.0 CFM/Watt @ 0.10	12.5 lbf/kW
36 - 47 inches	17.1 CFM/Watt @ 0.10	18.2 lbf/kW
48 - 72 inches	20.3 CFM/Watt @ 0.10	23.0 lbf/kW

Agricultural High-Volume, Low-Speed (HVLS) Fans (Pre-Notification Required) (AG112)

HVLS fans are an efficient alternative to high-speed box fans traditionally used in ventilation of livestock facilities. They are ideal for large areas with a high ceiling.

Requirements:

- This measure is available for installing high-volume, low-speed (HVLS) fans with a minimum diameter of 16 feet.
- Replacement of existing HVLS fan is not eligible for this measure.
- For retrofit applications, existing fans must be permanently removed from the affected space.
- Documentation must be included with the Final Application sufficient to verify there are no fans other than the new HVLS fan in the affected space..
- Incentive is per fan installed, and the incentive rate varies depending on the diameter of the fan blade.
- This measure qualifies for new construction and retrofit applications.

Agricultural Fan Thermostat Controllers (> 0.5 HP Fan Motors) (Pre-Notification Required) (AG113)

Requirements:

- This measure is available for installing a fan thermostat controller for agricultural circulation, ventilation and/or exhaust fans which has thermostat functions that disable the fans when the outside air temperature drops below a predetermined setpoint temperature, typically 70 degrees Fahrenheit.
- The circulation, ventilation, and/or exhaust fans to be controlled must be used in an agricultural setting and operate continuously May through October.
- Replacement of existing thermostat fan controller is not eligible for this measure.
- The controlled fan motor must be rated at greater than 0.5 HP.
- For retrofit applications, the existing fan motor must be manually controlled.
- This measure cannot be combined with any VFD/VSD or integrated variable speed motor (e.g. ECM) measures for the thermostat-controlled fan motors.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the current control strategy for the existing fan motors.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Rated horsepower (HP) of the controlled motors.
  - Operating schedule of the controlled motors.
- Incentive is based on the sum of the rated horsepower (HP) of the controlled fan motors.
- This measure qualifies for new construction and retrofit applications.

Irrigation

Variable Speed Drive on Agricultural Irrigation System Pumps (Pre-Notification Required) (AG114)

Requirements:

- This measure is available for installing variable speed drives (VSDs) for agricultural irrigation system pumps to allow the volume flow rate to be reduced to the minimum required.
- Pumps must operate a minimum of 500 hours per year to be eligible for this measure.
- This measure cannot be combined with the Micro (Drip) Irrigation Systems (AG116) measure nor the Low-Pressure or Zero-Energy Sprinkler Nozzle (AG117) measure.
- The replacement of existing VSDs is not eligible for this measure.
- For retrofit applications, qualified irrigation system designs include a) several center pivots served by one well, b) a corner arm center pivot where the water flow rate increases when the corner arms swing out towards the corners of the fields, or c) other design approved by program management (other designs will be reviewed on a case-by-case basis to determine eligibility for this measure or a custom incentive; if eligible for a custom incentive, a completed Variable Frequency Drive Information Worksheet (see Appendix of this Catalog) must be included with the custom incentive Pre-Notification Application, and must complete the pre- (if applicable) and post-retrofit power monitoring specified on the VFD Information Worksheet and include the data (kW) with the custom incentive Final Application.)
- Documentation must be included with the Pre-Notification Application sufficient to verify the design of, and current control strategy for, the existing irrigation system.
- Documentation must be included with the Final Application sufficient to verify the following for the controlled pump motors:
  - Rated horsepower (HP).
  - Operating schedule.
- Incentive is based on the rated horsepower (HP) of the controlled pump motor(s).
- This measure qualifies for new construction and retrofit applications.

Variable Speed Drives on Golf Course Irrigation System Pumps (Pre-Notification Required) (AG115)

Requirements:

- This measure is available for installing variable speed drives (VSDs) for golf course irrigation system pumps to allow the volume flow rate to be reduced to the minimum required.
- The replacement of existing VSDs is not eligible for this measure.
- The controlled pump motor must operate more than 750 hours per year.
- The following must be included with the Final Application:
  - A minimum of seven continuous days of post-installation power monitoring data (kW) representing typical water use (it is recommended to meter power every 15 seconds).
  - Documentation sufficient to verify the following for the controlled pump motors:
    - Rated horsepower (HP).
    - Operating schedule.
- Incentive is based on the rated horsepower (HP) of the controlled pump motor.
- This measure qualifies for new construction and retrofit applications.

Micro (Drip) Irrigation Systems (Pre-Notification Required) (AG116)

Requirements:

- This measure is available for installing a micro (drip) irrigation system.
- Drip tape systems are not eligible for this measure.
- For retrofit applications:
  - The existing irrigation system must be a high-pressure system (50 psi or greater at the sprinkler head).
  - The existing irrigation system must be an impact-type sprinkler irrigation system.
  - All existing sprinkler heads must be removed.
- This measure cannot be combined with the Variable Speed Drives on Agricultural Irrigation System Pumps (AG114) measure.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the following for the existing irrigation system:
  - System pressure (psig).
  - Type of irrigation system.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Size of the irrigated property (acres) (i.e., assessor's parcel map or other documentation).
  - For retrofit applications, that all pre-existing sprinkler heads have been removed.
- The incentive is based on the size of the irrigated property (acres).
- This measure qualifies for new construction and retrofit applications.

Low-Pressure or Zero-Energy Sprinkler Nozzles (Pre-Notification Required) (AG117)

Requirements:

- This measure is available for installing low-pressure or zero-energy sprinkler nozzles.
- For retrofit applications:
  - The existing system must be a high-pressure sprinkler system (50 psi or greater at the sprinkler head).
  - Must complete a one-to-one conversion from high-pressure sprinkler nozzles to low-pressure or zero- energy sprinkler nozzles.
- Both permanent (solid set) and portable (hand-move) sprinkler system nozzles are eligible for this measure.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the following for the existing system:
  - Quantity of sprinkler nozzles.
  - System pressure (psig).
- Incentive is per new nozzle installed.
- This measure qualifies for new construction and retrofit applications.

Low- or Zero-Energy Livestock Waterers (Pre-Notification Required) (AG118)

Requirements:

- This measure is available for installing new low or zero energy livestock waterers.
- New low energy waterer must have:
  - Minimum of two inches of insulation
  - Maximum combined heating element wattage of 250 watts.
- New Zero-Energy waterer must contain no heating elements.
- For retrofit applications:
  - The existing waterer must have heating elements.
  - The new low or zero energy waterer must serve the same herd size as the existing waterer.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify whether the existing waterer has heating elements.
- Documentation must be included with the Final Application sufficient to verify the size of the herd served by the new waterer.
- Incentive is per new livestock waterer installed.
- This measure qualifies for new construction and retrofit applications.

Dairy

Scroll Compressors for Dairy Refrigeration (Pre-Notification Required) (AG201 - AG204)

Requirements:

- These measures are available for installing a new high-efficiency compressor (e.g. scroll compressor) for a dairy refrigeration system.
- These measures are designed for one milk system per farm; if a farm has multiple milk systems, incentive will be based on the ratio of milk processed through each system.
- For retrofit applications, the existing compressor EER must be less than or equal to 9.5.
- New compressor EER must be greater than or equal to 10.5.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the EER for the existing compressor.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Pounds of milk pumped per day.
  - Whether the system has a functional milk pre-cooler heat exchanger.
- Incentive is based on pounds of milk pumped per day, and the incentive rate varies depending on the new compressor EER and whether the system includes a milk pre-cooler heat exchanger.
- These measures qualify for new construction and retrofit applications.

Variable Speed Drive on Agricultural Vacuum Pumps (Pre-Notification Required) (AG205)

Requirements:

- This measure is available for installing a variable speed drive (VSD) to control a blower-type agricultural vacuum pump.
- VSD must be automatically controlled to maintain the minimum required vacuum system pressure.
- The replacement of an existing VSD is not eligible for this measure.
- Documentation must be included with the Final Application sufficient to verify the rated horsepower (HP) of the controlled vacuum pump motor.
- Incentive is based on the rated horsepower (HP) of the controlled vacuum pump motor.
- This measure qualifies for new construction and retrofit applications.

Variable Speed Drive on Milk Pumps with Pre-Cooler Heat Exchanger (Pre-Notification Required) (AG206, AG207)

Requirements:

- These measures are available for installing a variable speed drive (VSD) on a milk pump, for a system that has an existing milk pre-cooler heat exchanger or is installing a new milk pre-cooler heat exchanger where none previously existed, to optimize the heat exchanger water flow to milk flow ratio.
- For retrofit applications:
  - If the existing system currently does not have a milk pre-cooler heat exchanger, a new milk pre- cooler heat exchanger must be installed at the same time the variable speed drive for the milk pump is installed to be eligible for the higher incentive “with New Milk Pre-Cooler (AG207)” measure.
  - A system with an existing milk pre-cooler heat exchanger, or installation of a replacement milk pre-cooler heat exchanger for a system at the same time as adding a variable speed drive, will be eligible for the lower incentive “with Existing Milk Pre-Cooler (AG206)” measure.
- Minimum daily milk production must be greater than or equal to 5,000 pounds per day.
- These measures may be combined with Milk Pre-Cooler Heat Exchanger (Chiller Savings) and/or Milk Pre-Cooler Heat Exchanger (Water Heating Savings) measures.
- These measures cannot be combined with any other VFD/VSD measure.
- These measures are designed for one milk system per farm. If a farm has multiple milk systems, incentive will be based on ratio of milk processed through each system.
- The replacement of an existing VSD is not eligible for this measure.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify whether the existing system has a milk pre-cooler heat exchanger.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Average daily milk production.
  - Whether the system has a functional milk pre-cooler heat exchanger.
- Incentive is based on pounds of milk pumped per day, and the incentive rate varies depending on whether heat is extracted from milk by an existing/replaced or newly added milk pre-cooler heat exchanger.
- Measure AG206 qualifies for retrofit applications and measure AG207 qualifies for new construction applications.

Milk Pre-Cooler Heat Exchangers (Chiller Savings) (Pre-Notification Required) (AG208)

Requirements:

- This measure is available for installing a heat exchanger ahead of the milk storage tank that utilizes well water to reduce the temperature of the milk before it enters the tank.
- Replacement of existing milk pre-cooler heat exchangers is not eligible for this measure.
- This measure may be combined with the Variable Speed Drive on Milk Pump with Pre-Cooler Heat Exchanger (AG206, AG207) measures.
- This measure cannot be combined with the Milk Pre-Cooler Heat Exchanger (Chiller plus Water Heating Savings) (AG209) measure.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify whether the existing system has a milk pre-cooler heat exchanger.
- Documentation must be included with the Final Application sufficient to verify the pounds of milk pumped per day.
- Incentive is based on pounds of milk pumped per day.
- This measure qualifies for new construction and retrofit applications.

Milk Pre-Cooler Heat Exchangers (Chiller plus Water Heating Savings) (Pre-Notification Required) (AG209)

Requirements:

- This measure is available for installing a heat exchanger ahead of the milk storage tank that utilizes well water to reduce the temperature of the milk before it enters the tank together with equipment that will enable utilization of heat transferred from the milk to well water by the heat exchanger to water that is currently heated (e.g. pre-heat wash water) by natural gas (AG209b) or electricity (AG209a).
- This measure may be combined with Variable Speed Drive on Milk Pump with Pre-Cooler Heat Exchanger (AG206, AG207) measures.
- This measure cannot be combined with Milk Pre-Cooler Heat Exchanger (Chiller Savings) (AG208) measure..
- Replacement of existing milk pre-cooler heat exchangers is not eligible for this measure.
- This measure typically involves the installation of a heat recovery tank.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify whether the existing system has a milk pre-cooler heat exchanger.
- Documentation must be included with the Final Application sufficient to verify the following:
  - Waste heat is being transferred to heated water.
  - Source of heat for heated water (natural gas or electricity).
  - Pounds of milk pumped per day.
- Incentive is based on pounds of milk pumped per day, and the incentive rate varies depending on the source of heat for the heated water (electricity or natural gas).
- This measure qualifies for new construction and retrofit applications.

Dairy Refrigeration Equipment Tune-up (AG210)

Requirements:

- This measure is available for completing a tune-up for commercial-grade on-farm dairy refrigeration equipment.
- Equipment must be installed and fully operational for at least 12 months prior to receiving a tune-up incentive.
- A Dairy Refrigeration Equipment Tune-Up Checklist must be completed by the service provider.
- Incentives are available for tune-ups only once per 24-month period with the intention of reducing energy use.
- The following must be included with the Final Application:
  - Tune-up Checklist prepared by the service provider.
  - Documentation sufficient to verify the pounds of milk pumped per day.
- Incentive is based on pounds of milk pumped per day.

LED Lighting Systems

Agricultural LED Grow Lighting (Pre-Notification Required) (AG211)

Requirements:

- This measure is available for installing new LED agricultural grow lighting fixtures.
- The new LED lighting fixtures should meet proper supplemental lighting levels in terms of photosynthetic photon flux density (PPFD, µmol/s/m^2) per watt of energy per area (W/m^2), expressed as photosynthetic photon efficacy (PPE, Mmol/J) suitable for specific vegetative, fruit and flowering plants; the intensity of the photosynthetically active radiation (PAR) light (400-700 nm) emitted should also be suitable to the respective plants being grown.
- For retrofit applications, the existing lighting fixtures:
  - Must be fluorescent, incandescent, high-pressure sodium or metal halide lighting fixtures.
  - Must be replaced with completely new LED lighting fixtures that reduce the lighting total input power (watts) for the space.
- Lighting fixture wattage, as listed on the application, must include the energy consumption of the applicable ballast and/or any other required operating device, and documentation must be included with the Incentive Application sufficient to verify the existing fixture wattage if the existing fixture is not listed in Table 2a, Table 2b or Table 2c in the Lighting section of this Catalog, or the fixture wattage is different than what is shown in those tables for a listed fixture.

- Documentation must be included with the Pre-Notification Application sufficient to verify the new LED lighting fixtures are listed by the DesignLights Consortium® (DLC®) as a qualified horticultural lighting product or meet the following requirements:
  - Photosynthetic Photon Efficacy (PPE) ≥ 1.90 µmol/J.
  - Horticultural Safety Certification to ANSI/UL 8800 (ANSI/CAN/UL 8800) by an OSHA NRTL or SCC-recognized body (e.g. UL, ETL, cUL, CSA, etc.).
  - Third-Party Tested.
  - Power Factor (PF) ≥ 0.90.
  - Photon Flux Maintenance (PFMp): Q_{90} ≥ 36,000 hours
  - Driver Lifetime ≥ 50,000 hours.
  - Fixture Warranty ≥ 5 years.
- Documentation must be included with the Final Application sufficient to verify the operating schedule for the new LED lighting.
- Incentive is based on the lighting input power reduction (watts) for retrofit applications, and on the rated input power of the new LED lighting fixtures (watts) for new construction applications; incentive rate is higher for new LED lighting fixtures that will operate at least 6,570 hours per year.
- Measures AG211a and AG211b qualify for retrofit applications, and measures AG211c and AG211d qualify for new construction applications.

Dairy Long-Day LED Lighting Systems (Pre-Notification Required) (AG212)

Requirements:

- This measure is available for installing a dairy long-day LED lighting system.
- Lighting fixture wattage, as listed on the application, must include the energy consumption of the applicable ballast and/or any other required operating device, and documentation must be included with the Incentive Application sufficient to verify the existing fixture wattage if the existing fixture is not listed in Table 2a, Table 2b or Table 2c in the Lighting section of this Catalog, or the fixture wattage is different than what is shown in those tables for a listed fixture.
- The new LED lighting system:
  - Must have new LED lighting fixtures that comply with applicable interior LED lighting measure (LT203 – LT211, LT302, LT303) requirements specified in the Lighting section of this Catalog.
  - Must have a minimum mean lumen light level at the cow's eye level, in spaces utilizing dairy long-day lighting, greater than or equal to 15 foot-candles, but no more than 24 foot-candles.
  - Must be operated 16 to 18 hours per day followed by 6 to 8 hours of darkness.
- For retrofit applications, the existing lighting fixtures:
  - Must be fluorescent, incandescent, high-pressure sodium or metal halide lighting fixtures.
  - Must be replaced with completely new LED lighting fixtures that reduce the lighting system total input power (watts).
- The proposed lighting system design layout, including the mean lumen light level at the cow's eye level, must be included with the Pre-Notification Application.
- Documentation must be included with the Final Application sufficient to verify the operating schedule of the new LED lighting system.
- Incentive is based on the lighting system total input power reduction (watts).
- This measure qualifies for new construction and retrofit applications.

Poultry LED Lighting Systems (Pre-Notification Required) (AG213)

Requirements:

- This measure is available for installing an LED lighting system for poultry production.
- Lighting fixture wattage, as listed on the Incentive Application, must include the energy consumption of the applicable ballast and/or any other required operating device, and documentation must be included with the Incentive Application sufficient to verify the existing fixture wattage if the existing fixture is not listed in Table 2a, Table 2b or Table 2c in the Lighting section of this Catalog, or the fixture wattage is different than what is shown in those tables for a listed fixture.
- New LED lighting fixtures must meet the following requirements:
  - Wavelength (nm) suitable to benefit specific poultry production (e.g. broiler, brooder, and layer production).
  - Safety Certification recognized by OSHA or the Standards Council of Canada (e.g. UL, ETL, cUL, CSA, etc.).
  - Third-Party Tested.
  - Power Factor (PF) ≥ 0.90.
  - Efficacy ≥ 80 lumens/watt in the white spectrum.
  - Lifetime (hours): L_{70} ≥ 50,000 or L_{90} ≥ 36,000.
  - Warranty ≥ 5 years.
- For retrofit applications, the existing lighting fixtures:
  - Must be high-pressure sodium, metal halide, fluorescent, or incandescent lighting fixtures.
  - Must be replaced with completely new LED lighting fixtures that reduce the lighting system total input power (watts).
- Incentive is based on the lighting system total input power reduction (watts).
- This measure qualifies for new construction and retrofit applications.

Indoor Agriculture

Indoor Agriculture Grow Room Dehumidification Units (> 155 Pints/Day) (Pre-Notification Required) (AG214)

Requirements:

- This measure is available for installing new portable or standalone dehumidification units in an indoor cannabis grow room that operates year-round.
- Greenhouse installations are not eligible for this measure.
- New unit must meet the following criteria:
  - Energy Factor ≥ 2.80 L/kWh.
  - Capacity > 155 pints/day.
- For retrofit applications:
  - The new unit must have the same capacity as the existing unit.
  - The existing unit must have an Energy Factor of ≤ 2.41 L/kWh.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the following for the existing dehumidification unit:
  - Capacity (pints/day).
  - Energy Factor (L/kWh).
- Documentation must be included with the Final Application sufficient to verify the use of the space.
- Incentive is based on the capacity of the new dehumidification unit (pints/day).
- This measure qualifies for new construction and retrofit applications.

Indoor Agriculture Grow Room LED Lighting HVAC Savings (Pre-Notification Required) (AG215)

Requirements:

- This measure is available for the HVAC energy savings resulting from installation of new LED agricultural grow lighting in indoor cannabis grow rooms.
- This measure is only available when combined with the Agricultural LED Grow Lighting (AG211) measure.
- Grow room must:
  - Utilize mechanical cooling.
  - Operate year-round.
- Spaces with free cooling are not eligible for this measure.
- Documentation must be included with the Final Application sufficient to verify the following for the affected space:
  - Use of the space.
  - Mechanical cooling is utilized for the space.
  - Operating schedule.
- Incentive is based on the lighting input power reduction (watts) from the companion Agricultural LED Grow Lighting (AG211) measure.
- This measure qualifies for new construction and retrofit applications.

Integrated Variable Speed Motors

Integrated Variable Speed Motor (e.g. ECM) on Agricultural Cold Storage AHU or Evaporator Fans (Pre-Notification Required) (AG301)

Requirements:

- This measure is available for installing an integrated variable speed motor (e.g. ECM) for an agricultural cold storage AHU or evaporator fan.
- For retrofit applications, the existing fan motor must be constant speed.
- Fan motor must operate a minimum of 2,000 hours per year.
- New motor must have a variable input.
- A brushless DC motor, also known as an electronically commutated motor (ECM), is eligible for this measure.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the control strategy for the existing fan motor.
- Documentation must be included with the Final Application sufficient to verify the following for the new fan motor:
  - Annual operating hours.
  - Rated horsepower (HP).
- Incentive is based on the rated horsepower (HP) of the new fan motor.
- This measure qualifies for new construction and retrofit applications.

Swine Heating

Heating Mats for Swine Farrowing Crates (Pre-Notification Required) (AG302, AG303)

Requirements:

- These measures are available for installing heat mats to warm swine within farrowing crates.
- For retrofit applications, these measures are available for replacing existing heat lamps used to warm swine within farrowing crates.
- Replacement of existing swine heat mats is not eligible for these measures.
- To be eligible for the double mats measure, the mats must be capable of warming two litters of separated piglets.
- New heat mats must operate at least 5,000 hours per year.
- For retrofit applications, documentation must be included with the Pre-Notification Application sufficient to verify the current method for warming swine within farrowing crates.
- Documentation must be included with the Final Application sufficient to verify the following:
  - » Annual operating hours for the new heat mats.
  - » For retrofit applications, that all pre-existing heat lamps have been permanently removed.
- Incentive is per new heat mat installed, and the incentive rate for installing a double mat is twice the incentive rate for installing a single mat.
- These measures qualify for new construction and retrofit applications.

Miscellaneous VFDs

Variable Frequency Drive on Agricultural Fans and Pumps (≤ 50 HP) (Pre-Notification Required) (AG304 - AG307)

Requirements:

- These measures are available for installing variable frequency drives (VFDs) or variable speed drives (VSDs) for agricultural fan (AG304, AG305) and pump (AG306, AG307) motors.
- The installation of a VFD/VSD must accompany the permanent removal or disabling of any throttling devices such as inlet vanes, bypass dampers, bypass valves, or throttling valves.
- For retrofit applications, the existing motor must be constant speed.
- The VFD/VSD speed must be automatically controlled by humidity, temperature, differential pressure, flow, or another variable signal.
- VFDs/VSDs installed on irrigation or HVAC systems are not eligible for these measures, however they may be eligible for another prescriptive measure or a custom incentive; if eligible for a custom incentive, a completed Variable Frequency Drive Information Worksheet (see Appendix of this Catalog) must be included with the custom incentive Pre-Notification Application, and must complete the pre- (if applicable) and post-retrofit power monitoring specified on the VFD Information Worksheet and include the data (kW) with the custom incentive Final Application.
- Motors rated greater than 50 HP are not eligible for these measures, however they may be eligible for a custom incentive; if eligible for a custom incentive, a completed Variable Frequency Drive Information Worksheet (see Appendix of this Catalog) must be included with the custom incentive Pre-Notification Application, and must complete the pre- (if applicable) and post-retrofit power monitoring specified on the VFD Information Worksheet and include the data (kW) with the custom incentive Final Application.
- The replacement of existing VFDs/VSDs is not eligible for these measures.
- The motor must operate more than 750 hours per year.
- A summary statement explaining the following must be included with the Pre-Notification Application:
  - » Motor application.
  - » Proposed motor VFD/VSD control strategy.
  - » For retrofit applications, the current control strategy for the existing motor.
- Documentation must be included with the Final Application sufficient to verify the following for the controlled motor:
  - » Rated horsepower (HP).
  - » Annual hours of operation.
- Incentive is based on the rated horsepower (HP) of the controlled motor, and the incentive rate varies depending on the annual hours of operation and whether the VFD/VSD is controlling a fan or a pump.
- These measures qualify for new construction and retrofit applications.

LEED® Whole Building

General Requirements

- Must be a Consumers Energy electric and/or natural gas customer dependent on the type of energy savings proposed.

New Construction Whole Building LEED® (Leadership in Energy and Environmental Design) (WB101 - WB103)

The intent of this approach is to validate the savings associated with LEED® certified buildings. Incentives are available for new construction projects that receive LEED certification. The incentives will be paid upon receiving LEED® Certification at the saving values validated by LEED. The LEED® Whole Building Approach incentives directly correspond to the LEED® NC v2009 and LEED® BD+C v4 ratings systems. Incentives are paid to Consumers Energy customers based on the energy savings (first year only) reported in the energy model and verified by the Green Building Certification Institute (GBCI) (incentive rates vary depending on the type of LEED® certification earned). For all specifications and guidance on these measures, please reference LEED® – EA Prerequisites Minimum Energy Performance (usgbc.org).

Customer Eligibility

- Projects must result in a facility improvement with a permanent reduction in electrical (kWh) and/or natural gas (Mcf) use at least 10% below baseline practices.
- Projects receiving the Whole Building Design Program incentive are not eligible to receive duplicate prescriptive and/or custom incentives for the same product or equipment.
- To be eligible under the New Construction Program, new construction/major renovation project must be classified as one of the following project types:
  - » New building projects wherein no structure or site footprint presently exists.
  - » Addition or expansion of an existing building or site footprint.
  - » Major tenant improvements that change the use of the space.
- Projects must apply the standards adopted by the Green Building Council Institute (GBCI) in the state of Michigan for the NC v2009 and LEED® BD+C v4 ratings system.
- Projects receiving the Whole Building Design Program incentive are not eligible to receive duplicate incentives for the same product, equipment, or service from more than one utility, unless that product, equipment, or service yields both natural gas and electric savings for a customer with two utility providers.
- Incentives are not available for renewable energy installations.
- Only savings calculated for interior building systems are eligible for these measures.
- Exterior lighting is not eligible for these measures, however it may be eligible for the exterior lighting New Construction LED Lighting Power Density (LT402) measure.
- Final Incentive Application must be received within 6 months of receiving the Certification of Operation (CofO) and within 60 days of the facility receiving the LEED® Certification.

Site Verification

- Upon submittal of the Final Incentive Application, program staff will conduct a second review to verify your project meets program requirements and to perform necessary inspections.

Energy Savings Analysis and Incentive Rates

- Applicants must utilize one of the GBCI approved software tools to provide a Whole Building Simulation energy model. The proposed model must reflect the designed system and be verified to match the mechanical, architectural, and electrical drawings and schedules. Ultimately, incentives will be paid upon receiving LEED® Certification at the savings value that is validated by GBCI during the certification process.
- Electrical Energy Savings
  - » 1 kWh per GBCI validation = 1 kWh savings.
- Natural Gas Fuel Savings
  - » 1 Mcf per GBCI validation = 1 Mcf savings.
  - » Conversion Constant: 10.28 therms = 1 Mcf.
- Projects are not allowed to take credit for savings above baseline for systems utilizing renewable energy.
- The incentive is based on the LEED® certified annual energy savings, and incentives are calculated separately for electric (kWh) vs. natural gas (Mcf) energy savings; incentive rate varies depending on the LEED® certification level (Silver, Gold or Platinum).

For all LEED® projects, please provide the following reports corresponding to the modeling software on your project.

	DO_{E2}, EQUEST & Visual DOE	Energy Plus	Carrier HAP	Trane TRACE
1	Building Energy Performance (BEPS)	Annual Building Utility Performance Summary (ABUPS)	Annual Cost Summary	Energy Cost Budget/PRM Summary
2	Building Utility Performance (BEPU)	System Summary - showing the unmet load	Unmet load reports for all plants and systems	Energy Use Summary Reports
3	Energy Cost Summary (ES-D)	Report that shows annual energy cost by fuel source	Systems Energy Budget by Energy Source	Performance Rating Method Details
4	System Design Parameters (SV-A)	-	System input data reports	Equipment Energy Use
5	Details of Exterior Surfaces (LV-D)	-	Wall constructions	Entered Values Report (for all rooms and systems)

The following documentation must be included with the Incentive Application in addition to the documentation outlined above. Energy savings will be validated per the LEED® review findings listed below:

- LEED® Certification Project Review Report and LEED Reviewers Comments.
- LEED® 2009 - EA Prerequisite 2: Minimum Efficiency Use Performance form. This form details the building's Performance Rating Method Compliance and Total Building Energy Summary.
- EAp2 Section 1.4 Table.xls from all supporting documentation included with the LEED® template.

Custom

General Requirements

- Must be a Consumers Energy electric and/or natural gas customer dependent on the type of energy savings proposed.
- Specifications (e.g. specification sheet) must be included with the Incentive Application for all new measure related products and equipment.

Custom Incentive (Pre-Notification Required) (CU101, CU102)

Requirements:

- Custom incentive projects must involve a facility improvement that results in a permanent reduction in electrical (kWh) and/or natural gas energy use (Mcf) because of an increase in system efficiency; projects that result in reduced energy use without an improvement in system efficiency are not eligible for a custom incentive, however projects that involve an automated control technology, such as energy management system programming, may be eligible for an incentive.
- All equipment purchased for custom projects must be new.
- Project measures covered by the prescriptive incentive portion of the program are not eligible for a custom incentive.
- Applicants have the option to apply for a custom incentive for projects that involve an integrated solution with both prescriptive and custom incentives.
- New Construction Projects can apply for a custom incentive if there is a verifiable reduction in electrical (kWh/yr.) and/or natural gas energy Mcf/yr.) use from a baseline system using applicable federal, state, and local energy codes and standard practices in the absence of regulations.
- For retrofit applications, the applicant is required to submit a Pre-Notification Application (see Custom Incentive Electricity and/or Natural Gas Savings Calculations below for requirements) while the existing equipment is still in operation to allow Consumers Energy the opportunity to verify the existing equipment.
- Project must have a simple payback period that is greater than or equal to one year and less than or equal to 15 years (project simple payback period equals the project cost divided by the annual energy savings). Consumers Energy reserves the right to require specific measurement and verification activities, including monitoring both before and after the retrofit is implemented, and to base the incentive payment on the results of these activities.
- Projects that are not eligible for incentives are specified under "Project Requirements - Project and equipment types that are NOT eligible for incentives..." on page 8 of this Catalog.
- The following must be included with the Pre- Notification Application:
  - » Estimates of the annual electricity and/or natural gas use of both the existing (if applicable) and proposed equipment based on the current operation of the facility (if applicable); for new construction applications, or if the existing equipment is at the end of its useful life, the applicant must substitute equipment that would meet the applicable federal, state, and local energy codes to estimate the baseline electricity and/or natural gas use when calculating the annual energy savings.
  - » Calculations and methods used to derive the savings, all assumptions used in the calculations, and documentation of the source of these assumptions (an Example Custom Incentive Calculation can be found in the Appendix of this Catalog); Consumers Energy will review the submittal and is solely responsible for the final determination of the annual energy savings to be used in calculating the incentive amount.
- Documentation sufficient to verify the electricity (kWh) and/or natural gas (Mcf) savings achieved by the project must be included with the Final Application.
- The incentive is based on the annual energy savings, and the incentive rate is higher for natural gas (Mcf) vs. electric (kWh) savings.

Process Improvement Guidelines

Manufacturing or process (non-HVAC), technically based, capital improvement projects resulting in an increase in production energy efficiency (kWh/unit or Mcf/unit, where unit could be defined as a measurement of production) may be eligible for a custom incentive. The following guideline is one way to analyze a custom process improvement. The savings method chosen must be agreed upon with Consumers Energy Business Energy Efficiency Programs. The customer must clearly identify the efficiency improvement. In following, electric projects would be evaluated based on the following parameters:

- The Annual Energy Savings attributed to replacement of equipment leading to increased production efficiency will be based on the unit energy savings multiplied by the production rate. The existing production equipment must be in good repair and operational. See dual baseline exception below.

  Annual Energy Savings =

  (Current Baseline kWh/unit – Proposed kWh/unit)

  x Production Rate

- Projects involving burnout, end of life, or natural replacement of equipment may use the new, future (proposed) production rate, however the unit energy savings baseline will be based on new equipment meeting minimum State or Federal energy efficiency standards or in-accordance to industry standard practices.

  Annual Energy Savings =

  (New Baseline kWh/unit – Proposed kWh/unit)

  x Proposed Production Rate

- The electrical energy use (kWh) must be based on the affected production equipment only. Production data will be validated with the customer's internal production documentation. In cases where the Proposed Production Rate exceeds the Current Baseline Production Rate, the following interpreted method shall be used:

  Production Rate =

  Current Rate + (Proposed Rate - Current Rate)
  x Correction Factor

Post-Retrofit Actual	Correction Factor
1 month	40%
2 months	60%
3 months	75%
4 months	90%

Process Improvement Example

In response to an increase in product sales, a plastic injection molding facility, operating 3,680 hours per year, is retrofitting its current 10-year-old injection molding machine to an improved injection molding machine that has both a higher capacity and is more efficient. The existing baseline machine can produce 100 lb./hr. of product at a unit energy rate of 15.0 kWh/lb. The proposed retrofitted machine is expected to produce 120 lb./hr. of product at a unit energy rate of 11.0 kWh/lb. Assume two months of daily typical production data averaging 120 lb./hr. was provided to support the increase in production data.

Since the existing machine is still fully operational and is being retrofitted to increase production and unit efficiency, the current in-situ operating performance can be used as the baseline. The proposed annual energy savings calculation can be calculated as follows:

Production Rate =

100 lb./hr. + (120 lb./hr. - 100 lb./hr.) x 0.60

= 112 lb./hr.

Annual Energy Savings =

(15.0 kWh/lb. – 11.0 kWh/lb.) x (112 lb./hr. x 3,680 hr./yr.)

=1,648,640 kWh/yr.

Please note that in some cases resulting in an increase in the production rate, a dual baseline approach may be more realistic in determining savings impacts. A dual baseline approach would be warranted if the customer would have had to install new equipment at improved production energy efficiencies, to meet minimum code requirements, or is a standard practice, or perhaps is the only option available. In some cases, interactive effects may be significant and must be included in the savings analysis. An example of significant interactive effects could be a project to better capture waste heat off the process. As a result of capturing additional waste heat, the facility uses more fuel for space heating. In this example, the interactive effect of the increased fuel used for space heating must be subtracted from the captured waste heat energy savings.

Additional Offerings

Building Operator Certification

Building Operator Certification is a competency-based training program for operations and maintenance staff working in commercial, institutional, or industrial buildings. This program achieves energy savings by training individuals directly responsible for the maintenance of energy-using building equipment and day-to-day building operations. Participants attend training classes, take quizzes and complete hands-on projects at their own facilities. Upon successful completion of the course, Consumers Energy customers may be eligible for incentives. Only participants who have facilities larger than 50,000 square feet (ft²) will be eligible for tuition reimbursement. For more information and current class registration, please visit **boccentral.org**.

Retro-Commissioning Facility IQ Service

The Retro-Commissioning (RCx) Facility IQ Service utilizes RCx techniques and a third-party provider to facilitate an approximate ASHRAE Level II facility audit, as well as ENERGY STAR® Portfolio Manager® benchmarking, to assist Consumers Energy customers to optimize the energy efficiency of their facilities. The focus of this service is to optimize the operation of the existing HVAC system(s) and Building Automation System(s) (BAS). While these assessments are particularly effective at identifying quick payback, no or low-cost improvements, capital type measures that could provide deeper savings and be eligible for prescriptive or custom incentives are also identified. The RCx Facility IQ Service has different qualification criteria and incentives depending on the size (square footage or energy usage) of the facility. Tier 1 focuses on large facilities and Tier 2 focuses on mid-size facilities.

RCx Facility IQ Tier 1 (Large) Facilities

Who can participate:

- Customers who purchase their electric and/or natural gas service from Consumers Energy.
- Modern BAS with most of the building controlled by Direct Digital Controls.
- > 125,000 ft² of conditioned space (heated and cooled) and/or > 1,600 MWH annual electricity consumption.
- No major maintenance issues.
- No major building systems upgrades planned for the next five years.
- Management commitment of resources to conduct study and implement findings (typically 20 man-hours).
- Willing to commit at least $7,500 toward implementation of low-cost or quick payback measures.

Incentives:

- An on-site facility energy assessment, including a formal assessment report with detailed analysis and calculations identifying prioritized facility improvement measures (FIMs), is provided at no cost to the customer (not to exceed $35,000).
- The customer will receive a $1,500 upfront incentive for customer provided study support.
- Incentives for implemented FIMs shall be split evenly between the provider and customer, up to 100% of the total FIM implementation cost less the $1,500 customer provided study support incentive, as follows:
  - FIMs implemented within 3 months of the study:
    - $0.05/kWh saved and $6.00/Mcf saved.
      - Customer receives: $0.025/kWh & $3.00/MCF.
      - Contractor receives: $0.025/kWh & $3.00/MCF.

RCx Facility IQ Tier 2 (Mid-Size) Facilities

Who can participate:

- Requirements are the same as for RCx Facility IQ Tier 1 facilities except:.
  - 40,000 to 125,000 ft² of conditioned space (heated and cooled) and/or 400 - 1,600 MWH annual electricity consumption.
  - Willing to commit at least $5,000 toward implementation of low-cost or quick payback FIMs.

Incentives:

- An on-site facility energy assessment, including a formal assessment report with detailed analysis and calculations identifying prioritized facility improvement measures (FIMs), is provided at no cost to the customer (not to exceed $25,000).
- The customer will receive a $1,500 upfront incentive for customer provided study support.
- Incentives for implemented FIMs shall be split evenly between the provider and customer, up to 100% of the total FIM implementation cost less the $1,500 customer provided study support incentive, as follows:
  - FIMs implemented within 3 months of the study:
    - $0.05/kWh saved and $6.00/Mcf saved.
      - Customer receives: $0.025/kWh & $3.00/MCF.
      - Contractor receives: $0.025/kWh & $3.00/MCF.

Retro-Commissioning Select Service

The Retro-Commissioning (RCx) Select Service utilizes remote analysis of multiple buildings with common HVAC control systems and similar HVAC components (e.g. school districts, national accounts, etc.) by a third-party provider, as well as ENERGY STAR® Portfolio Manager® benchmarking, to assist Consumers Energy customers to optimize the energy efficiency of their facilities. Custom analysis tools are utilized to calculate energy savings for the implemented facility improvement measures (FIMs).

Who can participate:

- Customers with multiple buildings located in Michigan that meet the following criteria:
  - Electric and/or natural gas service purchased from Consumers Energy.
  - Controlled by similar building automation systems (BAS) with direct digital control (DDC).
  - ≥ 40,000 ft² of conditioned space (heated and cooled) and/or ≥ 400 MWH annual electricity consumption.
  - No major maintenance issues.
  - No major building systems upgrades planned for the next five years.

Incentives:

- A virtual facility energy assessment, for the primary building chosen by the customer, will be facilitated through remote analysis of HVAC control systems by a third-party provider to identify facility improvement measures (FIMs) to potentially implement at the primary building and/or at any or all eligible secondary buildings.
- For FIMs implemented at the primary and/or at any or all eligible secondary buildings:
  - $0.05 per kWh saved and $6.00 per Mcf saved (up to 100% of the total FIM implementation and energy assessment costs).

Retro-Commissioning Defined Action Service

The Retro-Commissioning (RCx) Defined Action Service employs any number of 12 specifically defined but common building energy efficiency actions, as well as ENERGY STAR® Portfolio Manager® benchmarking, to find building system opportunities or issues. Custom analysis tools are then utilized to calculate energy savings for the implemented facility improvement measures (FIMs).

Who can participate:

- Customers who purchase their electric and/or natural gas service from Consumers Energy.
- Modern BAS with most of the building controlled by Direct Digital Controls.
- ≥ 25,000 ft² of conditioned space (heated and cooled) and/or ≥ 200 MWH annual electricity consumption.
- No major maintenance issues.
- No major building systems upgrades planned for the next five years.

Incentives:

- A limited scope facility energy assessment will be facilitated by employing any number of 12 specifically defined but common building energy efficiency actions to identify facility improvement measures (FIMs) to potentially implement.
- For implemented FIMs:
  - $0.05 per kWh saved and $6.00 per Mcf saved (up to 100% of the total FIM implementation and energy assessment costs)

ENERGY STAR® Programs

Consumers Energy Business Energy Efficiency Programs has teamed up with ENERGY STAR® to help your organization understand its current energy use and provide recommendations to help reduce energy use. This is accomplished by Benchmarking, setting an Energy Saving Goal, and developing an Energy Management Plan to implement.

Who can participate:

- Organizations with multiple buildings located in Michigan that meet the following criteria:
  - Electric and/or natural gas service purchased from Consumers Energy.
  - ≥ 5,000 ft² of conditioned space.
  - Management commitment of staff to assist with benchmarking and on-site building evaluation.
  - Agreement to submit and complete at least one project eligible for prescriptive or custom incentives.

Industrial Energy Management Program

The Industrial Energy Management program is designed to help industrial customers learn energy management tools and reduce energy use. This is accomplished through regional networking meetings, on-site training events, Kaizen activities and energy audits. Customers can reduce energy use between 10% and 20% during the first five years by adopting sound energy management techniques.

Who can participate:

- Consumers Energy electric customers with an annual energy use ≥ 1,000 MWh.
- Consumers Energy natural gas customers with an annual energy use ≥ 30,000 Mcf.
- If a customer receives both services, the energy use determines qualification.

Appendix

APPENDIX

Example Custom Incentive Calculation

- A batch chemical process requires aeration during a portion of the process which is accomplished by two 25 HP blowers. To ensure full aeration, both blowers run for 12 minutes of the 15-minute batch processing time. A study has been conducted that shows, on average, only 10.5 minutes of aeration is required for a full batch, and only 8 minutes for a half batch. The running current for each blower was measured as 21.8 amps.
- Production records from the prior 12 months show that on average, 31 half batches and 181 full batches are produced per week. The plant operates 50 weeks per year. It is proposed to incorporate a diffused oxygen sensor to optimize the duration of aeration through the blowers.

Parameters:

Motors:	480V, 3-phase
Existing blower run time:	12 minutes/batch
Existing current draw:	21.8 amps (each blower)
Average weekly batches:	181 full batches 31 half batches
Production wks./yr.:	50
Project cost:	$4,367.00
Blended electric rate:	$0.091/kWh

Assumptions:

Power factor:	0.8
Expected blower run with sensor:	10.5 minutes/full batch 8 minutes/half batch (to be verified post project)

Energy Savings Calculation

Electric Demand = V x A x PF x √3
= 480V x 21.8A x 0.8(PF) x √3
× 2 blowers = 28,999 W = 29 kW

Baseline Project Electric Energy Use

Electric Use $_{baseline}$ = (181 + 31) batches/week
x 50 wks./yr. x 12 min./batch
x 1 hr./60 min. x 29 kW
= 61,480 kWh/yr.

Post Project Electric Energy Use

Electric Use $_{new}$ = {(181 batches/week x 10.5 min.)
+ (31 batches/week x 8 min.)}
x 1 hr./60 min. x 29kW x 50 wks./yr.
= 51,920 kWh/yr.

Energy Savings

Annual Energy Savings = 61,480 kWh/yr. - 51,950 kWh/yr.
= 9,560 kWh/yr.

Annual Energy Cost Savings = 9,560 kWh x $0.091 kWh/yr.
= $869.96/yr.

Simple Payback Period = $4,367.00 / $869.96/yr.
= 5 yrs.

Anticipated Incentive = 9,560kWh/yr. x $0.10/kWh
= $956.00

APPENDIX

Sample Lighting Invoice

SAMPLE LIGHTING INVOICE

INVOICE

2 **Stark Mechanical**

123 W. 12th Street
Okemos, MI 48864
517-123-4567

1 INVOICE # 1234 Date: March 27, 2019

4 **SOLD TO**
Peter Quil
123 Happy St.
Grand Rapids, MI 48910

SHIP TO
Bruce Bannor
9876 Oak St.
Kalamazoo, MI 47650

SALESPERSON	JOB	SHIPPING METHOD	SHIPPING TERMS	DELIVERY DATE	PAYMENT TERMS	DUE DATE
Steve Rogars	Lighting retrofit	UPS	Due on receipt	3/21/2019	By Credit Card	2/1/2019

3

QTY	ITEM #	MANUFACTURER	DESCRIPTION	UNIT PRICE	DISCOUNT	LINE TOTAL
50	72866	Sylvania	GE-F28T8 / XLSP41ECO	$32.00		$1600.00
25	72262	Philips	GE-232-MAX-L-Ultra	$15.00		$375.00
				TOTAL DISCOUNT		
					SUBTOTAL	$1975.00
					SALES TAX	$118.50
				5	TOTAL DUE	$2093.50

Make all checks payable to ABC Mechanical
THANK YOU FOR YOUR BUSINESS!

REQUIRED INFORMATION

1. INVOICE NUMBER AND DATE
2. VENDOR NAME AND ADDRESS
3. ITEMIZED LIST OF EQUIPMENT MODEL NUMBER, MANUFACTURER, UNIT PRICE AND QUANITY
4. CUSTOMER NAME AND ADDRESS
5. TOTAL AMOUNT DUE

THE REQUIRED INFORMATION IS NEEDED FOR ALL PROJECTS; ANY MISSING INFORMATION WILL DELAY THE PROCESS OF YOUR PROJECT.

APPENDIX

Sample Boiler Tune-Up Checklist

Customer Information			
Company Name			
Address			
City	State	ZIP	Date
Phone			

Tune-Up Documentation (Submit one sheet per Tune-Up)		
Site Name	Manufacturer	Date of Tune-Up
Customer Contact Name	Model Number	Work Order/PO Number
Company Performing Tune-Up	Boiler Type	Annual Hours of Operation
Technician Performing Tune-Up	Boiler Size (MBH)	

- ☐ Measure pre/post combustion efficiency using electronic flue gas analyzer
- ☐ Provide date- and time-stamped documentation of the "after" combustion analysis and efficiency
- ☐ Adjust air flow and reduce excessive stack temperatures
- ☐ Adjust burner and natural gas input, manual or motorized draft control
- ☐ Clean burners, combustion chamber and heat exchanger surfaces
- ☐ Clean and inspect burner nozzles
- ☐ Complete visual inspection of system piping and installation
- ☐ Check safety controls

	Before	After
Combustion Efficiency		
Stack Temperature		
Oxygen Level		
Carbon Dioxide		
Carbon Monoxide		

Additional Comments

APPENDIX

Sample RTU/Furnace/Unit Heater/Process Burner Tune-Up Checklist

Customer Information

Company Name

Address

City | State | ZIP | Date

Phone

Tune-Up Documentation (Submit one sheet per Tune-Up)

Make | Model Number | Serial Number

Work Order/PO Number | Burner Size (Btu)

Date | Technician Performing Tune-Up | Company

Combustion Efficiency Percentage (Pre & Post adjustment) _____

Fan Section

- ☐ Check Filters. Clean or replace as necessary
- ☐ Check belt tension/wear; adjust or replace as necessary
- ☐ Inspect bearing and lubricate if needed
- ☐ Inspect sheaves for alignment or wear
- ☐ Check blower motor
- ☐ Check fan blades/housing; clean or repair as necessary

Electrical

- ☐ Check voltage
- ☐ Check contactors/relays
- ☐ Inspect circuit boards
- ☐ Amp check blow motor
- ☐ Check wiring/connections

Heating Section

- ☐ Check combustion efficiency and optimize
- ☐ Check CO, CO_2 and O_2 levels and optimize
- ☐ Check heat exchanger/flue
- ☐ Check pilot assembly/flame rod
- ☐ Check/clean burners
- ☐ Verify operating/safety controls
- ☐ Check inducer
- ☐ Provide date- and time-stamped documentation of the "after" combustion analysis and efficiency

Miscellaneous Equipment

- ☐ Check for proper damper or VFD/VSD operation
- ☐ Visually inspect insulation for moisture accumulation
- ☐ Visually inspect ductwork
- ☐ Check safety devices per manufacturer

APPENDIX

Variable Frequency Drive Information Worksheet

Completed worksheet must be included with the Incentive Application for all custom incentive VFD projects and where specified for prescriptive VFD measures. In addition, must complete a minimum of seven continuous days of line side (NOT load side) power monitoring before (if retrofit) and after installation (it is recommended to meter power every 15 seconds).

Fan / Pump Information

Fan or pump ID tag (from worksheet):	Type of area served by fan or pump:
If fan, note type (centrifugal, forward curve, backward curve, axial, etc.):	Equipment served by fan or pump:
Nominal Horsepower (HP) (if multiple motors, list individual HP ratings):	Nameplate motor efficiency (if multiple motors, list individual efficiencies):
Manufacturer:	Model:
Full load design conditions: Flow (CFM, GPM):	Pressure (inches static, feet of water, PSI, other):
Existing controls (discharge damper, inlet guide vanes, outlet control valve, bypass valve, etc.):	Existing set point (inches static, feet of water, PSI, other):

Operation Hours

The fan or pump operates the following hours (e.g. 0600 to 1800 or on demand):

Summer		Winter	
Weekdays	to	Weekdays	to
Saturdays	to	Saturdays	to
Sundays	to	Sundays	to
Number of shifts per weekday:		Number of shifts per weekend day:	

Existing Motor Load

The fan or pump operates the following hours (e.g. 0600 to 1800 or on demand): _____

Option 1 (retrofit): Measured input power under full load: _____kW (true RMS power), _____Power Factor (PF)

Option 2 (retrofit): Measured current and voltage under full load: _____Amps _____Volts
Three-phase load calculation = _____Amps x _____Volts x _____PF x 1.73 / 1,000 = _____kW

Option 3 (retrofit or new): Measured estimated fan or pump full load: _____kW
If estimating load, provide description, assumptions and formula used to calculate power:

Proposed Operations

The proposed VFD will be automatically controlled to maintain the following set points:

Flow (CFM, GPM, other): _____

Pressure (in static, feet of water, PSI, other): _____

If other, please describe: _____

APPENDIX

Compressed Air Correct Sizing Worksheet

Completed worksheet must be included with the Incentive Application when applying for the Correct Sizing Air Compressor (CA124) measure incentive. In addition, must complete a minimum of seven continuous days of power monitoring before and after retrofit (it is recommended to meter power every 15 seconds).

	Existing/Baseline	Proposed/Post
Size of Air Compressor(s) (HP)		
Air Compressor(s) Control Strategy		
Nominal Production Rate During Data Collection		

Annual Hours of Operation (hrs./yr.)	
Typical Discharge Pressure of the Air Compressor in this application (psig)	

APPENDIX

New Construction Building Interior Lighting Power Allowances

For interior lighting, the Building Area Method or the Space-by-Space Method can be used to assess the lighting power density allowances for new facilities, additions, or change in space type major renovations. Building exterior lighting power densities should be utilized for all new exterior lighting. The following LPD values and tables provided are from ASHRAE 90.1-2013 "Energy Standard for Buildings Except Low-Rise Residential Buildings." The Space-by-Space Method may be used instead of the Building Area Method. To utilize this method, refer to ASHRAE 90.1-2013.

Building Area Method Lighting Power Densities

Building Area Type	Lighting Power Density (Watts per ft^2)
Automotive facility	0.80
Convention center	1.01
Courthouse	1.01
Dining: bar lounge/leisure	1.01
Dining: cafeteria/fast food	0.90
Dining: family	0.95
Dormitory	0.57
Exercise center	0.84
Fire Station	0.67
Gymnasium	0.94
Health-care clinic	0.90
Hospital	1.05
Hotel/Motel	0.87
Library	1.19
Manufacturing facility	1.17
Motion picture theater	0.76
Multifamily	0.51
Museum	1.02
Office	0.82
Parking garage	0.21
Penitentiary	0.81
Performing arts theater	1.39
Police station	0.87
Post office	0.87
Religious building	1.00
Retail	1.26
School/university	0.87
Sports arena	0.91
Town hall	0.89
Transportation	0.70
Warehouse	0.66
Workshop	1.19

APPENDIX

New Construction Exterior Lighting Zones

Lighting Zone	Description
1	Developed areas of national parks, state parks, forest land and rural areas
2	Areas predominantly consisting of residential zoning, neighborhood business districts, light industrial with limited nighttime use and residential mixed-use areas
3	All other areas
4	High-activity commercial districts in major metropolitan areas as designated by the local jurisdiction

New Construction Individual Lighting Power Allowances for Building Exteriors

	Zone 1	Zone 2	Zone 3	Zone 4
Base Site Allowance (base allowance may be used in tradable or non-tradable surface)				
	500w	600W	750W	1,300W
Tradable Surface (LPDs for uncovered parking areas, building grounds, building entrances, exits and loading docks, canopies and overhands and outdoor sales area may be traded)				
Uncovered Parking Areas				
Parking Areas and Drives	0.04 W/ft^2	0.06 W/ft^2	0.10 W/ft^2	0.13 W/ft^2
Building Grounds				
Walkways less than 10 ft wide	0.7 W/linear foot	0.7 W/linear foot	0.8 W/linear foot	1.0 W/linear foot
Walkways 10ft wide or greater				
Plaza Areas	0.14 W/ft^2	0.14 W/ft^2	0.16 W/ft^2	0.2 W/ft^2
Special Feature areas				
Stairways	0.75 W/ft^2	1.0 W/ft^2	1.0 W/ft^2	1.0 W/ft^2
Pedestrian tunnels	0.15 W/ft^2	0.15 W/ft^2	0.2 W/ft^2	0.3 W/ft^2
Landscaping	0.04 W/ft^2	0.05 W/ft^2	0.05 W/ft^2	0.05 W/ft^2
Building Entrance, Exits and Loading Docks				
Main entries	20 W/linear ft of door width	20 W/linear ft of door width	30 W/linear ft of door width	30 W/linear ft of door width
Other doors	20 W/linear ft of door width	20 W/linear ft of door width	20 W/linear ft of door width	20 W/linear ft of door width
Entry canopies	0.25 W/ft^2	0.25 W/ft^2	0.4 W/ft^2	0.4 W/ft^2
Loading docks	0.5 W/ft^2	0.5 W/ft^2	0.5 W/ft^2	0.5 W/ft^2

APPENDIX

New Construction Individual Lighting Power Allowances for Building Exteriors (continued)

Sales Canopies				
Free Standing and Attached	0.6 W/ft²	0.6 W/ft²	0.8 W/ft²	1.0 W/ft²

	Zone 1	**Zone 2**	**Zone 3**	**Zone 4**
Outdoor sales				
Open Areas (including vehicle sales lots)	0.25 W/ft²	0.25 W/ft²	0.5 W/ft²	0.7 W/ft²
Street frontage for vehicle sales lots in addition to "open area" allowance	No allowance	10 W/linear foot	10 W/linear foot	30 W/linear foot
Non-tradable Surface (LPD calculations for the following applications can be used for the specific application only and cannot be traded between surfaces or with other exterior lighting. The following allowances are in addition to any allowance otherwise permitted in the "Tradable Surfaces" section of this table).				
Building facades	No allowance	0.1 W/ft² for each illuminated wall or surface for 2.5 W/ linear foot for each illuminated wall or surface length	0. 5 W/ft² for each illuminated wall or surface for 3.75 W/ linear foot for each illuminated wall or surface length	0.2 W/ft² for each illuminated wall or surface for 5.0 W/ linear foot for each illuminated wall or surface length
Automated teller machines and night depositories	270 W per location plus 90 W per additional ATM per location	270 W per location plus 90 W per additional ATM per location	270 W per location plus 90 W per additional ATM per location	270 W per location plus 90 W per additional ATM per location
Entrances and gatehouse inspection stations at guarded facilities	0.75 W/ft² of uncovered area (covered areas are included in the "Canopies and Overhangs" section of "Tradable Surfaces")	0.75 W/ft² of uncovered area (covered areas are included in the "Canopies and Overhangs" section of "Tradable Surfaces")	0.75 W/ft² of uncovered area (covered areas are included in the "Canopies and Overhangs" section of "Tradable Surfaces")	0.75 W/ft² of uncovered area (covered areas are included in the "Canopies and Overhangs" section of "Tradable Surfaces")
Loading areas for law enforcement, fire, ambulance, and other emergency service vehicles	0.5 W/ft² of uncovered area (covered areas are included in the "Canopies and Overhangs" section of "Tradable Surfaces")	0.5 W/ft² of uncovered area (covered areas are included in the "Canopies and Overhangs" section of "Tradable Surfaces")	0.5 W/ft² of uncovered area (covered areas are included in the "Canopies and Overhangs" section of "Tradable Surfaces")	0.5 W/ft² of uncovered area (covered areas are included in the "Canopies and Overhangs" section of "Tradable Surfaces")
Drive-through windows/doors	400 W per drive-through	400 W per drive-through	400 W per drive-through	400 W per drive-through
Parking near 24-hour retail entrance	800 W per main entry	800 W per main entry	800 W per main entry	800 W per main entry

APPENDIX

Affidavit of Natural Gas Infrared Heater Minimum 5 Degrees Fahrenheit Setpoint Reduction

I, _____, declare that after installing an infrared radiant (IR) heater that I will set the occupied temperature setpoint of the new IR heater a minimum of 5 degrees Fahrenheit lower than the occupied setpoint temperature of the previous or baseline forced air heating system (e.g. unit heaters, furnaces, etc.). An example would be if a space maintained at 70 degrees Fahrenheit by a previous unit heater would now be set back to a maximum temperature of 65 degrees Fahrenheit maintained by the new IR heater. Please note that in most cases, the thermostat setpoint reduction accounts for most of the fuel savings of IR heaters over conventional forced air heating systems.

I further declare that:

I am an authorized representative of company purchasing the new IR heater (i.e., Customer or End User).

Occupied Thermostat Setpoint of the previous or baseline forced air system: _____ degrees Fahrenheit.

Occupied Thermostat Setpoint of the new IR heater: _____ degrees Fahrenheit (must be at least 5 degrees Fahrenheit lower than the current or baseline thermostat setpoint).

NAME and ADDRESS OF THE CUSTOMER (COMPANY) RECEIVING THE IR HEATER:

_____

_____

_____

Signature: _____

Printed Name: _____

Title: _____

Date: _____

Please note: to be eligible for an infrared heater incentive from the Consumers Energy Business Solution Energy Efficiency Programs, the new IR heater thermostats must be set back a minimum of 5 degrees Fahrenheit lower than the previous or baseline forced air heating system.

Consumers Energy Business Energy Efficiency Programs

Questions: 877-607-0737 or ConsumersEnergyBusinessSolutions@cmsenergy.com

APPENDIX

Compressed Air Energy Audit Checklist

To assure a timely review and project approval, please complete this checklist.

Your system must meet the following requirements:

- ☐ Compressed air system has a rated horsepower (HP) of at least 50 HP excluding redundant, backup, and non-production air compressors (see Compressed Air – General Requirements for definitions).
- ☐ Compressed air system has an annual runtime greater than or equal to 2,000 hrs./yr. excluding redundant, backup, and non-production air compressors (see Compressed Air – General Requirements for definitions).

The following information must be included with the Incentive Application:

- On-site data collected for the individual compressed air equipment. Data must be logged for a minimum of seven continuous days and the parameters measured must include: power (kW), pressure (psig) and flow (CFM) where possible. Data must be provided to Consumers Energy Business Energy Efficiency Programs engineer.
- A written report containing the following information (please note which page in your report addresses each requirement):

  - ☐ Page ____ Brief description of the facility's air utilization by process.
  - ☐ Page ____ A detailed description of each air compressor, including backup, redundant and non-production air compressors (see Compressed Air – General Requirements for definitions), which must include rated HP, full-load kW, CFM and pressure; and control mechanism, machine status (i.e., either lead or lag), manufacturer and model number.
  - ☐ Page ____ Operating schedule and average annual hours of operation for each air compressor.
  - ☐ Page ____ Description of system storage capacity and demand/flow controllers.
  - ☐ Page ____ Flow diagram with description of flow path and pressures.
  - ☐ Page ____ Major compressed air leak detection survey, including identification, tagging and quantification of air leaks.
  - ☐ Page ____ Evidence of the completion of repairs on a spreadsheet detailing leak location, leak volume and date of repair. Verification of repairs must include one of the following: repair tickets, work orders or invoices for material and labor. Documentation must indicate which leaks were repaired and that at least 50% by volume of the air leaks identified in the audit have been repaired.
  - ☐ Page ____ Detailed potential energy/cost savings calculations based on measurements (both from leaks and compressed air system).
  - ☐ Page ____ Presentation of audit findings and recommendations.
  - ☐ Page ____ Detailed description of technology proposed to the customer, as appropriate.
  - ☐ Page ____ Approximate cost to improve system operation.
  - ☐ Page ____ Documentation of the current and proposed compressed air system efficiency in units of kW/100 CFM.

APPENDIX

Sample Steam Trap Maintenance Survey

1. Survey form

- This application requires that you provide a spreadsheet with survey/repair/replacement results as part of your steam trap maintenance program. A template is provided below, or you may use a professional report or another document with the same required information.

2. How to conduct the survey

- The survey may be conducted by a certified contractor or a certified customer technician. Surveys are typically performed using listening or temperature devices.
- Check and record the results for all steam traps being replaced in the facility that is requesting a rebate.

3. Submit your survey

- Include your completed survey as supporting documentation with the rest of your application.

	Existing			New		
	Trap#	**Location in Facility**	**Fail Status (Open/Closed)**	**Make**	**Model#**	**Trap Type**
Ex.	*27*	*North Press*	*Open*	*Manufacturer*	*800*	*Inverted Bucket*

Surveyor's Name Company Survey Date

Surveyor's Signature

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877-607-0737

ConsumersEnergyBusinessSolutions@cmsenergy.com

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