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Outside Ventilation Air Energy Costs



Commercial Baking facilities have requirements for exhaust air whether used for process applications or to provide occupant comfort and indoor air quality. You can be assured that what gets exhausted will be replaced by outside air whether it comes from makeup air units or as infiltration through the loading dock or points of least resistance (burr...wintertime). Certainly use of makeup air units is preferred since it provides conditioning before entering the facility, and when properly designed can help prevent insects, molds, and other particulates from entering the plant.

Northern Climates or those with heating degree days above 4,000 should be particularly concerned with the energy impact required to heat outside air and aware that the type and application of equipment installed has a major bearing on operating expenses. In most cases natural gas direct fired equipment is the best choice since it operates at 92% efficient compared to other sources that are pressed to achieve 70-80% and many times has inherent operational issues in bakery environments. Outside air control is very important and units are available in an "80/20" configuration that allows dynamic operation that modulates the amount of outside air needed based on space pressurization thereby optimizing energy savings potential. It is a good idea to perform an analysis to determine what loads are process and need to operate year around and those that can be disabled during winter operation.

Control of ventilation systems should be through an automated system but when manual operations are all that is available systems should be locked out to prevent someone from overriding at some point. It is also important to make sure that fans have operating dampers that close fully when the fans aren't in operation as open dampers allow air to relieve from the space costing money and allowing potential infiltration of "non-filtered" outdoor contaminants. For this reason our standard design uses motorized dampers for positive closure vs. the economical gravity type.

Outside air energy costs can be estimated by using calculations indicated below or contact us and we will gladly send a spreadsheet that will help estimate your energy costs and would be pleased to assist in developing industrial ventilation solutions for your company.

$$\text{Outdoor Air Energy Cost} = \text{Cost Unit} * ((24 * (\text{Operational Hours} / 8760)) * (\text{Degree Days} - 65 \text{ Base}) * (\text{Outside Air CFM} * 1.085) / (\text{Unit BTU} * \text{Operating Efficiency}))$$

Example Natural Gas Annual Cost @ 100,000 CFM:

$$\$136,252 = \$8.00 \text{ DT} * (24 * ((6800 / 8760) * 5898 * 100,000 * 1.085) / (1,000,000 * 70\%))$$

Savings Option 1: Savings Annual \$32,582 by upgrade systems to 92%.

Savings Option 2: Savings Annual \$27,250 by reducing airflow 20%.