**AR ${AR} – Use Compressor Exhaust to Heat during Winter Months**

### Recommended Action

### Divert warm air from the ${HP} HP compressor exhaust to save in heating costs during the winter months.

### Summary of Estimated Savings and Implementation Costs

|  |  |
| --- | --- |
| Annual Cost Savings | ${ACS} |
| Implementation Cost | ${IC} |
| Payback Period | ${PB} |
| Annual Natural Gas Savings | ${NGS} MMBtu |
| ARC Number | 2.2443.1 |

### Current Practice and Observation

The exhaust air from the ${HP} HP compressor in the plant is currently released into the atmosphere. This warm air could be redirected during the winter months to help heat the facility.

**Anticipated Savings**

It is found that up to 80% of the electrical energy consumed by an air compressor is converted into heat. Air compressor cooling systems can recover as much as 50% to 90% of the total heat generated[[1]](#footnote-1). This energy can be diverted into the plant to save natural gas heating costs during the winter months.

The annual natural gas savings, NGS, can be obtained with the following equation:

NGS = HP × FR × EC × C1 × η × OH,

where

HP = Size of air compressor; ${HP} HP

FR = Compressor power fraction; ${FR}%

EC = Fraction of electrical energy converted into heat; ${EC}%

C1 = Conversion factor from HP to MMBtu/hr; 0.002544 MMBtu/hr/HP

η = Efficiency of heat recovery; estimated ${EHR}%

OH = Wintertime operating hours; ${OH} hr/yr (${HR} hours/day × ${DY} days/week × ${WK} weeks/year)

NGS = ${HP} HP × ${FR}% × ${EC}% × 0.002544 MMBtu/hr/HP × ${EHR}% × ${OH} hrs/yr

= ${NGS} MMBtu/yr.

The annual cost savings, ACS, is calculate as:

ACS = NGS × Natural Gas Cost

= ${NGS} MMBtu/yr × ${NGC}/MMBtu

= ${ACS}/yr.

**Implementation Cost**

The implementation cost for this recommendation includes the purchase and installation of ductwork to distribute the warm air from the compressor to the plant during the winter, and a damper to duct the hot air outside during the summertime. The cost of such ductwork depends on geometry, available access, and other factors. A conservative estimate of the total implementation cost for this recommendation is around ${IC}.

**The total annual natural gas savings for this AR is ${NGS} MMBtu. The implementation cost of this recommendation is ${IC} and with an annual cost savings of ${ACS}, the payback period is about ${PB}.**

**Implementation Cost References**

The below links are for implementation cost references. We do not endorse/recommend these brands or products. Furthermore, these products may or may not be suitable for the application. The client should contact a vendor(s) to conduct a detailed study of the process, in order to determine the best product for the recommended application.

* <https://www.lowes.com/pd/IMPERIAL-3-25-in-x-10-in-x-36-in-Galvanized-Steel-Stack-Duct/3130037>
* <https://www.homedepot.com/p/Master-Flow-14-in-x-8-in-x-4-ft-Half-Section-Rectangular-Duct-RD14X8X48/100159140>
* <https://www.lowes.com/pl/Duct-fans-dampers-HVAC-duct-fittings-Heating-cooling/4294512240>

1. http://www.energystar.gov/ia/business/industry/downloads/Pulp\_and\_Paper\_Energy\_Guide.pdf [↑](#footnote-ref-1)