# GOOD PRACTICES IN SME

## Heat recovery in compressors

*Designed by freepik*

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## Compressor heat recovery installation

Compressors consume about 15% of the supplied electricity for producing compressed air. The remaining 85% is converted into heat, which is then radiated to the environment. Using heat recuperators can recover about 70-80% of the energy consumed by the compressor.

**Heat recovery for water heating**: waste heat is used to heat water up to 55 °C - 75 °C, which can then be used for utility or technological purposes.

**Heat recovery for heating**: waste heat can be used for air heating up to 25 °C - 40 °C, which can then be used to heat rooms or industrial drying.

*Source: KAPE based on „Good practices of implementation of energy efficiency measures in industry sheet nr. 105 - Compressed air system improvement cluster", EU MERCI, „Dokument referencyjny na temat Najlepszych Dostępnych Technik w zakresie Efektywności Energetycznej" Komisja Europejska,2009*


*Pic. 1 pneumatik: heat exchanger for a screw compressor*

## How to estimate the savings potential of using a heat recovery system for a compressor?

Using waste heat, we save financial resources which would normally be used to generate the same amount of heat in a gas or coal boiler. The savings potential can be estimated using the formula:

$$k = \frac{P_n \times \eta_{recovery} \times t_{work}}{W_o \times \eta_{motor} \times \eta_{boiler}} \times k_{fuel} \times 3{,}6$$

where:

$k - potenial\ savings\ [\frac{PLN}{year}]$

$P_n - power\ of\ the\ compressor\ [kW]$

$t_{work} - compressor's\ time\ at\ work\ annualy[\frac{h}{year}]$

$\eta_{recovery} - efficiency\ of\ heat\ recovery$

$\eta_{boiler} - boiler\ efficiency$

$\eta_{motor} - efficiency\ of\ the\ compressor's\ motor$

$W_o - calorific\ value\ of\ the\ fuel\ [\frac{MJ}{kg}]$

$k_{fuel} - cost\ of\ fuel[\frac{PLN}{kg}]$

## What savings can be achieved by using waste heat from a compressor to produce hot water when replacing a gas boiler?

Annual fuel (natural gas) cost savings for hot water production [PLN/year] under the following assumptions:

$\eta_{recovery} = 0{,}7$

$\eta_{boiler} = 0{,}9$

$\eta_{motor} = 0{,}9$

$W_o = 33{,}5\ [\frac{MJ}{m^3}]$

$k_{fuel} = 1{,}30\ [\frac{PLN}{m^3}]$

| | Compressor power [kW] | | | | | | |
|---|---|---|---|---|---|---|---|
| Compressor's hours at work [h/year] | 30 | 50 | 70 | 90 | 110 | 120 | 140 |
| 3 000 | 10 866 PLN | 18 109 PLN | 25 353 PLN | 32 597 PLN | 39 841 PLN | 43 463 PLN | 50 706 PLN |
| 3 500 | 12 677 PLN | 21 128 PLN | 29 579 PLN | 38 030 PLN | 46 481 PLN | 50 706 PLN | 59 158 PLN |
| 4 000 | 14 488 PLN | 24 146 PLN | 33 804 PLN | 43 463 PLN | 53 121 PLN | 57 950 PLN | 67 609 PLN |
| 4 500 | 16 299 PLN | 27 164 PLN | 38 030 PLN | 48 896 PLN | 59 761 PLN | 65 194 PLN | 76 060 PLN |
| 5 000 | 18 109 PLN | 30 182 PLN | 42 255 PLN | 54 328 PLN | 66 401 PLN | 72 438 PLN | 84 511 PLN |
| 5 500 | 19 920 PLN | 33 201 PLN | 46 481 PLN | 59 761 PLN | 73 041 PLN | 79 682 PLN | 92 962 PLN |
| 6 000 | 21 731 PLN | 36 219 PLN | 50 706 PLN | 65 194 PLN | 79 682 PLN | 86 925 PLN | 101 413 PLN |
| 6 500 | 23 542 PLN | 39 237 PLN | 54 932 PLN | 70 627 PLN | 86 322 PLN | 94 169 PLN | 109 864 PLN |
| 7 000 | 25 353 PLN | 42 255 PLN | 59 158 PLN | 76 060 PLN | 92 962 PLN | 101 413 PLN | 118 315 PLN |
| 7 500 | 27 164 PLN | 45 274 PLN | 63 383 PLN | 81 493 PLN | 99 602 PLN | 108 657 PLN | 126 766 PLN |
| 8 000 | 28 975 PLN | 48 292 PLN | 67 609 PLN | 86 925 PLN | 106 242 PLN | 115 900 PLN | 135 217 PLN |

*Source: KAPE*