



ROI & FUEL SAVINGS ANALYSIS

Heavy Equipment VIG ROI & Fuel Savings

Heavy Equipment | Cold Continental

APPLICABLE STANDARDS & REFERENCES

- SAE J1503 - Cab AC Performance
- ECE R43 / ANSI Z26.1
- ISO 3471:2008 - ROPS
- EPA eGRID 2023
- ISO 3449:2005 - FOPS

KEY RESULT

Annual Cost Savings

\$0

Simple payback: N/A

3.20 m2 cab glazing | Eff. deltaT 20 degC | 2,000 hrs/yr
Baseline U: 2.6 W/m2.K | VIG U: 0.55 W/m2.K | HVAC COP: 2 | Fuel: Diesel



RESULTS SUMMARY

Heavy Equipment | Cold Continental

Area: 3.20 m2	Eff. dT: 20 degC	Hrs/yr: 2,000	COP: 2	Fuel: Diesel	Cost: \$1.05/L
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ANNUAL ENERGY & FUEL SAVINGS

ANNUAL COST SAVINGS \$0 per year	HVAC ENERGY SAVED 0 kWh/yr per year
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PAYBACK & INVESTMENT

SIMPLE PAYBACK N/A Check inputs	INCREMENTAL COST \$896 \$280/m2 x 3.20 m2
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NET PRESENT VALUE

NPV AT 10 YR \$0 net of incremental cost	NPV AT 15 YR \$0 net of incremental cost	NPV AT 10 YR \$0 net of incremental cost
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CARBON IMPACT

ANNUAL CO2 REDUCTION 0 kg CO2 per year	LIFETIME CO2 (10 YR) 0 kg CO2 total avoided emissions
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DISCLAIMER

Steady-state conduction model per SAE J1503. Climate deltaT profiles are weighted annual averages. Diesel engine-driven compressor efficiency assumed 32%. Covers conduction only. Use as a comparative planning tool - not a certified energy audit.



METHODOLOGY & ASSUMPTIONS

ENERGY MODEL

Effective deltaT accounts for the mix of heating and cooling operation:

$$\text{deltaT_eff} = f_{\text{heat}} \times \text{deltaT_heat} + (1 - f_{\text{heat}}) \times \text{deltaT_cool}$$

$$E_{\text{hvac}} (\text{kWh/yr}) = U (\text{W/m}^2.\text{K}) \times A (\text{m}^2) \times \text{deltaT_eff} \times \text{operatingHours} / \text{COP} / 1000$$

$$\text{Fuel saved (L/yr)} = E_{\text{hvac_saved}} / 3.2 \text{ kWh/L (diesel, 32\% engine efficiency)}$$

CLIMATE DELTA-T PROFILES (degC)

Subarctic: heat 40 / cool 5 | 85% heating

Cold Continental: heat 28 / cool 10 | 65% heating

Temperate: heat 18 / cool 8 | 55% heating

Hot Arid: heat 8 / cool 28 | 20% heating

Tropical: heat 0 / cool 22 | 0% heating

FINANCIAL MODEL

Annual cost savings = Fuel saved (L/yr) x fuel cost (\$/L) [diesel] or Energy saved x \$/kWh [electric]

Simple payback = Incremental cost / Annual cost savings

NPV = Annual savings x $[(1 - (1+r)^{-n}) / r]$ - Incremental cost

CO2 reduction = Fuel saved x 2.68 kg CO2/L [diesel] or Energy saved x 0.35 kg/kWh [electric]

REFERENCES

SAE J1503 - Air conditioning performance test for off-road machines

ISO 3471:2008 - Earth-moving machinery, ROPS - Laboratory tests and performance requirements

ISO 3449:2005 - Earth-moving machinery, FOPS - Laboratory tests and performance requirements

ECE R43 - Uniform provisions concerning the approval of safety glazing materials

ANSI Z26.1 - Safety glazing materials for glazing motor vehicles