

# ENERGY SAVINGS REPORT - EXAMPLE 2



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TRANSPORTATION CABINET OFFICE BUILDING  
FRANKFORT, KENTUCKY  
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## NARRATIVE - TRANSPORTATION CABINET OFFICE BUILDING (TCOB) OPERATING COST COMPARISON

Annual operating costs for the Transportation Cabinet Office Building – as presently designed, with energy conservation measures; were compared to the same size and type building without energy conservation measures. The energy conservation measures are projected to save over half of the total annual operating costs. The total cost for the Transportation Building with energy conservation measures was \$753,454.00 compared to \$1,802,649.00 for the building without energy conservation measures.

The most effective energy conservation measure was the use of more efficient lighting fixtures. It used to take about 4 watts per square foot to achieve the required lighting levels. Now it takes less than 2 watts per square foot to achieve the same lighting level. The 75% efficiency light ballasts previously used have now been replaced with 95% high efficiency ballasts. Using these type lights reduced the cooling load due to lighting by over 50%.

Air system fan operating costs are substantially lower. Variable volume air systems with variable frequency drives reduced the cost from those using constant volume air systems.

Several energy conservation measures to the building shell contributed to less operating costs. Insulation in the walls reduced the wall heating and cooling loads by over 66%. Insulation did not used to be used in building walls. Using double pane tinted glass reduced the glass heating and cooling loads by over 50%, compared to single pane clear glass.

The underfloor air distribution system reduced energy costs. Because less ductwork is required in an underfloor air system, less fan horsepower was required to move the air.

Using hot water radiant heating panels along the North exposure enabled five air handling systems to be shut down during unoccupied periods.

Pre-cooling and pre-dehumidifying the ventilation air in a separate air handling system eliminated the requirement for summer reheat in the air handling systems serving the underfloor areas.

Using increased temperature differences between hot and chilled water supply and return piping systems resulted in less required pumping horsepower.

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# Annual Cost Summary

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**Table 1. Annual Costs**

Component	Conventional (\$)	TCOB (\$)
Air System Fans	390,894	69,566
Cooling	165,363	97,286
Heating	171,197	59,201
Pumps	10,937	3,816
Cooling Tower Fans	0	0
<b>HVAC Sub-Total</b>	<b>738,391</b>	<b>229,869</b>
Lights	957,649	416,976
Electric Equipment	106,609	106,609
Misc. Electric	0	0
Misc. Fuel Use	0	0
<b>Non-HVAC Sub-Total</b>	<b>1,064,258</b>	<b>523,585</b>
<b>Grand Total</b>	<b>1,802,649</b>	<b>753,454</b>

**Table 2. Annual Cost per Unit Floor Area**

Component	Conventional (\$/ft <sup>2</sup> )	TCOB (\$/ft <sup>2</sup> )
Air System Fans	0.894	0.159
Cooling	0.378	0.223
Heating	0.392	0.135
Pumps	0.025	0.009
Cooling Tower Fans	0.000	0.000
<b>HVAC Sub-Total</b>	<b>1.689</b>	<b>0.526</b>
Lights	2.191	0.954
Electric Equipment	0.244	0.244
Misc. Electric	0.000	0.000
Misc. Fuel Use	0.000	0.000
<b>Non-HVAC Sub-Total</b>	<b>2.435</b>	<b>1.198</b>
<b>Grand Total</b>	<b>4.124</b>	<b>1.724</b>
Gross Floor Area (ft <sup>2</sup> )	437143.0	437143.0
Conditioned Floor Area (ft <sup>2</sup> )	437143.0	437143.0

Note: Values in this table are calculated using the Gross Floor Area.

**Table 3. Component Cost as a Percentage of Total Cost**

Component	Conventional (%)	TCOB (%)
Air System Fans	21.7	9.2
Cooling	9.2	12.9
Heating	9.5	7.9
Pumps	0.6	0.5
Cooling Tower Fans	0.0	0.0
<b>HVAC Sub-Total</b>	<b>41.0</b>	<b>30.5</b>
Lights	53.1	55.3
Electric Equipment	5.9	14.1
Misc. Electric	0.0	0.0
Misc. Fuel Use	0.0	0.0
<b>Non-HVAC Sub-Total</b>	<b>59.0</b>	<b>69.5</b>
<b>Grand Total</b>	<b>100.0</b>	<b>100.0</b>