MELINK®
Intelli-Hood® Controls

ENERGY SAVINGS ANALYSIS

Think Green:
You will save money and energy with the Intelli-Hood controls. *But just how much?*

The following two energy savings analyses will help you calculate your potential annual savings and estimated time until payback.

The first report is our *One-Minute Energy Savings Calculator*. This is a great tool for someone who wants a quick, easy, and reasonably accurate estimate of savings.

The second is our *Detailed Energy Savings Report*, an excellent tool that produces an accurate and comprehensive description of savings. It yields objective results, as it utilizes an Outdoor Airload Calculator developed by independent PG&E consultant Don Fisher.

Each analysis uses the same data from a fast casual Mexican restaurant located in Houston, Texas. You will find that the *One-Minute Calculator* yields an energy savings that very close to the *Detailed Energy Savings Report* findings.

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ONE-MINUTE
ENERGY SAVINGS CALCULATOR

Annual Savings =

$$\frac{\text{CFM Reduction x Hrs/Yr x \$/CFM/Yr}}{\text{8760 Hours/Year}}$$

CFM Reduction is typically 10% to 50% of design exhaust volume. Therefore, the larger the hood and the more variable the cooking load, the greater the annual savings.

Hrs/Yr is the number of hours per year the kitchen hood actually operates. This typically ranges from 12 to 24 hours per day or 4380 to 8760 hours per year. The longer the hood operates, the more energy can be saved.

$/CFM/Yr is the average cost of conditioning (heating and cooling) make-up air per year. This number averages between $1 to $3 /CFM/Yr may be influenced by geographic location, energy costs, and type of heating equipment.

Payback Period =

$$\frac{\text{Installed Cost of Intelli-Hood® Controls}}{\text{Annual Savings}}$$

EXAMPLE

These are the estimated savings for the fast casual Mexican restaurant. It has a design exhaust volume of 2,900 CFM and operates for 15 hours a day.

Average CFM Reduction = 1,100 CFM
Hood operating hours = 5,475 Hrs/Yr
Cost of conditioning = $3/CFM/Yr

Annual Savings: $\frac{\text{1,100 CFM x 5,475 Hrs. x \$3/CFM/Year}}{\text{8760 Hours/Year}}$ = **$2,062 / Yr**

Payback Period: $\frac{\text{\$3,764 Installation}}{\text{\$2,062/Yr}}$ = **1.8 Years**

Melink Corporation **(513) 527-7020** **www.melinkcorp.com**

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DETAILED
ENERGY SAVINGS REPORT

REPORT SUMMARY

Company:	Fast Casual Mexican Restaurant
Location:	Houston, TX
Application:	Typical Store New Construction
Installed Cost:	$3,764
Total Savings:	**$2,102 / YR**
Motor Operating Savings:	$277 / YR
Heating Savings:	$597 / YR
Cooling Savings:	$1,227 / YR
Payback Period:	**1.8 YEARS**
Rate of Return:	
5 years	31.2%
10 years	41.7%

The projected savings shown above are based on the store's operating hours, HVAC system, cooking load, and geographic location. If the payback period is under three years or the internal rate of return is more than 25%, the Intelli-Hood® controls should be considered an excellent investment.

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MOTOR OPERATING SAVINGS

Input Data:

A.	Operating hours per day	15 HRS / DAY
B.	Operating days per week	7 DAYS/ WK
C.	Operating weeks per year	52 WKS / YR
D.	Horsepower of fan motor(s)	1.5 HP
E.	Cost per kilowatt hour	0.07 $/KW/HR

Constant Exhaust Volume Analysis:

F.	Total Time = A x B x C	5,460 HRS / YR
G.	Total KWHR / HP / YR = 0.746 / 0.9 x F	4525.7 KWHR/HP/YR

Variable Exhaust Volume Analysis:

H. % Rated RMP	J. % Run Time	K = F x J Time (HRS / YR)	L. Output (KW / HP)	M. System Effic	N = L / M Input (KW / HP)	O = K x N KWHR / HP / YR
100	9	491.4	0.746	0.9	0.829	407.3
90	11	600.6	0.544	0.9	0.604	363.0
80	14	764.4	0.382	0.9	0.424	324.4
70	35	1911	0.256	0.9	0.284	543.6
60	18	982.8	0.161	0.9	0.179	175.8
50	13	709.8	0.093	0.9	0.103	73.3
40	0	0	0.048	0.9	0.053	0
30	0	0	0.020	0.9	0.022	0
20	0	0	0.015	0.9	0.017	0
10	0	0	0.010	0.9	0.011	0
P. Total KWH / HP / YR (Total of Column O) =						**1,887.5**

Savings: (G - P) x D x E = **$277 / YEAR**

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CONDITIONED MAKE-UP AIR: HEATING

Input Data:

A.	Previous Net Exhaust Volume	2900 CFM
B.	New Net Exhaust Volume[1]	2085 CFM
C.	Winter Building Temperature	70° F
D.	Previous Net Heat Load[2]	283,499 kBTU
E.	New Net Heat Load[2]	203,836 kBTU
F.	Operating Hours per Day	15 HRS / DAY
G.	Operating Days per Week	7 DAYS/WEEK

Heating Fuel Type:

H.	Cost per Fuel Unit[3]	6 $/UNIT
J.	BTU per Fuel Unit[4]	1,000 BTU/UNIT
K.	System Efficiency[4]	0.8

Savings:

(D - E) x H / (J x K) = **$597 / YEAR**

Table 1

% Rated RPM (H)	% Run Time (J)	H x J
100	9	8
90	11	10
80	14	11
70	35	25
60	18	11
50	13	7
40	0	0
30	0	0
20	0	0
10	0	0
AVG % RPM =		**72%**

Notes

[1]Determine the New Exhaust Volume by completing Table 1. The New Exhaust Volume equals the AVG % RPM x the Previous Exhaust Volume.

[2]Using design weather data via the Outdoor Airload Calculator and multiplied by days/year ratio. (www.archenergy.com)

[3]Using local energy costs.

[4]Using typical system efficiency.

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CONDITIONED MAKE-UP AIR: COOLING

Input Data:

A.	Previous Net Exhaust Volume	2900 CFM
B.	New Net Exhaust Volume[1]	1595 CFM
C.	Previous Net Cooling Load[2]	638,823 kBTU
D.	New Net Cooling Load[2]	459,314 kBTU
E.	AC Correction Factor[3]	1
F.	Cost per Fuel Unit[4]	0.07 $ / KWHR
G.	System Efficiency[5]	3

Savings:

(C - D) x E x F / (3.413 x G) = **$1,227 / YEAR**

Notes

[1]Using New Exhaust Volume from CONDITIONED MAKE-UP AIR SAVINGS: HEATING on page 2 (see note 1).

[2]Obtained from Outdoor Airload Calculator (www.archenergy.com).

[3]The multiplier corrects for actual % outside air.

[4]Using local energy costs.

[5]Using typical system efficiency.

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AFTER-TAX CASH FLOW ANALYSIS

Input Data:

First Year Savings	$2,102 / YR
Initial Cost Plus Installation	$4,264
Marginal Tax Rate	34%
Estimated Annual Increase in Energy Costs	6%

Year	Savings	Cost	Depreciation (%)	Depreciation ($)	Net After-Tax Cash Flow[1]
0	-	($4,264)			($4,264)
1	$2,102	-	29	1,237	$1,808
2	$2,228	-	20	853	$1,760
3	$2,361	-	13	554	$1,747
4	$2,503	-	10	426	$1,797
5	$2,653	-	9	384	$1,882
6	$2,813	-	9	384	$1,987
7	$2,981	-	9	384	$2,098
8	$3,160	-			$2,086
9	$3,350	-			$2,211
10	$3,551	-			$2,344

Calculations:

Net Present Value[2] = $1,522
5 years @ 15%

Internal Rate of Return[3] (IRR) = 31.2%

Net Present Value = $4,598
10 years @ 15%

Internal Rate of Return = 41.7%

Notes

[1]Net After-Tax Cash Flow is calculated as follows:
NATCF = Savings - Costs - Tax Rate Savings - Costs - Depreciation)

[2]Net Present Value is calculated as follows: $NPV = C(0) + C(1)/(1 + r) + C(2)/(1 + r)^2 + ... + C(n)/(1 + r)^n$
(where C(n) is the net cash flow for the n^{th} year and r is the opportunity cost of capital)

[3] Internal Rate of Return is calculated by trial and error using the formula:
$NPV = C(0) + C(1)/(1 + IRR) + C(2)/(1 + IRR)^2 + ... + C(n)/(1 + IRR)^n$