

Energy Efficiency for the Commercial & Industrial Market

Delta Institute is a 501 (c)(3) non-profit that serves the Great Lakes region (founded 1998)

Mission

To promote economic development that is environmentally sustainable and socially equitable.

Energy Efficiency Expertise

- **Weatherization & Energy Efficiency Program**
 - **Institute Appliance Program**
- **EECBG energy efficiency audit program for commercial and industrial facilities**

Question: Why is energy efficiency important?

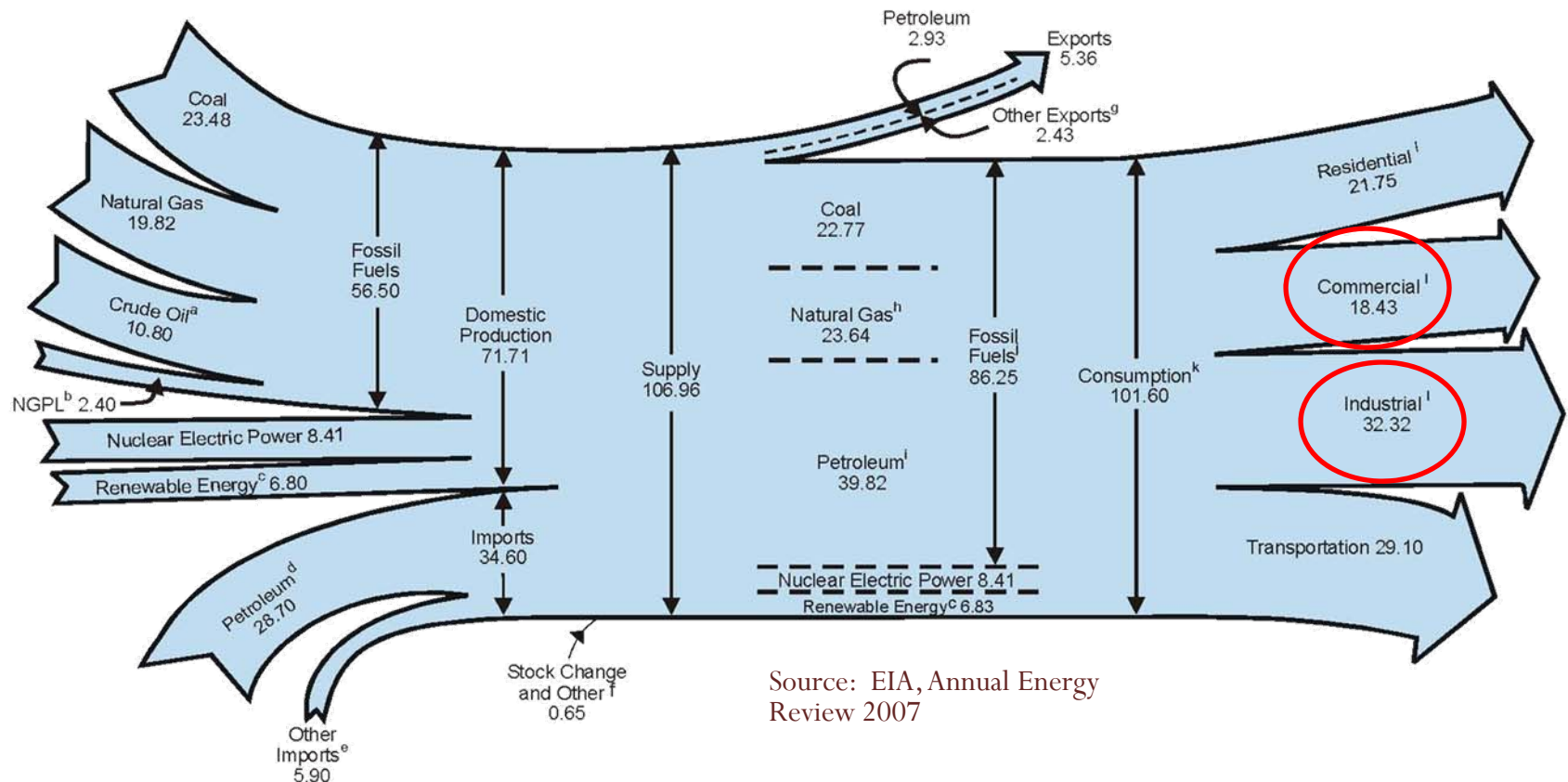


Answer: Depends on who you are...but

Saving Energy:

- Saves \$
Efficiency opportunities for C & I sector in heating, cooling, lighting, process systems, air compressing etc.
- Reduces financial risk
Reduces volatility of energy costs to a company's bottom line
- Reduces green house gas emissions from the burning of fossil fuels
- Promotes economic development

In the US, Commercial and Industrial accounts for over 50% of the Energy output.



Source: EIA, Annual Energy Review 2007



- **Commercial and Industrial facilities can typically save 30% of energy used** - U.S. Environmental Protection Agency, ENERGY STAR program
“Useful Facts and Figures.” 2007



**40,000 Square Foot Facility
Using 50,000 kWh hours per month**

- **Electricity cost per year:**

600,000 kWh/year X \$0.10 per kWh = \$60,000

30% savings = \$18,000 per annum!



**40,000 Square Foot Facility
Using 1,500 therms per month (on average)**

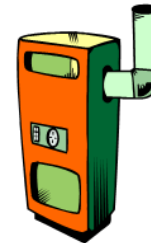
- **Natural gas cost per year:**

18,000 therms/year X \$0.80 per therm = \$14,400

30% savings = \$4,320 per annum!

Energy Audit Site Visit

- ASHRAE Level I, II and III
- Licensed energy auditor – Level II ½ day to 2 days
- Analysis of existing systems and equipment possibly through on site metering
 - HVAC
 - Lighting, Water Heating
 - Air compressor systems
 - Process systems
- Unobtrusive



Level II Energy Audit Report

May include a review of Level I elements:

- Building envelope
- Process systems
- Energy analysis
 - EUI
 - Distribution by end use
 - Utility bill analysis



** Plus*

- Energy Conservation Measures (ECMs) Detailed Analysis
 - Low Cost/No Cost – O&M or Retro commissioning
 - Capital Investment - Retrofits

Low Cost/No Cost ECMs

Maintenance & Operations vs. Retro Commissioning

Examples:

- Repair compressed air system leaks
- Repair drive belts and alignment
- Install vending misers
- Setback space temperature at night
- Install occupancy sensors
- Clean A/C condenser coils
- Install hot water pipe insulation

Capital Investment ECMs

Definition of Retrofit

Examples:

- Replace metal halide lighting with T-8 Fluorescent
- Replace old makeup air unit with infrared heating
- Replace HVAC units with high efficiency HVAC
- Eliminate simultaneous heating and cooling (BAS)

Case Study 1 - Office (30K sq ft) with Shop (20K sq ft)

O&M/ERM	Electric Savings (kWh)	Natural Gas Savings (therms)	Electric Demand Savings (kW-mo /yr)	Cost Savings (\$)	Project Cost (First Cost)	Incentive (\$)	Simple Payback in Years
Replace Existing T-8 Lamps with Lower Wattage T-8 Lamps	3,356	-	1.6	\$417	\$1,595	\$614	2.35
Setback Space Temperatures at Night	-	780	-	\$542	\$200	-	0.37
Install Occupancy Sensors in Selected Areas	5,218	-	0.3	\$502	\$1,223	\$934	0.58
Eliminate Electric Heat	6,826	-	-	\$627	\$30	\$0	0.05
Total	15,400	780	1.9	\$2,088	\$3,318	\$1,548	0.85

Case Study 1 - Office (30K sq ft) with Shop (20K sq ft)

Capital Investment/ERM	Electric Savings (kWh)	Natural Gas Savings (therms)	Electric Demand Savings (kW-mo /yr)	Cost Savings (\$)	Project Cost (First Cost)	Incentive (\$)	Simple Payback in Years
Eliminate Simultaneous Heating and Cooling	53,332	5,530	0	\$8,743	\$4,500	\$0	0.51
Install Heat trace System in Empty Garage	-12,600	5,719	0	\$2,821	\$9,048	\$0	3.21
Total	40,732	11,249		\$11,567	\$13,548	\$0	1.17

Case Study 2 – Production and Warehouse 45K sq ft

O&M/ERM	Electric Savings (kWh)	Natural Gas Savings (therms)	Electric Demand Savings (kW-mo /yr)	Cost Savings (\$)	Project Cost (First Cost)	Incentive (\$)	Simple Payback in Years
Repair Compressed Air System Leaks	105,987	0	16.1	\$12,888	\$7,500	\$3,180	0.3
Reduce Compressed Air System Pressure	22,055	0	3.4	\$2,691	\$1,800	\$661	0.4
Install Set-Back Thermostats	1,780	377	0	\$590	\$1,200	\$0	2.0
Repair Drive Belts and Alignment	9,418	0	0	\$1,130	\$3,400	\$0	3.0
Clean AC Condenser Coils	2,543	0	0	\$305	\$600	\$0	2.0
Total	141,783	377	19.5	\$17,604	\$14,500	\$3,841	0.6

Case Study2 – Production and Warehouse 45K sq ft

Capital Investment/ERM	Electric Savings (kWh)	Natural Gas Savings (therms)	Electric Demand Savings (kW-mo /yr)	Cost Savings (\$)	Project Cost (First Cost)	Incentive (\$)	Simple Payback in Years
Install Variable Frequency Drives	47,090	0	0	\$5,745	\$40,625	\$13,500	4.7
Pipe Outdoor Air to Air Compressor Inlets	28,868	0	4.4	\$3,522	\$5,000	\$866	1.2
Total	75,958	0	4.4	\$9,267	\$45,625	\$14,366	3.4
Replace 5 Older Roof Top Heating and Cooling Unit (Individual Incremental 8 to 14)	2,868	0	5.78	\$350	\$2,250	\$250	5.7



Utility company incentives are currently available and can save you substantial dollars when implementing energy efficiencies. Take advantage now!

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