Delaying Filter Maintenance: How Much is it Costing You?

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Regularly changing filters may not be high on your agenda. But when you look at how much intentionally or unintentionally delaying filter maintenance is costing you in terms of increased energy use, it suddenly becomes much more important.

Fact: *The cost of energy to push air through a filter usually exceeds the cost of the actual filter.*

Delayed filter maintenance causes the filter to run more days at peak energy usage. That means it doesn't take long for peak usage cost to offset any savings in filter price. (*See figure 3.*)

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Typical Life-Cycle Costs of Filter System

18% Filter Price and Installation

81% Energy Consumption

1% Filter Disposal

Filter price and installation represent only 1/5 of total filtration costs. But delaying the purchase of filters seems attractive because the savings appear to be immediate and tangible.

Energy use isn't as tangible. But it is the largest operating cost involved in filtration. It is also your biggest opportunity to save money.

Fact: *Filters play a major role in the energy consumed in operating the HVAC system in your building.*

It gets down to physics. Energy used is directly proportional to the airflow resistance of your filters. The more resistance, due to clogged filters, the more energy is used to push air through them.

Resistance typically increases as filters remove more and more contaminants from the air. This filtration is essential for air quality and protection of HVAC equipment. But it comes at an extremely high cost when filter maintenance is delayed.

Energy Consumption =

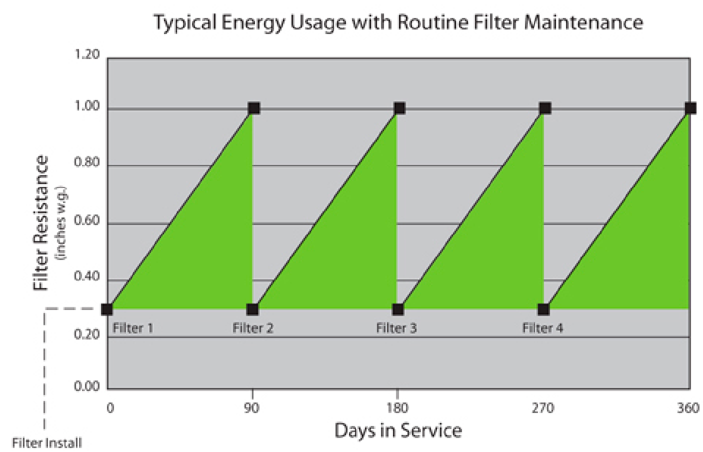
$$\frac{Q \times \Delta P \times t}{n \times 1000}$$

where:

Energy Consumption in kilowatt hours (kWh)
Q = airflow in cubic meters/second (m3/s)
ΔP = the average pressure drop across the filter in Pascals (Pa)
T = the time the fan is in operation in hours (hrs)
n = the product of the fan, motor, and drive efficiency in %

Figures 1 and 2 show typical loading curve schematics of routine maintenance (four cycles) versus delayed maintenance (three cycles).

Figure 1



In Figure 2, the red area shows the additional period of highest energy consumption.

Figure 2

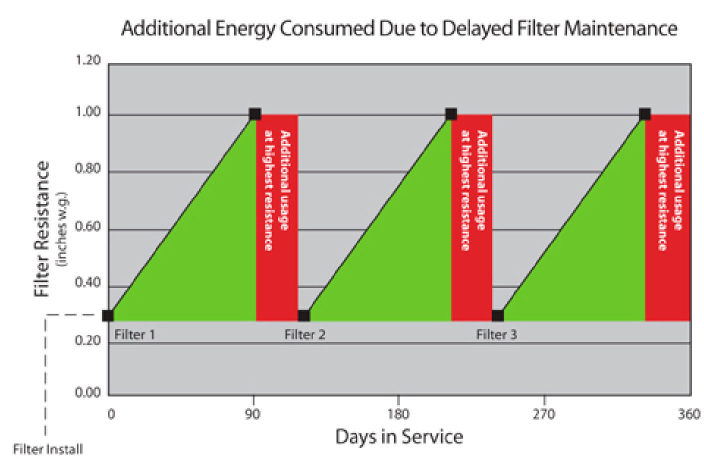


Figure 3 summarizes the total cost of a delayed versus routine filter maintenance approach. The energy cost of an extra month of usage is so high because the filters are operating at their highest airflow resistance.

Figure 3

Total Cost Comparison
Routine Versus Delayed Maintenance Schedule for Filter Change Outs

	Regular Scheduled Maintenance	Delayed Maintenance	Impact	
Initial Investment - Filter Cost *assumes $6 per filter; 100 filters in system*	$2,400	$1,800	$600	*savings*
Energy Consumption (kWhr) *assumes average △P is 0.64" wg*	227,660	259,600	31,940	*Additional kWh*
Energy Cost of System *at $0.07/kWhr*	$15,936	$18,172	$2,236	*Additional cost*
Total Cost	$18,336	$19,972	$1,636	*Total addl.cost*
CO^2 emissions (pounds) *at 1.354 pounds/kWh US EIA/DOE determined value*	**308,000**	**351,000**	43,000	*Additional CO_2*

While energy cost is one major factor, environmental impact is another cost to consider.

Fact: *Delaying filter maintenance increases energy production and CO2 emissions.*

According to the U.S. Environmental Information Administration, 1.354 pounds of CO2 are released into the atmosphere for every 1 kWh of electricity produced. The extra energy consumed by dirty filters drives up energy production and greenhouse gas emissions.

The bottom line: delayed filter maintenance may be extremely costly to your company – and our environment.

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