

**Extreme Reliability: Saving with your Air Compressor System**  
**Making the Best Green \$ Decision**



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## **Extreme Reliability: Saving with your Air Compressor System** *Making the Best Green \$ Decision*

Fleets have been buffeted by the economic storm for the past three years. Historically, counties and cities have shown recovery from recessions as long as 18-24 months following national economic recovery due to the lag in tax revenue collection associated with an economy in recession. In the US, the National League of Cities has expressed concern that the current downturn will last much longer in certain areas, as property tax revenues may be reduced for even longer than anticipated due to depressed property values. Also, business tax revenues will continue to be weak as many small businesses have failed to weather the crisis, and there are fewer new business startups. In fact, in many markets, property tax revenues are not forecast to return to 2007 levels for another 5-8 years.

Budget shortfalls are expected to be much more severe from 2011-2012. The municipal sector will likely see a fiscal shortfall of \$56-\$83 billion from 2010-2012 as a result of declining tax revenues and cuts in state funding.

But, though fleets have made adjustments to deal with these shortfalls in the current budget year, they are not expecting any relief in CY-2011. Fleet managers are taking various steps to address these economic constraints.

Three key concerns from the November 2010, Government Fleet article, "Top 10 Challenges Facing Public Sector Fleets in CY-2011" included zero-growth budgets, fuel prices and green fleet initiatives. Making the right choice on truck equipment and accessories - particularly with regards to a vehicle-mounted air compressor - can assist fleets in addressing these three issues.

### **Zero-Growth Budgets and Fuel Price Effect on Budgeting**

The decline in tax revenues and resulting budget constraints is considered the number one challenge facing public sector fleets in the 2011 calendar year. Since 2008, fleet managers have watched capital replacement budgets be impacted by the economic challenges facing the country - and the world.

Everything necessary to the operation of a fleet revolves around finances, and financial constraints will continue to affect public sector fleets for many years to come. As a result, the challenge for fleet management is to stretch the capital outlay budget as far as possible. Even with access to grants, budgetary shortfalls have caused grant requests to increase across the board. While the federal funding has helped with budgetary gaps, all fleets recognize the limitations of this solution and have been expecting a further reduction in available public funding in FY-2012.

Additionally, though fuel prices stabilized in 2010, a failure of the economy to stabilize may result in rising fuel costs. Fuel costs and alternative fuels continue to be a crucial issue for all fleets. Fuel volatility makes forecasting a fuel budget extremely difficult. As a result, fleets are budgeting tightly and looking for ways to reduce fuel consumption in the hope fuel prices will have less of an impact on their bottom line.



### Pressure to Expand Green Fleet Initiatives

Despite budget constraints, "green initiatives" continue to gain priority throughout the public works and utility fleet industry. Political support for carbon friendly, low-emission vehicle technologies, along with funding through the federal stimulus package has provided fleets the opportunity to acquire additional green vehicles and equipment.

Support for "green" fleets is expected to continue despite increasing pressure to reduce costs. Reducing emissions and fuel consumption continue to lead the response to these initiatives. This often means looking at more fuel-efficient tools, equipment and vehicle accessories to add value to this "greening" effort.

Fleet managers continue struggling to avoid the trap of making the wrong decision for what appears to be the right 'green' choice and choosing the right air compressor system can be part of this challenge.

Consider the following example:

- Truck Mounted Diesel – A 2011 6L 300 hp diesel Work Truck utilizes 50 HP to produce 150 CFM and .01 g/hp-hr PM (Maximum allowable Emissions per EPA regulations)
- Skid Mount Diesel Drive – A 2011, 10 hp diesel engine utilizes 10 hp to produce 30 CFM at .3 g/hp-hr PM (Maximum allowable Emissions per EPA regulations)

A job that takes 10 minutes with the Truck mounted 150 CFM air system will produce a total of .0833 g/hp-hr; whereas, the same job with the Skid Mounted 30 CFM compressor can take up to 5 times as long (50 minutes) and produce a total of 2.499 g/hp-hr. This produces 30 times more, not including additional energy and resources required in the manufacturing process to build, and eventually dispose of, two engines instead of one.

A smaller, more fuel efficient system, does not necessarily mean green. Cost savings must take into account fuel, labor and the loss of resources (for example, water losses from a broken water main that can't be repaired promptly when equipment and human resources are tied up at another job)

### Calculations

Skid mount		
HP	(PM) Particulate Matter	
1	0.249999	max allowable grams/hp-hr (.30) X Engine run time (.8333 hour)
10	2.49999	multiply by HP used = total grams of particulate matter
Truck w Air		
HP		
1	0.001667	max allowable grams/hp-hr (.01) X Engine run time (.166667 hour)
50	0.083333	multiply by HP used = total grams of PM

Additional info on EPA Exhaust and Crankcase Emission Factors for Engine Modeling Compression Ignition is available at <http://www.epa.gov/otaq/models/nonrdmdl/nonrdmdl2004/420p04009.pdf>



### **Condition Extremes**

Regardless of location, fleets are expected to operate in freezing climates, intense heat environments and in heavy precipitation, when demand can be greatest. Finding an air compressor that is designed for these conditions can go a long way toward addressing budgetary and environmental concerns.

From fuel and lubrication to equipment readiness to ability to perform to reliability, the design and characteristic of the air compressor a fleet uses can have a direct impact on the organization's biggest concerns.

Some specific features of air compressor systems can reduce issues that might arise in extreme weather conditions:

#### **Cold Climates**

- Specially designed compressor oils – particularly synthetic blends – ensure reliable performance and reduction in equipment issues and maintenance problems
- Pre-use preparation – such as compressor oil warming to ensure correct viscosity and appropriate hydraulic pressure (cold climate kit or digital control warming stage) – also contributes to cost savings and reduced environmental impact
- Maintaining recommended hydraulic oil viscosity – ensures equipment longevity and reduced operating costs

#### **Hot Environments**

- Air compressors equipped with a variety of system temperature probes ensures hydraulic and compressor fluid temperatures to not exceed recommended limitations by allowing system shutdown with a safety circuit
- Air-Liquid Cooling through a dual core cooler with a dedicated electric fan also prevents temperature excesses
- Equipment color and material – such as light colors for reflecting heat and lightweight aluminum panels for superior temperature conduction keeps equipment in ideal operating temperature range

#### **Heavy Precipitation**

- Weatherproofed electrical connections ensure uninterrupted operation and reduced maintenance needs
- O-rings, special weather packs and an air-tight system prevents electrical shorts and potential corrosion.
- All fasteners should be plated or stainless steel, housings should be aluminum and all other steel items should be fully powder-coated to ensure corrosion-resistance



## Vehicle-Mounted Air Compressors and Extreme Weather Conditions

Given the range of services provided by public works and utility fleets, performing in extreme weather conditions – intense heat, severe freezes, dangerous snow events, heavy precipitation, and strong winds – is considered mandatory. The public relies on public works and utility fleets for their safety in these extreme conditions. As such, fleets need to be able to rely on their vehicles, equipment and tools when these situations arise. Choosing the right vehicle-mounted air compressor can ensure reliability at these times as well as quick response while still addressing budgetary and environmental concerns.

### Types of Vehicle-Mounted Air Compressors

Most vehicle-mounted air compressors offer a variety of features that allow them to perform in extreme conditions while still addressing budgetary concerns and environmental impact. Not all air compressor systems have all the necessary features, or are reliable in those circumstances. The types of vehicle mounted air compressors available that could manage these conditions include:

#### Gas/Diesel Drive

A portable or mounted, self-contained compressor system. These compressors can be found skid mounted, chassis mounted or trailer mounted, referred to as a tow behind.

**Extreme weather features may include:** insulated enclosures, electric battery warmers, oil pan warmers, oversized cooler or block heaters.

**Budget consideration:** Transferability between vehicles, right-sized engines for fuel consumption

**Environmental benefit:** Running a smaller engine reduces exhaust and fuel use

#### PTO Direct Drive and PTO Shaft Drive

Both of these air compressor systems are driven off a Power Take Off (PTO) mounted to the vehicle's transmission or split off of the vehicle's drive shaft. Typically these represent larger, 100 CFM plus compressors.

**Extreme weather features may include:** Oversized cooler. Generally open to the elements.

**Budget consideration:** Initial install costs are higher, only utilizes the vehicle engine

**Environmental benefit:** Powered by only one engine and requires maintenance of only one engine, fewer enclosure components (less raw materials used)

#### PTO Hydraulic Underdeck

This is similar to both above deck and PTO direct drive and shaft drive underdecks. The PTO hydraulic is powered by a hydraulic pump driven by the PTO. The difference being that the components are all mounted under the vehicle, rather than on top.

**Extreme weather features may include:** hydraulic tank heater or an extra hydraulic cooler.

**Budget consideration:** Initial install costs are higher, only utilizes vehicle engine, less equipment allows for purchase of an additional time, labor and money saving piece of equipment

**Environmental benefit:** Powered by only one engine and requires maintenance of only one engine, fewer enclosure components (less raw materials used)



### **Underhood**

Rotary screw air compressor system integrated with the truck engine and fully contained under the hood. Compact and powerful, these compressors can produce up to 175 psi and up to 150 CFM.

**Extreme weather features:** because these systems are tied to the cooling system of the vehicle, in extreme weather situations they automatically benefit from the cooling function in extreme heat conditions and the heating function in extreme cold. Additionally, by being mounted under the hood they are also protected from excess precipitation.

**Budget consideration:** Uses one engine, reduced weight/payload, decreased idling and emissions, lighter weight construction material, no receiver tank, more compact size reduce size of vehicle required, reduced fuel and insurance costs, one less piece of equipment allows for the purchase of an additional time, labor and money saving piece of equipment

**Environmental benefit:** Uses one engine, variable speed throttle controls, reduced vehicle weight, improved equipment performance reduces fuel consumption

### **Hydraulic Above Deck**

May be a smaller, reciprocating type compressors or a larger, more powerful rotary screw system. Mounted on the truck deck and usually packaged in a metal enclosure. Run by hydraulic power, typically from a PTO or sometimes from an engine-driven clutch pump.

**Extreme weather features may include:** automatic cold-sensing, pre-warming of hydraulic oil, soft start, cooler bypass check valve.

**Budget consideration:** All components needed to run hydraulics, initial cost of bare compressor can be lower, one less piece of equipment allows for the purchase of an additional time, labor and money saving piece of equipment

**Environmental benefit:** Throttle-Enable functions, soft start, unload and standby modes

### **Conclusion**

When making a choice on a vehicle-mounted air compressor system, fleet managers need to take into account their key concerns – tight budgets and environmental impact – as well as the ability of the equipment to handle extreme weather conditions that are routine for a fleet. Longevity and reduced maintenance needs contribute toward improved budgets, while proper equipment functioning reduces the environmental impact.