

# 9 Debunked Myths on Nitrogen Tire Inflation



# INTRODUCTION

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Nitrogen tire inflation remains a new technology, one that has yet to be widely adopted by managed fleets as a way to go *GREEN* while improving the fleet's efficiency and the company's bottom line. Widely embraced by large industries such as the airlines and NASCAR for decades, it remains out of the mainstream. Many fleet managers and transportation directors have never heard of using Nitrogen for tire inflation, or may be skeptical that this application is just a gimmick. Others may just be reluctant to change from compressed air, or are hesitant to invest CAPITAL into a service they know very little about. Regardless, here are nine myths about Nitrogen tire inflation that HAVE been generally used to influence fleet managers and transportation directors from Nitrogen's use in their vehicles. These nine myths have been argued by bloggers, pitched by technicians at tire stores, and repeated by media everywhere without much regard to the science that proves Nitrogen's effectiveness as the BEST tire inflation medium. This white paper has been authored to provide transparency and in-depth clarity on WHY Nitrogen tire inflation is not a gimmick, but a viable way to create *hybrid tires*. Nitrogen tire inflation can reduce the America's dependence on foreign oil and to improve a company's environmental footprint through carbon reduction and sustainable practices for future generations.

## **1) NITROGEN ELIMINATES THE NEED TO REGULARLY CHECK TIRE PRESSURE.**

This is unequivocally false. While Nitrogen leaks out of a tire at a slower rate than Oxygen, this doesn't eliminate the necessity of regular pressure checks. Nitrogen still leaks out of a tire. There are numerous issues (valve stem, puncture, and rim seal) that will cause leaks within a tire and lead to unsafe driving conditions. Nitrogen will maintain pressure longer than tires filled with compressed air, and will make your tires safer to drive on, but we advise against using Nitrogen tire inflation as a substitute for regular pressure checks. As Goodyear stated in 2004,

*“Goodyear supports the use of Nitrogen, as an inflation gas, in all Goodyear, Dunlop, Kelly, Associate Brand and Private Brand products, based on the ability for a tire to retain pressure for a longer period of time... Please be advised that even with the use of Nitrogen as an inflation gas, regular inflation pressure checks are highly recommended.”<sup>1</sup>*

Besides, there are other tire problems, such as tread wear, that still require attention to tire maintenance.

## **2) NITROGEN INFLATION IS ONLY INCREASING NITROGEN FROM 78.1% to 93.4%+, THERE IS NO BENEFIT TO SUCH A SMALL INCREASE.**

This is an argument that a lot of skeptics use, but what makes Nitrogen tire inflation beneficial isn't the Nitrogen itself, but the decrease of Oxygen and water vapor. Decreasing the percentage of Oxygen is a more important factor than increasing the concentration of Nitrogen. When filling your tires with Nitrogen

for the first time, the tires are purged twice, removing the 78.1% “bad” Nitrogen (that is laden with water vapor, oil contamination, particulates, etc.) and replacing it with Nitrogen that is clean (99.99% of all liquids and solids removed @ 0.01u) and dry (-40 F or lower dew point). As Michelin clarified in its support for the practice:

*“The air we breathe and use to inflate tires chemically consists of 78% Nitrogen, 20 % Oxygen, and 2% other. When using Nitrogen as an inflation gas, the composition of Nitrogen increases from 79% to near 100%. Michelin supports the use of Nitrogen based on its ability to better retain air over a period of time.”<sup>3</sup>*

The Nitrogen now has the properties of an engineered gas. Water vapor causes pressure fluctuations during normal driving, so removing it is a distinct advantage. The Oxygen also damages the insides of your tire over time, so Nitrogen tire inflation extends the life of the tire. Also consider that in almost any other field of science, a 15.3 percent increase/decrease is significant, not as small as the skeptics prefer to argue with Nitrogen tire inflation.

### **3) TIRES FILLED WITH NITROGEN ARE NOT AFFECTED BY TEMPERATURE.**

This may seem like the case, since that’s one of the reasons why NASCAR and the airline industry use Nitrogen tire inflation. After all, since both race cars and airplanes travel at high speeds, the ability for Nitrogen-filled tires to retain those speeds without bursting makes it seem like Nitrogen isn’t affected by temperature. However, Nitrogen and compressed air respond to changes in ambient temperature in a similar manner, a 1.9% change of pressure for every 10

F change in temperature. The difference lies in the water present in conventional compressed air, where dew points (the dew point is the temperature at which the air can no longer hold all of its water vapor) affect how much of that water vapor turns into liquid. The dew point is always lower than, or equal to, the air temperature and can be as high as 70 F, compared with -40 F for Nitrogen. As temperature increases, liquid water vaporizes to become a gas and the tire's volume expands and increases tire pressure temporarily. So, the presence of water in a tire contributes to significant pressure variations as the outside temperatures changes. Bottom line - you will still see very minor pressure changes with Nitrogen, but it does not as dramatically as it does with compressed air in a tire.

#### **4) ON THE PERIODIC TABLE, NITROGEN MOLECULES ARE NOT LARGER THAN OXYGEN MOLECULES.**

The periodic table is separated based on molecular weight, *not* molecular size. That being said, diatomic Nitrogen (N<sub>2</sub>) is slightly larger than diatomic Oxygen (O<sub>2</sub>), and this difference allows Oxygen to fit through the relatively tight passage ways between polymer chains in the rubber. The difference in size between O<sub>2</sub> and N<sub>2</sub> is almost infinitesimal, only about  $0.3 \times 10^{-10}$  meters, or 0.0000000003 meters. Even so, diatomic Oxygen permeates approximately three to four times faster than diatomic Nitrogen through typical rubber<sup>2</sup>, such as what's used in tires. Just because Oxygen is heavier than Nitrogen, does NOT mean that it's also larger than Nitrogen.

## **5) IF YOU TOP OFF A NITROGEN-FILLED TIRE WITH REGULAR AIR, YOU NEGATE ANY OF THE BENEFITS GAINED BY THE USE OF NITROGEN.**

Understanding the science and benefits of Nitrogen as an inflation medium is just the first step – managed fleets have service providers whose vehicles are equipped with Nitrogen carts to manage blowouts and top-offs for their clients. Just as the choices in oil performance have improved and increased for an engine, the availability of Nitrogen services is improving and increasing every week. The fleet manager is responsible for sourcing Nitrogen availability for their fleet. Unlike other recognized maintenance practice, Nitrogen is not widely available. But, this does NOT mean that Nitrogen tire inflation isn't worthwhile for managed fleets **or** consumers. The choice to use Nitrogen in tires and to realize its benefits comes with the same responsibility that is inherent with maintaining proper oil levels in an engine. Simply – you allow your engine to run dry or low on oil – it runs poorly. In tires with Nitrogen in them, *maintenance* is similarly required to optimize the benefits and performance of the tires.

## **6) A WHILE AGO, I REPLACED THE AIR IN MY TIRES WITH NITROGEN AT A COST OF \$20. NOW, I'VE NOTICED THAT I'M GETTING ABOUT 40 MILES LESS PER TANK OF GAS. CAN NITROGEN CAUSE A DROP IN GAS MILEAGE?**

Another myth with Nitrogen tire inflation; referencing not having to worry about tire pressure and not understanding tire care. Nitrogen tire inflation maintains proper tire pressure for a longer period of time, up to six months longer, but it doesn't keep your tires properly inflated forever. Nitrogen does NOT ruin your

gas mileage, under-inflated tires do. Tires on ANY vehicle MUST be checked regularly, even if it's just to make sure you don't have a leak. If you are noticing a drop in gas mileage, especially one as large as 40 miles, there are OTHER serious issues with your vehicle. The Nitrogen in the vehicle's tires is not causing the fluctuation in gas mileage.

**7) OXYGEN WITHIN NORMAL AIR CAUSES 'OXIDATION' WITHIN THE TIRE. HOWEVER, I HAVEN'T SEEN ANY CONCRETE EVIDENCE AS TO WHAT OXIDATION REALLY IS OR WHY IT'S SUCH A BAD THING.**

Oxidation is the interaction between Oxygen molecules and other elements. It's what causes an apple to turn brown, unopened food to spoil after a long period of time, metal to rust, and rubber (such as the rubber in tires) to deteriorate. If these examples are not recognized as valid evidence and don't demonstrate how oxidation can be a bad thing, then the PRINCIPLE of oxidation is being misunderstood. We typically call oxidation 'rust' or 'rotting' doesn't mean that this identical oxidation process doesn't exist or cannot occur in a tire, where the very same chemistry is at work.

**8) THE ADVANTAGE OF NITROGEN BEING MORE STABLE AND LESS PRONE TO CHANGES IN PRESSURE DUE TO HEAT IN THE TIRES IS OF LITTLE BENEFIT TO AVERAGE DRIVERS.**

Not true. Sure, American consumers don't drive under the extreme conditions that NASCAR drivers and airplane pilots do. Both NASCAR drivers and airplane pilots have used Nitrogen filled tires for decades, as their tires are exposed to

more extreme temperature changes than consumer passenger cars. However, because the temperature changes aren't as extreme doesn't mean that they don't occur in severe climates in the United States. Since Nitrogen best handles ambient temperature changes, it means that a consumer will get more accurate readings from their tire pressure monitoring system, and are then less likely to over-inflate or under-inflate their tires by mistake. More stability also means a safer tire, a tire that is less likely to blow out.

## **9) NITROGEN TIRE INFLATION CANNOT CONTRIBUTE TO ENDING AMERICA'S DEPENDENCE ON FOREIGN OIL.**

When 11% of our carbon consumption is in the transportation sector, and 400 million gallons of gas are consumed every day in the United States, it's simplistic to say that a few percentage points of improvement in fuel efficiency won't do much of anything to solve the problem. Those few points add up significantly as more managed fleets make the change to Nitrogen. When over 300 million tires are disposed of in landfills every year in the United States, it is completely short sighted to say that Nitrogen tire inflation can't do anything to reduce that number. Nitrogen tire inflation can improve the life of the tire<sup>4</sup> and tread-wear rate and reduce the number of tires purchased by managed fleets. The impact on America's dependence on foreign oil is relative and is completely tied to Economy of Scale, but the impact becomes dramatic when a managed vehicle fleet, such as the Federal government's fleet of over 660,000 vehicles *could be* using Nitrogen as an inflation medium – this discussion made here for Nitrogen's use in tires becomes that much more compelling.





# CONCLUSION

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The cost for replacement tires have increased between 6 and 9 percent<sup>5</sup> per year for the past several years. To have proven Green Technologies helping managed fleets and consumers absorb costs and get the best R.O.I. for their tires is our goal. Nitrogen tire inflation is not only a sound investment; it's sustainability factor in carbon reduction and reducing waste in our environment makes Nitrogen's use a responsible transportation solution for the 21<sup>st</sup> century. We've debunked nine Nitrogen tire inflation myths that have previously moved fleet managers and transportation directors away from its use and have provided clarity, and a strong, sensible, scientific logic to better all of our understanding as we rapidly look for solutions to preserve our planet and reduce oil consumption.

## ABOUT NITROFLEET99

Nitrofleet99's mandate is simple: provide a national infrastructure of Nitrogen service sites, through which managed fleets of all sizes could convert and maintain their vehicle tires with the Nitrogen needed to maintain their hybrid tires. Nitrofleet99 is associated with the Department of Energy's Clean Cities Coalition, a national environmental advocacy organization that supports the use of green technology. For more information about Nitrofleet99 and Nitrogen tire inflation, please visit [www.GoNitroTire.com](http://www.GoNitroTire.com), or visit the Nitronomics blog at [blog.gonitrotire.com](http://blog.gonitrotire.com).

## REFERENCES

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