

Winter Misconceptions



Fortunately, the misconceptions about “full” hybrid operation during the winter primarily come from those that simply don’t understand the technology or how it is used. Unfortunately, there are quite a few misconceptions.

Spreading of incorrect & misleading information does occur. So, read the contents of this document carefully to help dispel those occurrences as you later encounter them online and in person. Awareness is a surprisingly powerful tool.

Prius has been available in North America since the second half of 2000 and in Japan since late 1997. None of those winters that followed proved to be a problem. The cold weather and slippery driving conditions present challenges, as the do for all other vehicle types, but the hybrid system is well equipped to deal with them.

Differences between traditional vehicles and “full” hybrids are abundant during the winter, though most are subtle... which is the very reason misconceptions come about. Many small influencing factors lead to drawing conclusions incorrectly. Knowledge of what they are and how they contribute to the resulting emissions & efficiency is very helpful.

Awareness

It is heightened rather dramatically by the Multi-Display. You are shown every little efficiency nuance, effects you were totally unaware of with traditional vehicles. Not having such an informative tool would allow you to continue believing the effects of winter are minor; instead, you become very concerned seeing that data for the first time. The factors are numerous. Most of them are not unique to hybrids. Stop worrying. Much of what you perceive is likely just a misconception.

Starting

For most people, engine starting is the greatest concern during the winter. So naturally, misconceptions about how hybrids start during the coldest days are common.

With traditional vehicles, there's just a small starter-motor drawing from a small battery which spins the engine to a minimum speed (around 100 RPM). That makes the process somewhat uncertain. Hope is that the brief electric assistance is enough to allow the fuel & spark to take over. Initial combustion is often rough, caused by limited power availability and having to overcome resistance from thick lubricants.

With the "full" hybrid, startup is actually rather trivial. Components within the engine itself are adapted for easier starting anyway (allowing for seamless restarts while the vehicle is already in motion). Combine that knowledge with the fact that a dramatically more powerful starter-motor & battery are available and you'll begin to understand why winter isn't a problem. Using that substantial power advantage, the engine is spun to idle speed (between 800 & 1000 RPM) then maintained electrically until oil pressure is established. Following that, fuel & spark are initiated. The result is a remarkably smooth start process which does not rely on an aspect of hope as with traditional vehicles.

For Prius, there is an additional advantage in the winter. It has a 3-liter thermal liquid storage device. Each time the hybrid system is shut off, that is pumped full with hot anti-freeze. Then later when the hybrid system is turned back on, that stored liquid is returned to the engine. The result is warmth before the startup process even begins. This feature is in place to reduce emissions by making heat available to the catalytic-converter faster than usual, but as a side benefit it serves as a stress reducer for the engine.

Heater

The availability of heat from a hybrid is often asked about. With the engine shutting off frequently, how does it keep you warm? The answer is simple: the same way as traditional vehicles. A heater-core is supplied with hot anti-freeze which heats the air passing through it. When that heat is eventually consumed, the engine will start back up. The process requires gas that would normally not be used, but it ensures you don't get cold. And to increase the supply of heat and reduce the amount of gas needed, the radiator of a hybrid can be covered the very same way as that for traditional vehicles.

Also keep in mind the misconception of fan-speed. Most people assume the fastest blower setting will produce the hottest air. That isn't actually true. A slower flow rate will allow more thorough transfer of heat from the core. It's counter-intuitive, but it works. Try it sometime. You'll be surprised by the difference.

Battery-Pack

The effects of cold temperatures on the battery-pack generate many misconceptions. People make assumptions based on other rechargeable devices they use, not realizing how different the operation of a hybrid actually is.

Capacity is reduced during the winter due to the cold. But since the engine runs more often (resulting in more electricity being available than during the summer) and the fact that the “full” hybrid never utilizes the entire capacity anyway, the topic is basically moot.

Temperatures being lower actually provides a benefit. Drawing from the battery-pack can be more generous. Concern about the chemicals within aging faster due to heat is reduced. In the winter, keeping it cool is much easier. As a result, you’ll notice how the electric motor is favored more during the cold season, especially when the engine is still warming up.

Emissions

Just like people inside the hybrid, heat from the engine is needed for the catalytic-converter too. The chemical reaction required to cleanse emissions requires heat. That’s why the engine will sometimes startup at time you don’t anticipate it. When the hybrid isn’t moving, the motion of the engine is used to generate electricity. So that use of gas for the sake of creating heat is still being put to good use.

Efficiency

All vehicles suffer from lower efficiency during the winter. Seasonal cycles are normal. Don’t get overly concerned with measurements during the coldest days without taking into account the effect warm temperatures have. It’s the overall annual average that counts, not individual tanks of gas.

Winter causes hybrid publicity to suffer tremendously. Both those poorly informed and those that intentionally deceive feed misconceptions using only data from driving during the cold season. It’s an unfortunate reality that this happens.

Traffic patterns are different due to winter road conditions. That alone will yield efficiencies differences. It’s an influencing factor often overlooked.

Winter Air & Fuel

Cold air reduces the amount of energy take can be extracted from fuel. This lowers efficiency. The fact air is generally drier in the winter reduces efficiency too, since moisture content contributes to pressure generated from expansion during combustion.

The refinery formula for fuel during the winter is different, to help reduce emissions. The result of this switch during the cold season is lower efficiency. People are not usually aware of this, which leads to misconceptions about hybrids not often noticed after the change back to the formula for summer occurs.

Steering

The fact that the steering in “full” hybrids is electric doesn’t often lead to a misconception. But knowing that there isn’t any fluid used to make the wheels turn left & right couldn’t hurt. Understanding all aspects of how a hybrid operates is helpful in some fashion or another.

Clearance

Excessive height, like that offered from the typical SUV, isn’t actually needed for winter driving. A hybrid like Prius, whose body stands 5.25 inches above the ground, handles snowy conditions just fine. The misconception is that more clearance is needed. But in reality, snow depth greater than that isn’t encountered very often. Most urban & suburb roads are plowed before accumulation that deep occurs. And of course, you can still drive through piles taller than that anyway.

Tire Upgrades

If you have any concerns about traction during winter driving, just upgrade to a better tire. Misconceptions come from those expecting the standard factory tire to perform in ways it was never designed to deliver.

All-Season tires are the most common choice for Prius owners. That upgrade provides traction increases in all conditions all year long, everything from rain to snow. They are an excellent improvement option that don’t sacrifice much efficiency.

Snow tires incur an efficiency penalty (there are usually fairly noisy too), but their superior road grip ability is an acceptable tradeoff for some hybrid owners. The dedicated-use design is most noticeable on ice, where no other tire type can reduce slip as well.

Traction-Control

This feature is becoming more common and is often standard on hybrids. For the “full” type like Prius, this feature also delivers benefit of protecting the propulsion components.

Spinning tires is never a good thing. Beside the loss of grip, it also accelerates the aging of tires. A fine layer of rubber is scratched off whenever the tire spins. Traction-Control helps to prevent that. In the winter, this is especially important... since that spinning causes heat, which results in ice forming directly underneath the tire.

The misconception comes from the belief that tires should be allowed to spin excessively, that brute force is the most effective method of getting through snow. The better option is a slow & powerful dig, which is what the traction-control attempts to provide.

Braking (ABS & "B")

Braking almost always gets overlooked, a very common misconception about winter driving needs. People have an obsession about how deep of a snow they can drive through, making them forget how important being able to stop is too. "Full" hybrids like Prius do that well.

All Prius include ABS (Anti-Lock Braking System), which help you retain control, allowing you to continue to steer even when attempting an emergency stop. Its work the very same way ABS does in traditional vehicles.

Engine Braking (that "B" mode) is another braking feature offered by "full" hybrids. When using that mode, deceleration of the vehicle is provided in part by the engine itself. It works like a silent air brake, where the pumping of pistons without any combustion causes resistance. This can be very handy for gentle slowing on slippery curved or hilly roads, where you'd step on the brake-pedal only if additional braking is needed.

Cornering (VSC)

Rounding a tight corner too hard on snow or ice will cause any vehicle's tires to slip. The misconception is that VSC (Vehicle Stability Control), which is designed to help you regain control in that very situation, is provided when you step on the brake-pedal. In reality, it is quite different from ABS. This safety option is available with hybrids, including some models of Prius.

VSC will automatically activate anytime the vehicle detects any wheel losing traction while you drive, at times other than when you are trying to stop. The computer assists with recovery by taking control of the appropriate wheel to help deliver that requested steering. In other words, it can correct an over-steering mistake. This is something only the vehicle itself can do, since the human interface on any vehicle (traditional or hybrid) does not provide the ability to alter the response of each wheel individually.

Engine Oil

Weight makes a difference; don't accept claims contrary to that. 5W-30 should always be used, as specified on the filler cap. It is a misconception that thicker oil won't affect performance, all year long (not just the winter). Thinner oil equates to higher efficiency. Though only a minor improvement, even little bit really does add up.

Synthetic oil better protects engines in extremely cold temperatures. That is well proven. So whether or not it also contributes to slightly better MPG is somewhat of a moot point, especially when you consider how little it costs with respect to the price of a gallon of gas and how long the oil will be used for.