

MASS ATTACK ON FUELISHNESS: SMART DRIVING SAVES DOLLARS ECODRIVING TIPS TO BECOME A 'HYPERMILER' December 2008

This compilation of driving tips was developed primarily by **Ecomodder.com**, with additional information from **CleanMPG.com**, **eartheasy.com**, the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency (EPA) (www.fueleconomy.gov/feg), and **ecodrivingusa.com**. Other sites with more tips and ideas also are accessible on the Internet.

'**Hypermiling**' is a term used in North America that refers to a set of techniques used to maximize fuel economy. Those who practice the techniques are referred to as "*hypermilers*." Hypermilers are drivers who exceed the U.S. Environmental Protection Agency (EPA) estimated fuel efficiency on their vehicles by modifying their driving habits. The term 'hypermiler' originated from hybrid vehicle driving clubs and noted hypermiler Wayne Gerdes and combines current technology (e.g., real time mileage displays) with driving techniques innovated historically with events such as the Mobil Economy Run during the 1930's, gas rationing during World War II, techniques that prevailed during the 1973 oil crisis, and methods used globally in markets where motor vehicle fuel is consistently expensive.
[Source: Wikipedia]

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Getting started

1) Drive less. The best way to reduce fuel use is to drive less. Actions include:

- a) Living closer to place of work;
- b) taking public transportation;
- c) telecommuting, if feasible;
- d) carpooling and vanpooling;
- e) bicycling; and
- f) walking.

2) Park and ride. If part of your commute is not bicycling-friendly, travel to a point that is and then bicycle the rest of the way. This practice also can be applied to carpooling and mixed private/public transportation trips (e.g., see *MassRIDES*, at www.commute.com).

3) Attend a driving clinic. These training sessions often instruct attendees on efficient driving techniques, and are sometimes staffed by experienced drivers. Consult the Internet for driving efficiency and safety forums to learn more and to participate in discussions about increasing fuel efficiency.

4) Clean junk from your trunk. Removing unnecessary items from your vehicle saves fuel. It takes energy to move the extra weight around. An extra one hundred (100) pounds in your vehicle can reduce your miles per gallon (MPG) by up to 2% (DOE/EPA).

5) Let the most efficient driver drive. Let the most efficient licensed driver drive! And take the opportunity to learn from his/her skills.

6) Keep your car in shape. A well-maintained vehicle can return fuel economy increases such as:

- a. Proper tuning, a 4% average;
- b. Air filter replacement, up to 10%;
- c. Use of manufacturer's recommended grade of motor oil, 1-2%; and
- d. Properly inflated tires, up to 3%.

7) Remove unused roof racks. If your vehicle has an unused roof rack or bicycle rack, remove it. This action will reduce aerodynamic drag and increase fuel economy.

8) Check tire inflation regularly. Make sure that your tire pressures are set, at

minimum, to manufacturer specifications, but not over the maximum. The higher the pressure, the less rolling resistance. Proper tire pressure is safer, extends tire life, and can improve your gas mileage up to about 3%. Underinflated tires can lower MPG by 0.4 % for every 1 pound per square inch (psi) drop in pressure of all four tires (DOE/EPA).

Check tire pressure with your own tire gauge at least monthly, when tires are "cold" (not driven for at least 3 hours or for more than 1.5 miles). Also, be aware that tire pressure drops as outdoor air temperatures fall – monitor tire pressure as the seasons change.

9) Track your fuel consumption. One of the first steps in improving efficiency is tracking fuel consumption. Get in the habit of saving all your fuel receipts, recording distance travelled and fuel economy (MPG). Keep a small notebook to record trip type and new techniques employed to monitor your progress.

While the slower pace of tank-to-tank feedback isn't ideal for feedback on driving technique, recording and monitoring your "big picture" progress is great motivation.

See Ecomodder.com for more information on tracking fuel consumption.

10) Install and use a fuel consumption display. Feedback is critical to improving driving habits.

Tank-to-tank monitoring of fuel consumption will not provide the level of information a driver may need to monitor his/her driving efficiency. Vehicle instrumentation is available that allows the driver to reset the readout at will for tracking individual trips, and/or portions of trips traveled on a regular basis.

Options for vehicles without factory installed fuel economy computers (like in Toyota hybrids) include the ScanGauge and SuperMID. Even the venerable vacuum gauge can help improve efficiency when driving with load/target driving.



Route selection and trip timing

11) Take the road less traveled. Generally speaking, if you have the option of choosing lightly traveled roads over busier ones, you give yourself more flexibility to employ a wider range of fuel saving techniques than if you are surrounded by other vehicles.

You may even find that a somewhat longer, lightly traveled route may result in lower overall amount of fuel used than the shorter, busier route.

12) Leave early and don't rush. The enemy of efficient driving is finding

yourself in a rush. Leave for your destination slightly early so you don't feel pressure to drive faster, brake later and otherwise fall back into bad habits.

Driving efficiently can be much more relaxing than the typical person's driving style, but you need to allow a bit of extra time.

13) Crosswind barrier. Headwinds aren't the only winds that increase fuel consumption - cross winds can have a large negative effect as well. In crosswind conditions, choosing a route with a barrier (trees or buildings) along the edge will save fuel compared to a road in the open.

14) The "corridor effect". All else being equal, traveling at a constant speed on a freeway within a flow of traffic (in the same direction) is more efficient than going the same speed in isolation. The reason is aerodynamic: a flow of traffic generates a localized wind current in the direction of travel. You will benefit from this artificial breeze.

15) Note your transition points. If you regularly travel the same roads, make a conscious effort to note (memorize) the points along the way where transitions occur that maximize efficiency.

E.g., memorize where you can initiate a coast to just make it to the next stop sign. Or note at what speed you can crest a hill so you're traveling just fast enough for the next transition after the descent.

16) Time your gas station trips. Plan to refuel your car during off-peak times to avoid lines and excessive idling.

17) Avoid drive-thrus. Avoid drive-thru windows. They lead to excessive idling.

18) Lane of least resistance. In multi-lane traffic, choose the "lane of least resistance" to avoid unnecessary and unpredictable braking and changes in speed.

E.g., avoid lanes where buses are starting and stopping, or cars may be braking unpredictably to turn into driveways and parking lot entrances.

19) Avoid stops at the bottom of hills. Avoid roads which require drivers to stop at the bottom of hills (which force you to brake and waste the kinetic energy you just gained going downhill).

20) Take advantage of the wind. If possible, time trips to take advantage of strong tailwinds. Avoid setting out into strong headwinds or crosswinds.

21) Choose smooth road surfaces. Choose a route with a smooth, paved/concrete surface over gravel or rough, broken roads, all else being equal. Smoother surfaces offer reduced rolling resistance.

22) Avoid bad weather. Avoid driving in inclement weather if possible, as

rain/snow/slush can dramatically increase rolling resistance.

The exception to this rule may be when high winds (tailwinds) can be used to your advantage.

23) Avoid peak traffic. If you have the option, avoid travel during peak traffic times. With the roads full of other drivers, you have fewer options for using driving techniques that the herd doesn't typically use or tolerate (e.g., reduced highway speeds, drawn out coasting up to stop signs).

24) Drive when it's warm out. A vehicle's tires and drivetrain generate more rolling and mechanical resistance when cold. Further, a cold engine is less efficient than one which is fully warmed to normal operating temperature. If you have the flexibility, time your trips to coincide with warm temperatures (i.e., mid-day) rather than cold (night or early morning).

25) Respect merging traffic; don't block intersections. Let vehicles make left turns out of parking lots and side roads and driveways. When in a stopped line of vehicles, leave space for a passage to and from side streets, and don't get caught in the middle of an intersection when the traffic light turns red.

26) A right turn can be the right turn. You may use more time and fuel turning left onto a busy street than turning right and going around the block. Note: United Parcel Service (UPS) drivers plan their daily routes to minimize left turns. This saved UPS over 3.3 million gallons of fuel and 30 million miles in 2007.



Suburban driving

27) Conserve momentum: stop sign "stop and crawl". When multiple vehicles ahead of you are progressing through a stop sign (or a right turn at a red light), this represents a mini "stop and crawl" situation normally found in a bumper-to-bumper traffic jam.

If possible, time your approach to arrive at the stop sign as the last car ahead is departing.

28) Combine errands & do the longest leg first. Avoid very short trips. If you have multiple stops, plan them to do all on the same trip. When combining multiple trips into one journey, go to your farthest destination first, and work your way back. This ensures the vehicle is warmed up as much as possible before subjecting it to multiple starts and stops.

29) Minimize idling when stopped. If you're going to be stopped for more than several seconds, shift to neutral and shut off your engine. This is one of the main reasons hybrid vehicles get such good fuel economy in urban driving.

Caveat 1: this assumes your vehicle is in good tune and will re-start immediately, every time.

Caveat 2: if you're a defensive driver, you're habitually evaluating the risk of a rear crash when slowing and when stopped. Obviously you will want to leave your engine on in those circumstances (for a quick rear crash avoidance maneuver).

30) Traffic light timing - stale "green", no pedestrian signal. In the absence of any other indication about how stale the light is (e.g., if there's no pedestrian signal or waiting cross traffic), assume that the green light ahead is about to change. Adjust your approach speed accordingly (if traffic permits – i.e., you don't hold anyone up) to avoid a full-on brake application should the light change.

31) Traffic light timing - red lights with sensors. When approaching a red light, slow down early if there's a car in front of you that can trip the sensor so you may not have to come to a complete stop.

CleanMPG.com cleverly nicknamed this technique "rabbit timing".

32) Traffic light timing –"stale" green. When approaching an intersection with a green light, you can watch the pedestrian signal crossing light to help determine when it will turn yellow.



Highway driving

33) Lights on for safety; lights off for MPG. In certain driving environments / conditions, the use of daytime running lights (DRLs) or manually switching on headlights during the day increases safety.

Depending on the vehicle, power demands of the lighting system ranges from a few watts to well over 100 watts, all of which is ultimately powered by gasoline. In the US, where DRL implementation is voluntary, automakers have an exemption from CAFE testing that permits vehicles' fuel economy to be tested with the lights switched off.

Switching off DRLs where their safety contribution is minimal (e.g., driving on a divided, controlled access highway) or are not posted as a requirement will save a small amount of fuel.

34) Find/adopt a 'blocker' for slower freeway speeds. Some people are uncomfortable driving at speeds less than the average flow of traffic on multi-lane freeways.

One solution is to find another vehicle going the speed you want to travel (large, conspicuous vehicles work particularly well) and drive either ahead of or behind it. (Note: this is not a suggestion to draft, which is not a safe driving technique.)

35) Close the sunroof at higher speeds. Some sunroof styles are better than others. The worst offenders are the kind that tilt and slide to the outside, on top of the roof. When open, these "roof-top spoilers" can significantly increase aerodynamic drag.

36) Close the windows. Drive with windows closed at higher speeds to minimize aerodynamic drag. Use flow-through ventilation if the vehicle is so equipped.

37) Reduce speed. Aerodynamic drag increases exponentially with speed, so reduce highway cruising speed as much as practical and safe.

Generally, a vehicle's most efficient speed is just after its highest gear has engaged.

38) Constant throttle position cruising. Once you reach the desired travel speed, pick a throttle position and hold it.

Advantages: more efficient than using the cruise control (which varies throttle position frequently and wastes fuel on hills).

Disadvantages: less efficient than "driving with load" (DWL) / "target driving" (where the throttle is eased back on inclines).

39) Cruise control - when to use it. Set the cruise control if you're the type of driver whose speed creeps up higher and higher the longer you're on the road or if you have difficulty holding a steady speed (it wanders up and down).

Realize that cruise control is just a bandaid for those behaviors. Generally it's less efficient than constant throttle driving, and much less efficient than "driving with load"/"target driving".

40) Cruise control - when not to use it. Only use cruise control on flat roads with light traffic. Think safety first. On hilly roads, cruise control responds to changes in grade - by feeding in more throttle on the uphill and releasing on the descent - in the exact opposite way an efficient driver would do, which is to back off the accelerator and lose speed (possibly also downshifting) as you climb, and regain that speed on the descent.

41) Use Fast Lane transponders and HOV lanes. Mass Turnpike's Fast Lane transponder will let you sail through road, tunnel, and bridge toll plazas in 12 eastern states. HOV (high occupancy vehicles) lanes save time, fuel, and

aggravation. You can drive the I-93 HOV lanes north and south of downtown Boston.



Braking tips

42) The most efficient way to slow down. When you "have" to slow down, here's an approximate hierarchy of methods, from best to worst.

- 1) coasting in neutral, engine off (i.e., roll to a stop)
- 2) coasting in neutral, engine idling
- 3) regenerative coasting (hybrid vehicles)
- 4) regenerative braking (hybrid vehicles)
- 5) coasting in "deceleration fuel cut-off" mode (in gear, above a certain engine RPM)
- 6) conventional friction braking (non-hybrid or hybrid)

Choosing the right method depends on traffic conditions (following vehicles), vehicle condition, applicable laws (coasting on hills posted as not allowed), and how quickly you need to stop.

43) Conserve momentum: avoid stopping. Avoid coming to a complete stop whenever possible (and when safe and legal, of course). It takes much less energy to accelerate a vehicle when it's already traveling just a few miles per hour than it does from a complete stop.

44) Hybrids: minimize regenerative braking. While regenerative braking in hybrid vehicles - capturing braking energy into the battery - is more efficient than braking with conventional friction brakes, it's still not as efficient as 'driving without brakes' (DWB).

So even if you drive a hybrid, you'll get better economy when you minimize use of the brake pedal.

45) "Drive without brakes" (DWB). Minimize use of the brake pedal. Each time you press it, you're effectively converting gasoline into brake dust and heat.

Driving as if you have no brakes will cause you to do two things: 1) reduces 'excessive' acceleration, and 2) extends the amount of time you spend coasting down to stops and turns.

Obviously you have to balance use of this technique against traffic conditions so as not to adversely affect other drivers.

See Ecomodder.com's Blog for more information on DWB.



Advanced techniques

46) Conserve momentum: brake hard. It sounds like a contradiction, but there are rare times when braking hard can save fuel compared to coasting or light braking: it's a "damage control" technique when faced with an unpredictable/unanticipated stop or slow down ahead and not a lot of space.

An example: approaching a fresh red traffic light that had no other indicators to predict the change (no pedestrian signal and no cars waiting on the cross street). If you brake lightly to moderately, you will cover the entire distance to the intersection and have no option but coming to a full stop.

But if you brake quite hard initially, you can potentially scrub enough speed and buy enough time to coast the remaining distance to the intersection at a low speed. With judgment and some luck, you'll arrive at a fresh green light and avoid a full stop.

Obviously, rapid deceleration is not a safe option if there is following traffic.

47) Make fuel economy a game or challenge. Competing against yourself (or others) to get the best possible fuel economy can do wonders for increasing motivation to learn more, refine your skills, and try harder.

48) Use the "racing line". Knowing how to pick the "racing line" through a corner, when safe, can help to preserve momentum. Generally, the racing line is the path through a turn with the largest possible radius. It may permit a higher speed with more comfort (less body roll and g-forces), and less tire scrub.

Note this is not advocating high speed turns, where the cost of increased tire wear may outstrip fuel savings. Even at low speeds, choosing the "racing line" has benefits.

49) Encourage a pass: hug right. Drivers who travel below the normal flow of traffic should facilitate drivers approaching from behind to go past, rather than force them to slow down.

One method of gaining the attention of the driver behind is to move your vehicle very obviously to the extreme right of the lane you're traveling in when it's safe for the following vehicle to pass.

Adding a turn signal to the move or the 4-way flashers may be even more effective.

Of course, pulling completely off the roadway onto the shoulder to let following traffic by is also worthwhile, if you have the option.

50) Hill tactic: don't waste potential energy. When facing a red traffic light, or some other predictable stop-and-start situation at the bottom of a hill, you're better off stopping near the top before you've accelerated to full speed. Wait, and time your release to make it through on green, and you avoid turning your potential energy into brake dust and heat. (Also known as 'smart braking'.)

51) Heavy traffic: play the accordion. If faced with worst-case "stop & crawl" traffic conditions, leave as much space ahead of you as possible and continually "accordion" that space to keep your vehicle moving near a constant speed while the cars in front of you stop and start.

Yes, some people will cut into the space you create ahead of you. Deal with it.

Note that this may aggravate following drivers who can't absorb the big picture, and that must be taken into account.



Parking (and departing)

52) Start up: wait for the opportunity to move. Don't start the engine until there's actually an opportunity to start driving: e.g., a gap in traffic when exiting a driveway or parking space.

You can plan even further ahead: don't turn the key until you know you can time the next traffic light down the street.

53) Parking tactics: orbit to bleed momentum. If you find you have too much momentum after reaching your preferred parking spot, continue coasting further down the row or "orbiting" a spot until you can roll to a stop in position without touching the brakes.

(The extent to which you might continue "orbiting" depends on whether your engine is on/off and whether you're driving a manual or automatic. Also, it obviously depends on traffic in the lot.)

54) Parking tactics: gravity assist. Slopes can be useful in maneuvering into a parking place. Gravity can be a hindrance in parking as well. Avoid driving down into a parking "hole" which you must drive out of later. Even if you coast into the hole, you'll face a net efficiency loss when you drive your cold vehicle up and out later.

55) Parking tactics: avoid parallel parking. For on-street parking, the better spot is one with enough room to pull in and out rather than multiple reverse and forward maneuvering (parallel parking).

56) Parking tactics: reverse in. If you have no pull-through spots from which to choose, reverse in when arriving, instead of driving in when warm and backing out and turning around when the vehicle is cold and fuel economy is at its worst.

Also note that reversing into a flow of traffic is riskier (and therefore much slower and less efficient) because you may not have a clear view until your vehicle's back end is well out of the space.

57) Parking tactics: pick the periphery. Choosing a spot in the "periphery" of a busy lot will be more efficient than navigating the rows of traffic and pedestrians to get as close as possible to the building or destination.

58) Parking tactics: pull-through spot. Drive into a "pull through" spot, rather than a spot that requires reverse and forward maneuvering.

59) Start up: not until you're adjusted. Don't start the vehicle until you're settled in: seat, seatbelt buckled and mirrors adjusted, and any passengers settled in.

60) Multiple vehicles: choose the one that's warmed up. In a multi-vehicle household, if you have the choice of using similar vehicles, choose the one that was driven most recently if it's still warm.

61) Multiple vehicles: choose the most efficient one in the 'fleet'. If you have a multi-vehicle household or workplace, choose the most efficient vehicle from the fleet that will accomplish the task at hand.



Transmission tips

62) Manual transmission: cruise in high gear. When cruising at a constant speed, shift to the highest gear you can use without lugging the engine.

63) Automatic transmission: highest gear/lowest RPM for posted speed. When cruising, drive the speed that allows the lowest RPM for the speed zone you are in.

E.g., If the posted speed is 30 and your car shifts into 3rd at 35, you may be able to achieve the 3rd gear shift, then reduce and hold 30 without causing a downshift.

64) Automatic transmission: torque converter (TC) lockup. Drive at the speed that allows the TC (torque converter) to lock up. This is often around 40-45 mph. Speeds just above this typically return the highest cruising fuel economy.

65) Automatic transmission: neutral when stopped. Shift automatic transmissions to neutral when stopped (assuming you're going to leave the engine running). Remaining in drive wastes fuel as the engine continues to try to creep the car forward while being held back by the brakes.

66) Automatic transmission: upshift coaxing. Some automatic transmissions can be coaxed to upshift sooner when accelerating by briefly releasing some throttle pressure, then re-applying to continue accelerating.

67) Automatic transmission: use OD (overdrive). If your transmission has an "OD" (overdrive) button or position, leave it engaged to ensure the transmission will shift into its highest gear as soon as possible.

68) Automatic transmission: use economy mode. If your automatic transmission has a "power/economy" button, leave it in economy mode. This usually results in earlier upshifts and later downshifts, saving fuel.



Winter / foul weather

69) Wait for the snow plow. Driving through fresh snow increases rolling resistance moderately to dramatically, depending on the depth/type of snow. Better fuel economy will result when you wait for the plows (or for other vehicles to pack the snow down) before setting out.

Similarly, getting stranded in a ditch or snow drift because you set out in bad weather is a surefire way to waste fuel if you need to idle the car to stay warm while waiting for help.

70) Winter: avoid wheel spin on ice and snow. If you drive in ice/snow, avoid wheelspin when traction is low. Wheelspin is particularly inefficient if your vehicle is equipped with brake assisted traction control.

Changing to dedicated snow/ice tires that offer better traction may save fuel.

71) Follow the leader in rain or snow. In weather conditions that leave a lot of precipitation on the road - heavy rain or snow - drive in the tire tracks of the vehicle in front to reduce rolling resistance.

An exception to this tip may be on "rutted" surfaces where water tends to pool in

the ruts. In such instances, driving on the ridges between the ruts offers less resistance.

72) Winter: clean off snow and ice. Completely clear snow & ice off your vehicle before driving. It will minimize your use of energy-consuming accessories (defrosters), remove an aerodynamic penalty (increased frontal area), reduce weight (a layer of ice and snow over an entire vehicle can weigh a surprising amount), and will avoid potentially dangerous conditions for drivers aside or behind you if sheets or chunks fly off your car while you are driving.

73) Winter parking: clean out the garage. If you have a garage space for your vehicle, clean it so that you can park your car inside during the cold months of the year. The faster warm up will return better fuel economy and make for a more enjoyable start to your driving.

74) Winter: use heated parking. If you've got the choice, heated parking will improve fuel economy. Heated parking, however, can accelerate corrosion on vehicles driven on salted roads. Further, depending upon the facility, heated parking generates additional (and potentially undesirable) energy consumption.

75) Avoid heater use until the engine has reached operating temperature. The heater utilizes the heat of the engine's coolant to warm the passenger compartment. Vehicle engines are designed to run 'rich' (a higher fuel-to-air mixture) until a minimum engine temperature is reached. Running the heater blower prior to reaching normal operating temperature removes heat from the engine's coolant, and consequently the engine – which will increase slightly vehicle warm-up time and increase fuel consumption.

76) Avoid 'warm up' idling and 'racing the engine'. Don't idle your engine to warm it on a cold day. Racing the engine during and after startup, between gear shifts (on manual transmissions), or at stoplights also wastes fuel. An idling or racing engine gets zero miles per gallon.

Begin driving – under light loads - as soon as the engine is running smoothly (usually immediately). It's a more efficient way to warm the engine and entire drivetrain, including tires.



Hot weather

77) Minimize air conditioning use. Air conditioning requires a lot of power. Use it sparingly.

For driving at speeds typical of city roads, save fuel by using the vehicle's flow through ventilation and opening windows.

At highway speeds air conditioning use and overall vehicle energy efficiency will vary upon that vehicle's powertrain, design, state of repair, ambient weather conditions, and driver habits.

78) Cycle the air conditioner compressor if air conditioning is needed. If you have to use the air conditioner, set the air flow to recirculate and manually turn the A/C on and off as needed to keep passenger compartment comfortable. In most modern vehicles, the air conditioner compressor operates when the driver selects the defog or defrost mode at outside temperatures above 32 degrees. Adjust use of defog/defrost option accordingly to balance safety with savings. Also, manually switch from recirculate to fresh air as needed to prevent window fogging. For greater efficiency, switch the A/C on when under light engine loads or deceleration fuel cut off and off when under moderate/heavy loads.

79) In the summer, park in the shade. Parking in the shade and/or using a reflector shield on the inside of your front window when parked in the sun will keep the inside of your vehicle cooler, which can help reduce need for air conditioning.

80) Use a beaded seat cover. These covers work surprisingly well as an alternative to (or to defer the use of) air conditioning, by letting air flow behind and beneath you. They keep you from sticking to your seat, and your clothes from sticking to you.

81) Trip timing: avoid the hottest times of day to reduce A/C use. If you live where the weather is very hot, avoid driving if possible during the peak temperatures of the day when use of the air conditioner is "required."



Just generally good defensive driving tips

82) Maintain a space cushion. When driving on a multi-lane roadway, try to maintain a "space cushion" around you. For example, avoid driving parallel to another moving vehicle in the next lane. The more options you leave open for making a prompt lane change if one is needed, the safer and more efficient you will be (if it means avoiding an unnecessary slowdown).

83) Maintain appropriate following distance. Avoid driving so close behind another vehicle that you are forced to "immediately" brake if it begins slowing down. This practice is always important, but is critical for safe urban or suburban driving where traffic speeds fluctuate frequently.

The greater your following distance, the better your forward visibility will be, which enables you to look well ahead and anticipate changes in the driving environment.

Further, trucks and other commercial or recreational vehicles more likely will be able to see you in their side view mirrors.

84) Be smooth. Smooth use of the accelerator, steering, transmission, and brakes is not only more comfortable for you and your passengers, it is also a little more efficient (less scrubbing of tires, energy lost through suspension movement). It's also better for the longevity of the vehicle and in general a sign of a skilled driver.

85) Use your horn defensively. Defensive drivers will tap their horns to ensure they have the attention of other motorists or pedestrians in close quarters and potentially risky situations.

Being proactive will save fuel if it means you can avoid having to brake or stop unnecessarily.

86) Look well ahead & anticipate. Your ability to drive efficiently depends on being able to anticipate changes in the driving environment. The way to do this is by constantly scanning well ahead in your intended path.

In city driving you should know what's happening at least 10-15 seconds ahead. On the freeway, at least 30 seconds visual lead time is appropriate.

87) Drive the posted speed. Drive the posted speed limit or the minimum allowed when safe to do so. While each vehicle reaches its optimal fuel economy at a different speed or (or range of speeds), gas mileage usually decreases rapidly over 60 mph. Assume that each 5 mph over 60 mph is like paying an additional \$.30 per gallon (at \$3.96/gal.) (DOE/EPA). Your fuel economy benefit can be in the 7-23% range.



Miscellaneous

88) Don't keep up with the Joneses. It is easy to be competitive when driving. Avoid aggressive driving. Don't let other drivers lead you astray from your driving style. "Jack-rabbit" starts and hard braking alone can increase fuel consumption by 40% but reduce travel time by only 4% (eartheasy.com). Driving sensibly can save you 5-33% (city-highway) in fuel economy benefit.

Purchase and drive a car wisely. DOE & EPA estimate that the difference between a car that gets 20 MPG and one that gets 30 MPG amounts to \$990 per year (assuming 15,000 miles annual driving and fuel at \$3.96/gallon), or \$4950 in extra fuel costs over 5 years.

89) Minimize use of low range transmission. Many four-wheel drive / AWD vehicles also come with high and low transmission ranges. Low range increases

engine RPM and fuel consumption for a given gear/road speed combination compared to high.

90) Minimize use of four-wheel drive. The added friction of drive components in four-wheel drive mode increases fuel consumption, especially when the center differential is locked and the vehicle is turning.

91) If you have to carry items outside the vehicle... carry them on the back of the vehicle, instead of on the roof. Long, skinny items even can be carried beneath some vehicles (with ample ground clearance). This is more important the faster and farther you intend to go. A loaded roof rack can decrease your fuel economy by 5%.

92) Minimize accessory loads. Minimize use of electrical and mechanical accessory loads when safe and/or practical (lights, defrost, blower, A/C, electric heated seats, DVD players/screens, heated mirrors, etc). Operating the A/C on "Max" can reduce MPG by about 5-25% compared to not using it (DOE/EPA).

93) Use a block heater. Pre-warm your engine in winter with an electric block heater. Engines are most efficient at full operating temperature, and the block heater helps it get there sooner. About 2 hours is the maximum time needed to pre-warm a small engine.

94) Drive a car like you would ride a bike. As counterpoint, for cyclists looking for a way to wrap your head around the subject of efficient motoring: drive like you bike.

Meaning, if you think about spending energy as wisely in your car as you do when you ride, you should automatically become aware of several of the major tips on this list, such as:

- a) Ensuring your tires are properly inflated & vehicle is in good mechanical condition, for reduced rolling & mechanical resistance.
- b) Smart braking: you'll spend more distance coasting up to stops (you don't pedal madly towards stop signs and then jam on the binders, do you?)
- c) You'll "drive with load" on hills (you don't usually power up hills trying to maintain your previous cruising speed, do you?)
- d) You'll reduce speed (because cyclists are highly attuned to the relationship between aerodynamic drag and the energy consumed to travel at high speed).

95) Avoid towing. Trailer towing delivers the triple whammy of increased weight, higher aerodynamic drag, and a third (or fourth) set of tires for more rolling resistance.

Carry loads in the vehicle if possible.

If not, minimize towing speeds and adjust your technique to account for the extra momentum the trailer and its load will add.

96) Tighten your gas cap. The Car Care Council (carcare.org) has estimated that loose, missing, or damaged gas caps cause 147 million gallons of gas to evaporate every year. As much as 30 gallons of gas could be lost annually to evaporation from one car with a loose cap. Do your part like many other drivers and make sure your gas cap is on tight.

97) Listen to slower music. Leave the speed metal at home. Fast paced music can make a driver more impatient, more aggressive, and more likely to speed. At the same time, slower paced music is more relaxing and tends to promote a more sensible driving style while also reducing stress.