



***Sri Lanka Sustainable Energy Authority***

**A MOTORIST'S  
GUIDE TO  
IMPROVE  
FUEL ECONOMY  
IN DRIVING AND  
RIDING**





# Forward

Energy crisis is the major problem faced by the country right now. The role of the transport sector, which has been the hidden culprit for the draining of foreign reserves has come to light in the 2022 economic crisis. We, as citizens of Sri Lanka should play a part in salvaging the country, through small contributions that we can make, which would collectively make a great positive impact. It is recommended that every concerned motorist should read this booklet and improve their driving and riding habits using the knowledge provided here and apply it where ever they can, for the betterment of the country.



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# Introduction

Transport sector accounts for more than one-third of the total energy demand of Sri Lanka which is almost entirely supplied by imported fossil fuels(1). Currently, Sri Lanka has 4.5 million active vehicles, of which 54% are motorcycles, 16% are three-wheelers (motor tricycles), 11% are motor cars, and 1% are buses. Almost All the fuel for transport is imported. Hence, there is a dire need of engagement of energy management practices in the transport sector. Efficient use of existing vehicle fleet is one important option in this regard. SLSEA, identifying the immediate need of this sector, decided to introduce a guideline for motorists for the improvement of fuel efficiency of vehicles. It is recommended to every motorist to read this guideline for improving the vehicle efficiency for reduction of their fuel bill which has sharply increased within a span of few months.

## Purchasing of vehicles

It is always wiser to purchase a vehicle which meets your transport need with the highest fuel economy. Hybrid vehicles save fuel compared to mild hybrid and purely fuel powered vehicles. Also, it is recommended to purchase the vehicles considering the number of passengers and the load intended to be transported. Following is a comparison between common vehicle types and their fuel economy. If you own several of these, try to use the most efficient one for the trip.

**Table 01: Fuel Efficiency of several vehicle types**

Type of vehicle	Fuel economy km/l
Motor cars	15-20
Motor cars-hybrid	20-25
SUVs	10-15
Passenger Vans	8-12
Double cabs	12-14
Buses	5-7
Three wheelers	17-18
Motorbikes	60-80

## Obeying the traffic rules

When you drive, always obey the traffic rules (For example, maintaining the lane discipline and parking without causing blockades). This avoids unnecessary traffic congestions which saves fuel in your vehicle as well as improving national fuel economy. Monetary loss due to traffic congestion in Colombo city alone was estimated to be LKR 32 billion per annum in the year 2009(2).

## Managing daily transport needs

Make a list of trips that you need make a week ahead and in that day in advance and try to reduce the number of trips as much as possible. For short distances travel by foot or use a bicycle. Use public transport as much as possible. When driving, avoid the congestion times. When you are travelling as a group, use a single vehicle rather than using several. Use online systems for payments rather than travelling to banks or payment counters for paying utility bills etc..

## Practice Eco-Driving

A skilled driver is capable of selecting proper speeds that allow him to travel smoothly without sudden acceleration and violent stops. When driving,

- Look far ahead
- Keep eyes moving
- Get the overall picture
- Make sure others can see the driver
- Always leave the margin for a safe escape(3).

Avoid rapid acceleration and hard braking. Rapid acceleration causes more fuel consumption. The best practice is to accelerate gently and try to maintain a constant velocity. Maintain appropriate vehicle distance to avoid hard braking. Hard braking causes dissipation of useful energy as heat. The driver behavior will affect 15%-30% of fuel economy in urban drive conditions. In highway driving condition the driver behavior count for 10%-40% of fuel economy(4)

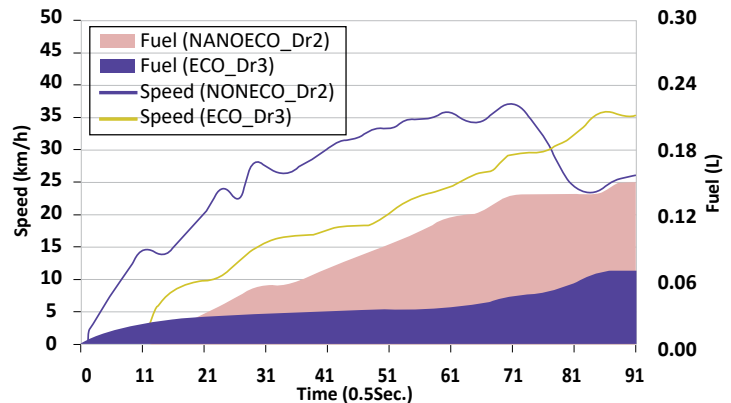


Figure 01: Effect of Mild acceleration on fuel economy

## Use recommended tyres and size

If you do not use the type and size of tyre recommended by the manufacturer, it would lead to increased fuel consumption, especially when the width of tyres increase. The recommended Tyre specification (Table 02) can be generally found on labels inside the driver's door on the vehicle, inside the fuel flap, or inside the glove compartment. Look for the brands which contain energy labels which help customers to identify Tyres with low rolling resistance. It has been estimated that up to 9% fuel saving can be achieved by using an EU-A grade Tyres when compared to a G grade Tyres (5)



Figure 02: Tyre with energy label

155/80 R 75 T	
155	Width of tyre in mm
80	Side wall height as a percentage of the width
R	Construction (R means Radial)
75	Load index
T	Speed rating
Buses	5-7
Three wheelers	17-18
Motorbikes	60-80

## Check and maintain the correct tyre pressure

Maintain the tyre pressure at the manufacturer's recommended value. Check the tyre pressure at fortnightly intervals or at least once a month. Reduced tyre pressure will increase the rolling resistance which will reduce fuel economy by 0.6% to 3% (6) (7) (8). The recommended tyre pressure value can be found in its owner's manual. It is also recommended to use Nitrogen gas for tyres as it retains tyre pressure for longer periods.



## **Remove unnecessary cargo**

Eliminate unnecessary cargo in your vehicle such as ornamental rails, large speakers and vehicle cleaning equipment. An extra 50kg in your vehicle could decrease your fuel economy by 1%(9). The effect of the cargo is higher for the smaller vehicle than a larger vehicle. It is better to check the trunk before starting.

## **Avoid unnecessary idling**

Stop the vehicle when you park. Prolonged idling creates excess emissions and wastes fuel. Any shutdown longer than 1minute can save fuel assuming a maximum of 10 start and stops per day(10) Reduce the usage of electric accessories during the shutdown. It will improve the fuel economy.

## **Properly tighten the fuel cap**

It has been estimated that up to 2% loss of fuel can occur if the fuel cap is not tightened properly. Hence frequently check the fuel cap(11).

## **Maintenance of vehicles**

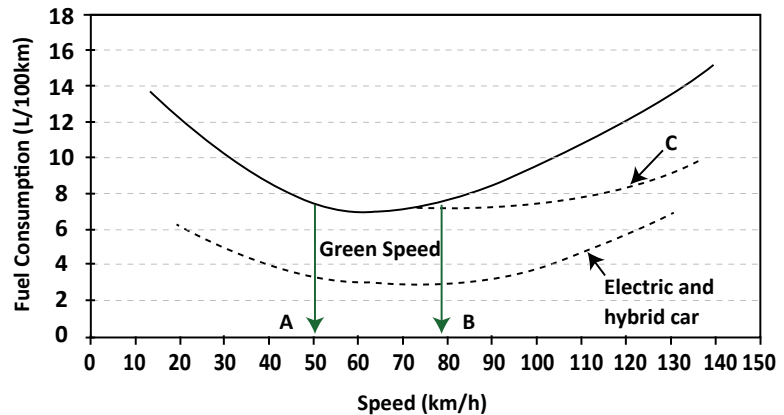
Follow manufacture recommended schedule for the maintenance. It is recommended to pay attention to the following while servicing your vehicle to increase fuel economy:

- Tune up the engine at the recommended milage (20,000 km for most gasoline engines). The efficiency gain can be 1-4% (8).
- Use the manufacturer recommended grade of motor oil. Increased friction losses due to arbitrary choice of oils can increase the friction on pistons that can contribute to a loss of 1-2% of efficiency(8). Further, improper cooling of engine would happen due to this leading to engine overheat and piston seizing, which would ultimately lead to more losses.

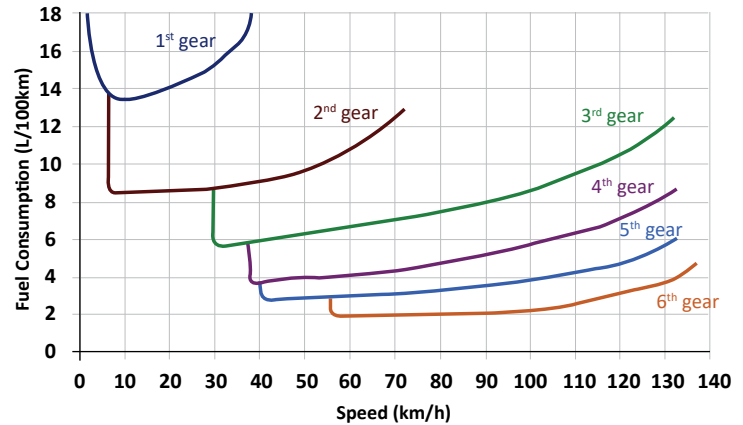
- Brake binding can increase the fuel usage due to increased friction. This can significantly increase the fuel usage
- The uneven wear of the tyres is a sign of bad wheel alignment. It is recommended to check wheel alignment at regular intervals. A car with bad wheel alignment will also drift slightly from side to side, even when the steering wheel is positioned to move forward, increasing the mechanical losses. Proper wheel alignment can save 3-6% of fuel (12).
- A clogged air filter will increase the fuel consumption of a vehicle if the vehicle is an older one with the carburetor. For vehicles without carburetor the loss is less than 2% (13)

## Maintaining optimal speed

Generally, the fuel economy is best at 50-80 km/h. Maintain 80 km/h in highway travel for optimal fuel consumption (14). The fuel economy rapidly decreases above 80 km/h. The relationship between vehicle speed and aerodynamic drag is parabolic therefore the effect of aerodynamic drag at higher speed is more significant.



If you are driving a manual transmission vehicle, it is always recommended to shift the gears to higher position as soon as you have achieved the optimal speed (15). Following graphs shows the variation of fuel economy at various speeds and gear positions.



## Avoid carrying cargo on the roof

The roof attached cargo will increase the projected area of the vehicle, contributing to an increased drag coefficient. As a result, aerodynamic drag will be increased which will reduce the fuel economy. The effect of aerodynamic drag become greater as the speed increases (16). When you are in city limits hauling cargo can increase fuel consumption by 2-8%. (17). If you are required to attached cargo, try to attach to the back of the vehicle.

## Use cruise control

Use cruise control in highway travel if the terrain is relatively flat and the vehicle density is low. The vehicle will maintain a constant speed when normal cruise control is applied. Driving at a constant speed will consume less fuel than driving with high acceleration and deceleration rates. It is estimated that around 3% fuel can be saved with cruise control (18)

## Close shutters while driving on highways

Drive with closed shutters on highways to improve fuel economy for small and lower drag coefficient vehicles. Open shutters cause higher aerodynamic drag which increases fuel consumption. Opening shutters with the air conditioning switched off will decrease the fuel consumption at lower speeds.

## Reducing air conditioning load

It is estimated that around 10-15% of fuel usage of a vehicle is for air conditioning (11). Following steps can be taken to minimise the Airconditioning load (19)

- Park the vehicle in the shade
- Before starting the vehicle, roll down the windows and let the hot air escape
- When cruising at low speed roll down the shutters a little and use natural air for cooling instead of air conditioning
- Use appropriate temperature. 25°C is recommended for Sri Lanka
- Use air circulation mode to reduce fresh air ingress when the occupancy of the vehicle is low
- Make sure that the Air conditioning system components are serviced properly this includes A/C filter, cooling coils, condenser, and the refrigerant.

## Hybrids, plug-in hybrid electric vehicles, and electric vehicles

Hybrid vehicles are of two types; mild hybrids and Full hybrids. In mild hybrids, there is a relatively small hybrid battery, which can assist the vehicle's engine while accelerating, cruising, and powering the accessories like air conditioning system. When it comes to full hybrid vehicles, there are two main types of power trains; parallel hybrids and series

hybrids. In parallel hybrids, the engine can be powered in one of 3 ways; directly by the engine, directly by the electrical motor, or by both systems working together. In a series hybrid, the wheels are powered solely via the electric motor, with the engine providing power for the electric motor. Plug-in hybrids are full hybrid vehicles with a battery that can be charged using an external power source.

## **Use the ECO mode and EV mode**

Most of the Full-hybrid and electric vehicles are equipped with economy mode. Enabling ECO mode will improve the fuel economy by reducing the acceleration rate. It also regulates the power used by the vehicle's air conditioning, as well as other accessories, to increase fuel efficiency (20). ECO mode is useful when the vehicle is driven through a busy city, stopping, and starting regularly.

Full Hybrid and PHEVs are equipped with EV mode where the vehicle runs solely on battery power. This mode can reduce fuel usage when driving at low speeds especially for PHEVs.

## **Avoid hard braking**

Apply brake gently and smoothly. This permits the regenerative braking system to recuperate energy from the vehicle's kinetic energy. Hard braking activates conventional friction breaks. Then the kinetic energy is dissipated as heat (21).

## **Using accessories**

Most of electric and plugin hybrid vehicles are equipped with pre-heating and pre-cooling function. The cabin can cool or heat when vehicle is plugged in to the grid. This will reduce the energy requirement for HVAC system while driving.

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