Fuel sensitive driving

The motor in a car is there to transform fuel into motion, electricity for electronic devices and lights, and into heat or cooling for the passengers.

At the end of the day, a car is usually at the same place it was the previous morning: not moving, neither heated nor cooled, with the same power in the battery. Used fuel was completely transformed into heat, some useful, some not.

Searching for ways to save fuel means to check where heat is produced and utilized, and to try to be more efficient.

The major heat production spot is the internal combustion engine (ICE). Efficiency is around 1/3, which means that 2/3 of the fuel is directly transformed into waste heat. An easy way to reduce that waste is to stop the motor each time that the car is not moving; this is typically an automatic feature on new cars. The other easy way to reduce heat production is to voluntarily limit the motor's RPMs (revolutions per minute); situations requiring more than 3000 RPMs are really unusual.

When buying a new car, know that a small motor will heat less than a large one, and an electrical motor produces almost no heat. Electric vehicles use typically 20 kWh for 100 km, which translates to about 2 liters of fuel; this is 1/3 of the fuel consumption of an equivalent ICE motorized car, but 1/3 is also the efficiency of an ICE. If the electricity is produced with any kind of solid or liquid fuel, the waste heat production is displaced from the vehicle to the power plant, although the power plant will be more efficient than the ICE motor and offers more heat recycling possibilities.

The other major heat producers are wind resistance and tire traction. Tires will be the major player at low speeds, and wind resistance at higher speeds.

The heat produced by wind resistance is real even if it is immediately dissipated into the air. Since this heat production is directly related to the speed of the vehicle, an easy way to reduce this energy loss is to drive slower. It also increases efficiency to remove or adjust anything that reduces the aerodynamics of a speeding car (roof rack, open window ...).

Regarding the tires, the right pressure will prevent excessive fuel consumption and will increase safety. As a larger payload increases a tires' deformation, increased tire pressure is sometimes required for loaded cars. To help the buyer, the European Union defined tire efficiency classes, from A to G. A car with A tires uses about 9% less fuel than one with G tires. Of course, energy efficiency is not the only thing to check when buying tires.
https://ec.europa.eu/energy/sites/ener/files/documents/user_guide_-_tyres_en.pdf

Brakes are the next main waste heat producers. Braking, in essence, is transforming speed into heat. Engine braking avoids the heating of brakes, but the heat transformation is still happening. The main way to save braking energy is to anticipate required speed reductions and removing the foot from the gas in a timely manner. A loaded car will produce more heat when braking, so it makes sense to remove loads that are not required. Electric vehicles can do battery regenerative braking, some as soon as the gas pedal is lifted up, others require a light pressure on the brake pedal.

For electric vehicles, space heating can be a significant energy user, so efficient seat and steering wheel heaters are sometimes employed. ICE cars use what would otherwise be waste engine heat for space heating.

The other heat producers are either small players (radio) or are required for operations, security and safety (electronics, lights). Other electricity consumption (computers, car refrigerator...) as well as air conditioning can have a big impact, but are usually only used when needed.

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