SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)
COIMBATORE-35
Accredited by NBA-AICTE and Accredited by NAAC – UGC with A+ Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

UNIT I: INTRODUCTION TO HYBRID ELECTRIC VEHICLES

TOPIC: **BASICS OF VEHICLE PERFORMANCE**

INTRODUCTION

- Hybrid electric vehicles are powered by an internal combustion engine and one or more electric motors, which uses energy stored in batteries.

- A hybrid electric vehicle cannot be plugged in to charge the battery. Instead, the battery is charged through regenerative braking and by the internal combustion engine.

- The extra power provided by the electric motor can potentially allow for a smaller engine. The battery can also power auxiliary loads and reduce engine idling when stopped.

- Together, these features result in better fuel economy without sacrificing performance.

VEHICLE PERFORMANCE

- We use an objective, data-driven approach to analyze four key aspects related to vehicle performance to give you the best recommendations for electric vehicles based on all of your needs.

- Some just look at the fastest electric cars to judge performance; but we consider horsepower, top speed, acceleration, and drive type when analyzing performance, to give you a better recommendation for which electric cars will perform in the most real-world situations..

HORSEPOWER

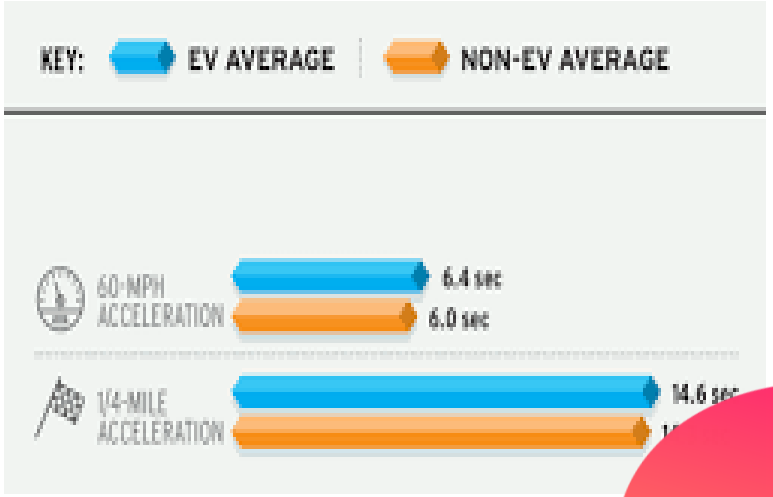
- The electric cars with the most horsepower generally have the most powerful batteries. Horsepower determines how much power your electric vehicle can muster.
- A horsepower is a unit of measurement of power representing how much output can be generated from a motor.
- For example, one horsepower represents 500 foot-pounds per second of output. Electric motors can also be represented in Kilowatts of power, in which case one horsepower represents 745.7 watts per second of capacity.
- An electric car can feel more powerful than a internal-combustion-engine car because an electric motors' full torque is deployed as soon as the driver steps on the accelerator.
- We use horsepower as one of the factors of performance to help us find the best-performing electric vehicles based on your criteria.

TOP SPEED

- Some of the fastest electric cars can top speeds of over 250 mph, but you'll pay a higher premium for some of these.
- Still, many electric cars have no problem reaching speeds well over 100 mph. As of today, electric (depending on the manufacturers) can have a slightly slower top speed than gas powered vehicles.
- Electric vehicles have lower top speeds because the manufacturers limit top speeds to preserve battery consumption.
- Therefore, we use top speed as a dimension of performance based on your criteria.

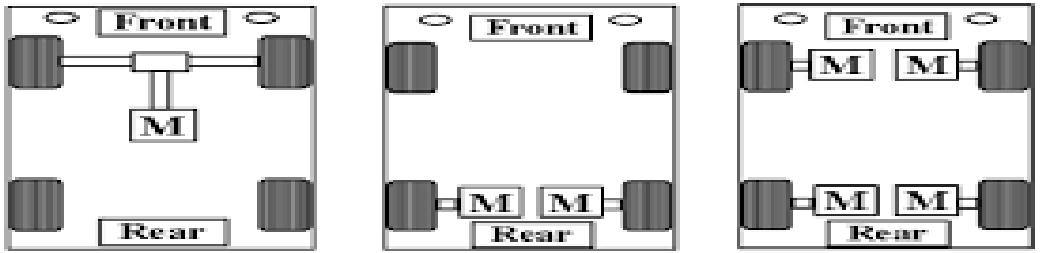
ACCELERATION

- Acceleration to measure how quickly the electric vehicle can go from standstill to 60 seconds in seconds.
- Since electric cars have instant torque where the motor directly power the wheels, acceleration times are quicker than gas-powered cars.
- We use acceleration to measure quickness, which acts as a factor to determine what electric car has the best performance to match your criteria.
- The electric cars with the fastest acceleration will help with performance ratings.



DRIVE TYPES

- Electric car drive types are another factor we consider when determining electric vehicle performance.
- Electric vehicles either receive power to their front, rear or all four wheels simultaneously. Therefore, we use the drive type as a factor in determining performance. All wheel drive will give you the best handling and performance, but will also cost more.



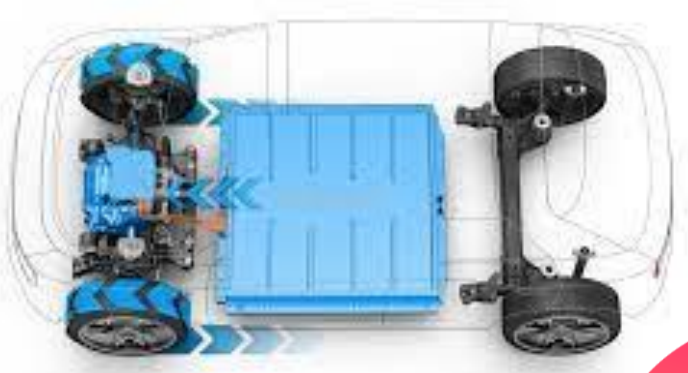
(a) Front or rear wheel drive type EV

(b) Front or rear two in-wheel drive type EV

(c) Four in-wheel drive type EV

FRONT WHEEL DRIVE

- Front-wheel drive is where the front two tires receive power from the motor.
- The benefit of having a front-wheel drive is traction in the rain and snow versus a rear-wheel-drive vehicle.
- The downside of a front-wheel-drive car is handling. Front-wheel drive handles the worst out of the three drive types.



Rear Wheel Drive

- Rear-wheel drive is where the back tires of the vehicle receive power from the motor.

- As a result, rear-wheel-drive enjoys better than average handling. On the downside, rear-wheel drive electric vehicles are at their weakest in rain and snow.

AAL WHEEL DRIVE

- All-wheel drive is where all four tires receive power from the motors.
- Typically with electric cars, all-wheel drive means at least one motor for the front tires and a separate motor for the rear tires.
- As a result, all-wheel-drive electric vehicles enjoy excellent traction and are the best option for handling rain and snow.
- All-wheel drive cars also enjoy better than average handling making it a good choice for weather and handling.
- The downside for all-wheel drive is cost and weight.
- All-wheel-drive systems mean adding cost and weight to your electric vehicle making the feature available in more mid to higher-end electric cars.

ALL WHEEL DRIVE

THANK YOU