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TOPIC:

ENVIRONMENTAL PROTECTION THROUGH THE USE OF ELECTRIC CARS

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Electric vehicles (EVs) are vehicles that use electricity to run, instead of traditional fuels, such as gasoline or diesel. This new concept in the automotive industry has gained great popularity in recent years, thanks to technological improvements and an increased awareness of the impact of climate change and environmental pollution. Electric vehicles are an important part of the development of sustainable transportation and play a key role in achieving global goals to reduce greenhouse gas emissions and reduce dependence on fossil fuels.

Main Characteristics of Electric Cars

An electric car operates using electrical energy stored in an advanced battery system that powers the electric motor to drive the vehicle. Some of the advantages of electric cars include:

- **No emissions of harmful gases**: Unlike cars with internal combustion engines, electric cars do not emit harmful gases such as carbon dioxide (CO2), nitrogen oxides (NOx), and dust, thus contributing to air purification and improving environmental quality.
- **Low noise**: Electric motors are much quieter than combustion engines. This aspect contributes to reducing noise pollution, especially in cities with heavy traffic.
- **High energy efficiency**: Electric cars are much more efficient in using energy compared to traditional cars, as they can convert up to 90% of the energy used for movement, while gasoline and diesel cars can only achieve 20-30% efficiency.
- **Low operating costs**: The cost of charging an electric car is much lower compared to fuel costs for a traditional car, and electric cars require less maintenance as they have fewer moving parts, which reduces long-term maintenance costs.

The Variety of Electric Cars

Several types of electric cars are available on the market, each with different features and benefits that can be tailored to different needs. Here are some of the main types of electric cars:

- **100% Electric Vehicles (BEV)**: These cars run exclusively on electricity and are known as "Battery Electric Vehicles" (BEV). They have an electric motor that draws power solely from a rechargeable battery, without the help of an internal combustion engine. Some popular examples are the Tesla Model 3, Nissan Leaf, and Chevrolet Bolt.
- **Hybrid Vehicles (HEV)**: Hybrid cars use an internal combustion engine and an electric motor that work in parallel or assist each other to provide greater efficiency. This type of car is ideal for those looking for a way to switch from traditional cars to electric ones, without having to worry about long distances.
- **Plug-in Hybrid Vehicles (PHEV)**: PHEVs are an advanced form of hybrid cars, as they have a battery that can be charged by connecting it to the electrical grid. This allows the car to run for several kilometers on electric power alone, and when the battery runs out, it can switch to the combustion engine. Popular examples are the Toyota Prius Plug-In and the Mitsubishi Outlander PHEV.
- **Fast Charging Electric Vehicles (FCEV)**: Fuel cell electric vehicles use hydrogen as a source of energy to produce electricity. These vehicles are still in the development phase and represent an alternative fast-charging option, but are more expensive and require an extensive hydrogen charging infrastructure.

The History of Electric Cars

Electric cars are not a new invention. In fact, the first electric cars appeared in the late 19th century. In 1828, Hungarian Ányos Jedlik invented an electric motor, and a few years later, in 1834, the first electric-powered cars were created by the Multinational Electric Car Company. However, gasoline-powered cars gained popularity after the invention of the internal combustion engine and the development of the oil industry in the 20th century.

In the late 20th and early 21st centuries, interest in electric cars grew due to concerns about environmental pollution and limited energy resources. Companies such as Tesla, Nissan, and Chevrolet led the industry forward, producing electric cars with high performance and longer travel distances.

Benefits of Electric Cars for Society and the Environment

In addition to the individual benefits for users, electric cars offer numerous benefits for society and the planet. Some of these benefits include:

- **Improving air quality**: Electric cars do not produce emissions of gases that pollute the air, helping to improve air quality, especially in large cities.
- **Reducing dependence on fossil resources**: By switching to alternative energy sources, such as renewable energy, electric cars help reduce dependence on fossil resources, contributing to a more sustainable economy.
- **Noise and acoustic pollution reduction**: Electric cars are much quieter than traditional cars, helping to reduce noise pollution, a significant problem in densely populated cities.

Types of Electric Cars

Electric cars are available in several shapes and sizes, each with different advantages and features to suit different user needs. The type of electric car a consumer chooses depends on the intended use, the distance they will travel, and the assistance they require in terms of charging infrastructure. Here are some of the most popular types of electric cars:

1. 100% Electric Vehicles (BEV)

100% electric cars, known as Battery Electric Vehicles (BEV), are cars that use exclusively electric power to operate and do not have an internal combustion engine. They are vehicles that rely entirely on energy stored in batteries and are known for their high performance and maximum efficiency in use.

- **Characteristics of BEVs**:
    - **Battery**: BEVs rely on a powerful battery system, usually a lithium-ion (Li-ion) battery, that stores energy and uses it to drive the electric motor. BEV batteries can offer varying ranges, depending on the battery capacity and vehicle model.
    - **Charging**: BEVs can be charged via the electrical grid, and the charging time depends on the capacity of the charging station and the capacity of the battery itself. Electric cars with fast charging capabilities can be charged up to 80% in one hour.

- **AUTONOMY**: Many 100% electric cars offer a range that ranges from 150 to 500 kilometers, depending on the model and road conditions. The range of the car is a key factor for frequent travelers and users who travel long distances.

Well-known examples of BEVs:

- **Tesla Model 3**: One of the most popular BEV models, with an autonomy of up to 500 km and excellent performance.
- **Nissan Leaf**: A popular BEV vehicle, with an autonomy of around 300 km and a reasonable price for many users.
- **Chevrolet Bolt**: Another popular option, offering considerable autonomy and fast charging capabilities.

2. Hybrid Vehicles (HEV)

Hybrid electric vehicles (HEVs) are vehicles that contain two power sources: an electric motor and an internal combustion engine (usually gasoline). These vehicles cannot be charged from an external power source, as they use the energy generated by the combustion engine to charge the battery. The electric and combustion engines work together to provide an excellent balance between energy efficiency and power.

- **Characteristics of HEVs**:
  - **Mixing two energy systems**: The combustion engine is assisted by the electric motor, which can be used for short distances to save fuel. When the battery is charged, the car can use only electric power to move, reducing pollution and fuel consumption.
  - **AUTONOMY**: Hybrid cars offer high autonomy due to the combination of two systems, which enables them to cover long distances without having to constantly charge.
  - **Fuel efficiency**: HEVs are very fuel efficient, as they use the electric motor to assist the combustion engine and charge the battery while driving.

Well-known examples of HEVs:

- **Toyota Prius**: One of the most popular and reliable hybrid car models, which has rewarded consumers with high fuel efficiency and low emissions.
- **Honda Insight**: Another popular model that offers excellent performance and fuel economy.
- **Ford Escape Hybrid**: A hybrid SUV that offers an excellent mix of electric and fuel power, for those looking for a larger and more powerful vehicle.

3. Plug-in Hybrid Cars (PHEV)

Plug-in Hybrid Vehicles (PHEVs) are a variant of hybrid vehicles, but with one important difference: they can be charged using an external power source, such as an electrical outlet. This means that users can charge the car and drive it for short distances on electric power alone, and then switch to the combustion engine for longer distances.

- **Characteristics of PHEVs**:
    - **External charging**: PHEVs can be charged by plugging them into an electrical outlet, enabling the use of electric power for short distances and switching to the combustion engine for longer distances.
    - **Electric and mixed autonomy**: PHEVs offer an electric autonomy that typically ranges from 30 to 60 kilometers, enabling pure electric use for daily commutes, while being able to use the combustion engine for longer distances.
    - **Operating cost**: PHEVs offer opportunities for energy savings and reduced emissions if used primarily in electric mode, as they consume less fuel when used like hybrid cars.

Well-known examples of PHEVs:

- **Toyota Prius Plug-in**: This model is a plug-in hybrid that offers the possibility of charging and using electricity for short distances.
- **Mitsubishi Outlander PHEV**: A hybrid SUV that offers the option of charging and is suitable for longer trips and city use.
- **Volvo XC90 T8**: A plug-in hybrid luxury SUV that offers excellent performance and the ability to use electric power for short distances.

4. Fast Charging Electric Vehicles (FCEV)

Fuel Cell Electric Vehicles (FCEVs) are another type of electric vehicle that uses hydrogen to generate electricity for the electric motor. These vehicles are similar to BEVs in terms of using electric motors, but they use hydrogen as a fuel source to generate electricity for the motor.

- **Characteristics of FCEVs**:
    - **Fuel cell**: FCEVs use a fuel cell to convert hydrogen into electricity, releasing only water as waste. This makes them unique, as they have no CO2 emissions.
    - **Fast charging**: A major advantage of FCEVs is their ability to charge quickly. These vehicles can be fully charged in 3-5 minutes, a huge advantage compared to BEVs that can take hours to charge.
    - **Hydrogen charging infrastructure**: While charging is very fast, hydrogen charging infrastructure is still very limited, and this is an obstacle to the widespread acceptance of this type of car.

Well-known examples of FCEVs:

- **Toyota Mirai**: One of the most popular FCEV car models, which uses hydrogen to produce electricity and offer excellent performance.
- **Hyundai Nexo**: An FCEV SUV that also uses hydrogen to generate energy and has a significant autonomy.

Electric vehicles (EVs) are increasingly used in many countries around the world, which offer various incentives and policies to promote the use of these vehicles due to their environmental and

economic benefits. Some countries are more advanced in the acceptance and use of electric vehicles due to more developed charging infrastructure, government subsidies and high awareness of the impact of pollution. Here are some countries where electric vehicles are used more:

1. Norway

- **Use of EV**: Norway is a global leader in the use of electric cars, with more than 50% of new cars sold being electric. The country has managed to have a very high number of EVs per person, making it a prime example of sustainable transport use.
- **policies**: The Norwegian government offers a number of benefits to electric car users, including reduced taxes and excise duties on EVs, tax-free access to parking, and ease of passage through toll zones.
- **Charging infrastructure**: Norway has an extensive network of charging stations and the charging infrastructure is plentiful and easy to use.

2. Czech Republic

- **Use of EV**: In recent years, the Czech Republic has seen a huge increase in the use of electric cars, with many EV models becoming available to consumers. The country has made significant progress in subsidizing electric cars, especially in larger cities like Prague.
- **policies**: The Czech government has offered incentives and support for those who buy electric cars, as well as invested in the development of charging infrastructure.
- **Charging infrastructure**: There has been an increase in charging stations for EVs, which helps electric car users travel safely and conveniently.

3. Germany

- **Use of EV**: Germany is one of the largest markets for electric cars in Europe, with a large percentage of EVs sold each year. The country is known for car manufacturers such as Volkswagen, BMW and Mercedes-Benz, which are investing heavily in the development of electric cars.
- **policies**: The German government has offered subsidies for the purchase of electric cars and has made major investments in charging infrastructure. It also has a goal of increasing the use of electric cars in the coming years.
- **Charging infrastructure**: Germany has an extensive network of charging stations and is developing more charging options in cities and on highways.

4. China

- **Use of EV**: China is the global leader in the use and production of electric vehicles. The vast majority of electric vehicles sold in the world come from China, which is also one of the leading manufacturers of EVs. China has a large number of cities that have embraced the use of electric vehicles as a cleaner alternative to traditional combustion engine vehicles.
- **policies**: China offers strong incentives to electric car buyers, including high subsidies and tax breaks. The government has drawn up ambitious plans to increase EV use and have an extensive charging infrastructure.

- **Charging infrastructure**: China has a large network of charging stations, and is in the process of further developing charging options to support the growth of electric cars.

5. United States of America

- **Use of EV**: The United States has seen a rapid rise in the popularity of electric cars, with companies like Tesla pioneering the field. California is the state with the highest EV usage and is one of the leaders in the electric car market in the US.
- **policies**: The United States, particularly California, has offered incentives and subsidies to those who buy electric cars, including tax credits and support for the development of charging infrastructure. The federal government has also invested in electric vehicle subsidies, including increasing financing options for the construction of charging stations.
- **Charging infrastructure**: The US has an extensive network of charging stations, and many companies are developing new networks to support electric cars, especially in larger cities and along major roads.

6. Netherlands

- **Use of EV**: The Netherlands has a high use of electric cars, and is one of the leading countries in Europe for the percentage of electric cars on the road. This country has created a suitable climate for the growth of the number of electric cars.
- **policies**: The Dutch government offers various incentives for electric cars, including tax benefits and subsidies for buyers.
- **Charging infrastructure**: The Netherlands has one of the most developed networks of charging stations in the world, which makes it a suitable place for the use of electric cars.

7. Sweden

- **Use of EV**: Sweden has seen a significant increase in the use of electric cars, and is one of the European countries that has massively adopted this technology. One of the main factors is high environmental awareness and government policies to support clean vehicles.
- **policies**: Sweden offers strong incentives for purchasing electric cars, including subsidies and tax breaks for those who buy eco-friendly vehicles.
- **Charging infrastructure**: Sweden has an extensive network of charging stations and is in the process of increasing charging options to support the growing use of EVs.