

Electric Vehicles

an overview...

Early History Shows...

Electric

Other

- **Rechargeable batteries** that provided a viable means for storing electricity on board a vehicle did not come into being until **1859**, with the invention of the lead–acid battery by French physicist Gaston Planté.
- An early electric-powered **two-wheel cycle** was put on display at the **1867** World Exposition in Paris by the Austrian inventor Franz Kravogl.

- In **1769** the first STEAM-POWERED automobile capable of human transportation was built by Nicolas-Joseph Cugnot.
- In **1808**, François Isaac de Rivaz designed the first car powered by an INTERNAL COMBUSTION ENGINE **FUELED BY HYDROGEN!**
- In **1870** Siegfried Marcus built the **first petrol powered combustion engine**, which he placed on a pushcart...

Early History Shows...

Electric

- English inventor Thomas Parker, who was responsible for innovations such as electrifying the London Underground, overhead tramways in Liverpool and Birmingham, and the smokeless fuel coalite, built the **FIRST PRODUCTION ELECTRIC CAR** in London in **1884**.

ICE

(Internal Combustion Engine)

- In **1885**, Karl Benz developed a petrol powered automobile. This is also considered to be the **FIRST "PRODUCTION" VEHICLE** as Benz made several other identical copies. The automobile was powered by a single cylinder four-stroke engine.

Early History Shows...

Electric



German Flocken Elektrowagen of 1888, often regarded as the first electric car of the world.

ICE



1885-built Benz Patent-Motorwagen, the first car to go into production with an internal combustion engine.

EVs through the years...



One of the many **Detroit Electric** variations - **1912**.

What happened next?

- By the 1920s an **improved road infrastructure** required vehicles with a greater range than that offered by electric cars.
- Worldwide discoveries of **large petroleum reserves** led to the wide availability of affordable petrol, making petrol-powered cars cheaper to operate over long distances.
- Petrol cars became even **easier to operate** thanks to the invention of the **electric starter by Charles Kettering** in 1912, which eliminated the need of a hand crank for starting a petrol engine.
- The **noise emitted by ICE cars became more bearable** thanks to the use of the muffler, which Hiram Percy Maxim had invented in 1897
- The initiation of **mass production** of petrol-powered vehicles by **Henry Ford** brought their price down.

EVs through the years...



East German **electric vans** of the **Deutsche Post** in **1953**.

EVs through the years...



The **Enfield 8000**, a purpose designed electric car which entered production in **1966**.

EVs through the years...



The **Flinders Uni** mobile test bed (**Investigator 1**) built in **1972**.

EVs through the years...



The General Motors **EV1**, had a range of 260 km with NiMH batteries in **1999**.

EVs through the years...



The original **TESLA Roadster** - **2008**. The world distance record of 501 km for a production electric car on a single charge (Simon Hackett 2009)

EVs through the years...



Mitsubishi i-MiEV (GA MY10) hatchback – 2010 -

EVs through the years...



Nissan LEAF – 2010 -

EVs through the years...



TESLA Model S – 2012 -

EVs through the years...



BMW i3 – 2014 -

EVs through the years...




TESLA Model X – 2015 -

EVs through the years...



TESLA Model 3 – 2017 -



*What are the differences
between an EV
and other cars (ICE)?*

Differences...

Electric

- Efficient electric motor
- Efficient motor controller
- Efficient battery storage/charging and power distribution
- No starter motor required.
- Approximately 300 moving parts
- Servicing: Check windscreen washer fluid and check coolant levels (if present). No engine oil or filters to change.

ICE

- Inefficient Internal Combustion Engine – with oil lubrication and filters.
- Approximately 3000 moving parts
- Inefficient radiator system to keep the engine hot!
- Dangerous liquid fuel system – storage and distribution.
- Exhaust system to pollute the air.

Driving Differences...

Electric

- Electric motor has high torque over a wide rev range – No gears required.
- Quiet driving – able to hear nature around you.
- Very fast effortless acceleration.
- No drivetime emissions.

ICE

- The Internal Combustion Engine has very narrow torque range and requires many gear changes.
- Many are very smelly to drive behind!
- Emitting all sorts of dangerous gases etc.

Electric Vehicles

Thank you

Some text and images courtesy: WIKIPEDEA

Eric Rodda - AEVA (SA) - Green Drive Day - April 8, 2018