The future ZEV

The new concept for CO_2 neutral cars.

The background

- The CO_2 emission is harmful to our environment. Global weather changes takes place due to green house effects. The outcome is negative to mankind.
- Many people suffers from the air pollution made by combustion cars. Life value is reduced and people die earlier.

Available zero emission energy sources.

- Electricity made from non fossils sources. Renewable energy sources like wind energy, solar energy, water power plants, wave energy, tidal energy and bio energy. Nuclear energy.
- Bio fuel. Hydro carbons fluids or gases made from organic matter in a way, where it is CO_2 neutral.
- Hydrogen made from water with power from CO_2 neutral sources.

Availability.

- Zero emission electricity is already available in large scale and can be extended almost unlimited.
- Bio fuels will be limited by the interest in using the agro land for food production.
- Hydrogen can basically only be made from electricity. It is unlimited but is depending on having electricity available.

Energy efficiency policy.

- Target is lowest amount of energy per person kilometre.

Battery car energy efficiency

- Charger power factor 0.9
- Battery charge factor 0.95
- Battery discharge factor 0.9
- Motor controller 0.95
- Electric motor 0.9

Overall energy system factor 0.66

App. 66% of the electric energy is transmitted to the wheels.

Fuel cell car energy efficiency.

- Production of hydrogen 0.8
- Storing and distributing hydrogen 0.8
- Overall fuel cell efficiency 0.4
- Motor controller 0.95
- Electric motor 0.9

Overall energy system factor 0.22

App. 22% of the electric energy used is transmitted to the wheels.

Battery car versus fuel cell car.

- Both cars have app. the same weight and volume of the propulsion system.
- Batteries and fuel cells are expensive.
- The fuel cell car is fast to refill, but there is no infrastructure.
- Battery car can be charged from existing electric grids, but take an hour or more.
- Battery technology is well established.
- Fuel cells are not commercial available yet.
- The fuel cell car use 3 times as much energy as the battery car pr km.

The weak points of the battery car.

- Long charging time. Min. ½ hour, typical 1-5 hours.
- Limit range per charge. Typical 80-100 km.
- Expensive battery. High investment.

Technical solution to weak points.

- The charging time problem can be converted to a few minutes waiting time if the battery package is changeable at the service station (gas stations or alike). The batteries are in one or more boxes under the vehicle and can be dismounted, changed and mounted by a sub terrain robot (like changing batteries on a battery drill machine).
- In case the battery changing stations are as frequent as 20-30 km apart, the range limits of 80-100 km is no longer a problem.
- The high cost is not avoidable. If the batteries are changeable and owned by the service companies, the user buy the car and make a leasing contract for the batteries, which allows the owner to swap batteries when he needs it. The leasing fee can be a combination of annual contribution and usages by Ampere hours fees.

Hen and egg

- Nobody will buy a hydrogen car, if there is no where to tank hydrogen
- Nobody will buy a battery car with changeable batteries, if there is no where to have the batteries changed.

  In order to get started, the infrastructure must be designed parallel to the design of the car. Imagine petrol cars and no tank stations.

  If the car manufactures will agree on a common concept, the service companies will join with facilities, the new concept will work. It might have to be geographically limited in the up growing period, till it has proven its efficiency.

Battery standard

- A standard must be set for the battery unit, so the various cars can use the same unit and various manufactures can offer compatible products.
- The single battery unit must be little enough to fit a small car like a Quadricycle. Larger vehicles can have 2-4 of the same units. A little economy car might have 2 units, a mid size family car 3 units and the larger cars 4 units. The car controller and the box computer coordinates charging and discharging, so the batteries are operated synchronic with respect to differences in performance.
- The battery unit must contain an electronic unit, which provide the board computer with information about the battery power and other battery conditions. It control the charger in the car and the cooling of the batteries. The computer registries charged and discharged Ampere hours, which can be a a part of the fee in the leasing cost (like tariffs for telephone calls).

Proposed battery unit standard

- A robust insulated box with 120 V and 50-60 Ah battery capacity.
- The box is 900 x 450 x 300 mm (l x w x h) and weight 120-150 kg depending on battery technology. (NiMH-NiCd).
- Has a snap on and off interface to the car frame, which can be robot activated for automated swapping.
- Has an electric touch contact, so the power and communication automatically is established when the box is in place.
- Has a build in computer.
- Has a liquid to air cooling device.

Let us go ahead

- It is time to get started.
- The climate changes are already active.
- The technology is there.
- Political will is rising in favour of zero emission vehicles (Rio, Kyoto, Johannesburg, etc.).

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Other interested link: www.evguide.nu