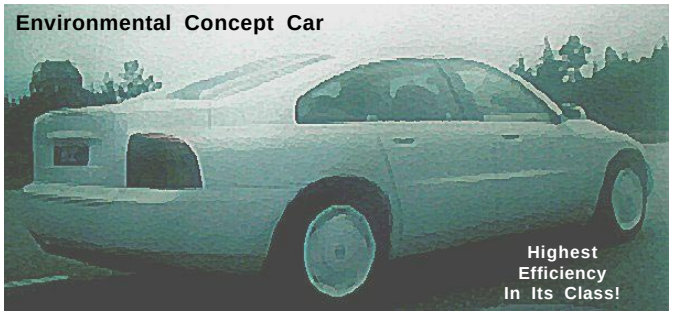
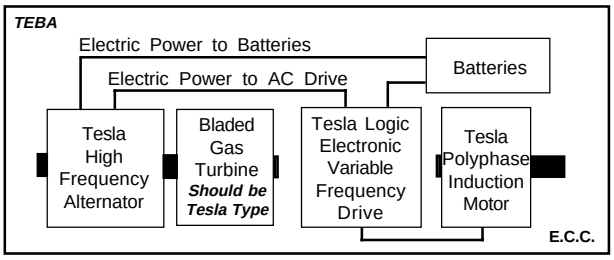
Tesla Turbo/Electric Hybrid Design

Current Hybrid vehicles such as the popular Prius by Toyota are changing the automotive landscape as fuel prices escalate. However, this is a very crude example of what is possible using the hybrid system first proposed and detailed by Tesla. It has recently been reported that if total energy inputs are considered, between a gas guzzling "Hummer" and the more energy intensive manufacturing and material costs, including battery replacement, of the Prius, lifetime energy consumption is approximately the same. This equation changes completely, however, when a hybrid is built to the complete Tesla spec.



Volvo came the closest with its: "Environmental Concept Car," or "ECC." It enabled the high performance Volvo "850" to achieve a doubling of mileage; comparable to that of the smaller Prius. This is even more impressive when it is considered that Volvo doubled the weight of the 850, with batteries; required to meet the then pending, "Zero Emissions" requirement of the California legislature. Despite this doubling of weight, the performance of what is a high performance stock vehicle increased dramatically in the hybrid mode.

Volvo employed a specially built conventional gas turbine as a power plant to achieve this. Conventional turbines are not practical for automotive applications, however, because of their cost, complexity and safety considerations. These problems are resolved if the "Tesla Turbine" engine were to be employed. The Tesla turbine is simple and low cost while being the safest type of turbine. The only turbine that self regulates over speed when unloaded, instead of running away to explosion, as does a conventional bladed turbine.



It is also, as documented in this newsletter, the only type of turbine that can ingest solids without damage. This includes dirty water. Water injection can be used with conventional turbines to drastically increase thermal efficiency, but with a conventional type it must be ultra pure. But water can be used for up to half the fuel volume and thereby the potential to again double mileage! Highly purified water is very expensive, however, limiting its use with the conventional machine to special applications. Not so with the Tesla type.

The Tesla turbine is the only type that is, by its nature, a flywheel, allowing for non-battery energy storage. The promise of high speed composite flywheels has been made for many a decade now but always seems to be "five years" away. The only proven commercial flywheel technologies are those that employ metallic mass and speed for storage. The Tesla turbine is inherently a metallic flywheel which stores energy in the same way.

Multiple fuels can be employed with all turbines but the Tesla can even ingest heavy crude and "bunker fuels" that destroy a conventional type. This means refining could be scaled back with a huge reduction in total emissions. The Tesla turbine engine can even burn dirty waste oils, at extremely high temperatures, thereby detoxifying this waste while powering the vehicle. The Tesla turbine could even run on powdered coal!

When not in use it could feed power into the grid with very little wear and tear, making a decentralized power system a reality. So unlike the Prius — the complete Tesla hybrid beats the "Hummer" — hands down.

Volvo almost got it right! But they lacked knowledge of the Tesla turbine which would make it economic. Following is a historical piece describing Volvo's valiant efforts.

Popular Science — Automotive Newsfront
February 1993

In an ingenious hybrid, Volvo has revived the gas turbine—using it to charge batteries that power an electric traction motor *(ed: Tesla 3phase)*. The Volvo Environmental Concept Car (ECC), a full-size sedan based on the Volvo 850, tops 100 mph using hybrid drive, runs up to 415 miles without refueling, and gets 45 mpg at a constant 55 mph, all while easily meeting 1993 California emissions requirements. Hybrid drive uses a low-output electric motor for silent, zero-emissions city driving and a gas or diesel engine for cruising to overcome the limited range and performance of pure electric drive. It also sidesteps the potential pollution caused by fuel-burning power stations.

The ECC uses a hefty full-time 95-hp electric motor and a relatively small 120-volt nickel-cadmium battery pack kept at peak charge by a gas turbine generator. Volvo design director Peter Horbury explains the reasoning behind the system:

"Compared with piston engines, gas turbines with continuous combustion have far lower emissions—aided by much higher burn temperatures—giving more complete combustion. For a given output, they are lighter and more compact as well as vibration-free."

In the ECC, a 55-hp engine running at 50,000 rpm powers a 40-kilowatt generator *(ed: Tesla high frequency)* in a neat package originally designed at the Royal Institute of Technology in Stockholm. The generator, running on a common shaft with the turbine, is specially designed for such high speeds. Its high-voltage alternating current output is first converted to direct current suitable for battery charging, then back to alternating current to power the synchronous traction motor.

There are three operation modes selected by push buttons. For zero emissions in urban traffic the driver can choose pure electric. Fully charged, the batteries are good for about a 50-mile range. In the hybrid mode, the electronic management system automatically starts the gas turbine if the batteries are low or when a sharp power demand is beyond their available capacity.

For maximum power in an emergency situation, the driver presses the gas turbine button. If the batteries are fully charged, however, he gets a visual warning to switch to hybrid operation, confirming turbine shut down and return to automatic mode. ⊙