

from the braking forces. These features give it a capability of much better matching of the load to a wider range of power sources and a much greater range of applications because of the fact that it removes the necessity for the delivery of the torque to the load by means of a direct mechanical shaft, gear or hydro-kinetic OEM torque converter connection. The design, using compressed gas storage of energy, further uncouples the speed of the load from the speed of the power source. Thus, large torques can be delivered to the wheels at start up without having to build up to high engine revs in the process, and more torque and energy can be delivered to the load without developing a lot of unneeded energy and CO₂ emission in a massive engine at high revs.

In systems using an internal combustion engine as a source of power this decoupling of the energy source from the load that is being driven opens very significant and far-reaching opportunities. The energy storage and release system will **eliminate the need for wasteful, massive CO₂ emitting engines that are designed more for the purposes of responding to the few times that maximum performance is needed rather than for the needs of ordinary driving which occupies the vast majority of driving time.** The Hydristor will permit the use of a lighter, more modest, less “high-strung” engine which, by operating over longer times, can accumulate large amounts of energy in the storage system. This stored energy can then be released rapidly to provide the greater power demands when high performance is required; after which the engine can restore the reserve energy (at a slower rate appropriate to the more modest engine) to be available when again needed. In fact, the engine will be set to run at a constant speed - near idle most of the time - even while the car is in motion. This enables the engine to be adjusted for optimum fuel efficiency and minimized carbon dioxide production. Short term heavy power needs (e.g. for fast starting, quick passing, hill climbing, etc.) will be provided from the energy storage system. On the other hand, sustained heavy energy demands are met by raising the engine speed as required, supplemented by the stored energy if needed to produce a smooth flow. Depending on the capacity of the energy storage system (which can be an option chosen by the owner at purchase, or as an “add-on”), this configuration can provide “street” performance in the range of current “behemoth” engines, but with much better mileage and carbon dioxide emission ranges. Although the Hydristor will also enable greatly improved performance for race cars as well as ordinary cars, other considerations will demand configurations different than those discussed here for production cars.

The more compact design of the Hydristor will enable it to fit within the space currently occupied by the transmission and flywheel so that as detailed below, **retrofitting can be done to convert existing autos to incorporate the Hydristor, without requiring that they be junked.** It is anticipated that when the Hydristor is in volume production, the cost of an up-grade to a Hydristor installation will be comparable to an automatic transmission overhaul. This fact alone will enable the nation to take advantage of the efficiency of the Hydristor in nearly **all of the existing vehicles** at a total cost in the range of several hundred billions of dollars – **well below the cost of total vehicle replacement.** This may also be compared with all of the fiddling, re-jiggering including even computerization that has had to be done with conventional internal combustion engines, greatly increasing their costs, and increasing the problem of keeping them maintained, in order to achieve only a small percentage of the efficiency, energy economy and CO₂ emission reduction that will be accomplished much more effectively as well as simply and easily with the Hydristor. The conversion to the simpler and more compact Hydristor will reduce the weight of the system as well, further improving the energy efficiency and carbon dioxide reduction.

The retrofitting can be undertaken by current manufacturers with new autos currently in their stocks prior to sale or it can be done by owners of vehicles now on the road. In either case, the retrofitability will extend the useful life of existing cars, rather than having to scrap them. It will