

Vehicle AC Power  
The Key to Energy Independence for the U.S.

Vehicle AC power is the core key enabling technology that:-

- Enables hybrid vehicles (less fuel use and emissions).
- Enables elimination of secondary diesel refrigeration and stand alone genset engines.
- Enables transition from mechanical system accessory loads to electrical system accessory load with major fuel efficiency benefits.

30 to 50% savings in fuel costs and corresponding reduction in emissions from implementation of above strategies can be the key pathway to energy independence and must therefore be a key component in Federal & State energy and emission strategies.

AuraGen is a flux axial induction machine vehicle AC power source.

### Background

More than a hundred years ago a major “war of the currents” was fought between Edison and Westinghouse / Tesla as to the relative merits of AC and DC power.

A hundred years ago the talk was to replace the major health risk horse manure with the new technology cars. Now we have come full circle as health care experts try to combat the millions of annual asthma cases and other health ailments from vehicular emissions.

Major increase in fuel efficiency, reduce in fuel consumption and corresponding reduction in emissions is the only meaningful way forward – AC power provides this solution.

Westinghouse / Tesla won the war of the currents despite Edison’s stronger PR and marketing skills and AC power dominated in homes, offices, shops and factories henceforth.

In vehicles, however, DC power has continued to dominate. The recent global energy crisis and the introduction of AC power on hybrid vehicles suggests a new era of AC vehicle power technologies is set to emerge.

Near his death, Nicola Tesla wrote of a new induction machine with 3 to 4 times the power density of anything that he had previously invented. Alas he died leaving the thoughts of such an induction machine as one of the great unsolved mysteries of modern day science.

Over the past decade Aura Systems (“AURA”) has spent over \$150 million developing a proprietary axial flux induction machine, called the AuraGen, that is 3 to 6 times more powerful than anything previously invented.

The AuraGen technology is proven and tested and already featured on some high profile commercial applications. The next stage is for mass deployment.

Induction machines dominate the world of electric motors with more than a 90% market share so it seems highly unlikely that far more costly permanent magnet machines with life cycle disadvantages will ever gain large market share..

### AuraGen Technology Potential

- Using AuraGen technology you can convert mechanical systems on vehicles that are under 50% efficient to electrical systems that are over 90% efficient. That alone can improve fuel efficiency 20%.
- You can substantially reduce the cost of the major AC motor generator component on a hybrid vehicle by replacing it with a more economic AuraGen induction machine motor generator. That reduces cost and shortens payback time.
- You can eliminate decades old alternator technology that is 35% efficient and replace with AuraGen technology that is more than 70% efficient
- You can reduce the need for a secondary diesel engine for refrigeration or for power needs (Transport Refrigeration Units -- TRUs or Stand Alone Generators -- Gensets)
- You can replace starters and engine driven compressors with more economic AC all electric systems.
- You can replace bulky, heavy, noisy Gensets on military vehicles and marine craft.

### AuraGen Technology Applications

AuraGen can provide a 5kW to 50kW AC power source on a vehicle depending on the available engine torque. The technology will also enable you to store the power generated in high capacity batteries so that power can be deployed at a later time. This enables you to:-

- Convert engine driven compressors and mechanical systems that provide cooling, air conditioning, braking, steering and power needs to all electric systems that will use less power to provide better results. This will also enable customer to down size the core diesel engine.
- Use economic and efficient induction machine AC motor generators in hybrid vehicles that dramatically reduce vehicle costs, giving greater return on capital investment and faster payback..
- Eliminate the alternator and starter in a vehicle with more efficient power generation technology
- Eliminate secondary diesel engine used for refrigeration or diesel engine gensets.
- Provide the requisite power source in new generation military vehicles that increasingly thirst for more and more power.

### AuraGen Technology Development

In the development of the AuraGen technology over the past decade, Aura Systems has been actively involved with numerous leading corporations including Azure, BAE, Fedex, Ford, GM, Gates, General Dynamics, International, Isuzu, Lockheed and others.

The AuraGen (called VIPER for the military applications) was favorably reviewed by the Department of Defense in a report to Congress dated August 2006.

There are a number of proven applications already being deployed in the field.

### Conclusion

DC power has dominated vehicle power systems for a hundred years. There are no good scientific reasons for that other than, perhaps, that viable alternate AC power technologies did not exist.

The new hybrid vehicles and their needs for large power sources has demanded the use of AC power in those applications. Now that the conventional dogma of DC power has been challenged in hybrid vehicles, there seems to be little doubt that AC power will play an increasing role in increasing fuel efficiency, reducing fuel consumption and reducing vehicle emissions.

The AuraGen technology, given its efficiency and proven results over a prolonged period, is poised to play a major role in that deployment of AC power technologies on new conventional and hybrid vehicles.

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