THE CONSULTANT

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Chairman's Corner — *John Dunn, President, Ambertec, Inc.*

Epiphany. From http://www.m-w.com/dictionary/epiphany:

A usually sudden manifestation or perception of the essential nature or meaning of something. An intuitive grasp of reality through something (as an event) usually simple and striking. An illuminating discovery, realization, or disclosure. A revealing scene or moment.

I had one the other day after driving my son to his college in Albany.

I needed to find some supper before driving back to Long Island, so I went to the only place that was open in the area, a T.G.I.F. in a nearby shopping center.

I went in and was escorted down this hall and then down that one, then up one set of stairs and then up another, finally coming to a few isolated tables and booths that were up on a balcony and very much out of the way, so to speak, from the main entrance.

I looked around and noticed a very tired looking middle aged couple sitting at one booth and two really overweight young girls at another table. I sat down at a table of my own and soon, a second couple of my own age was seated too.

After a while, I looked down from the balcony at the lower levels and noticed that there were lots of attractive, young people down there. Only down there. Epiphany struck!

That's okay, though. I had my younger days, I have a loving family and all in all, I got nuttin' to gripe about. I just know that a little better than before, that's all.

Meetings

May 2007

Topic: Business meeting: Preparation of a New Printed Directory.

Dave Allen of Mainly Marketing Enterprises, Inc. showed us some of his ideas for a new directory. We discussed some of the problems of getting a good mailing list together and making the target audience want to read and save the directory. We discussed alternative formats and what we expected to accomplish with the printing or mailing. To be continued.

June 2007

7:00 PM, Wednesday, June 6, the first Wednesday of the month.
Briarcliffe College, 1055 Stewart Avenue, Bethpage, NY
See website for directions: www.consult-li.com

Topic: Rail Voltage Ripple Estimation
Speaker: Mr. John Dunn, Ambertec, Inc., Merrick, NY

Light refreshments will be served. Admission is free (no charge), and no pre-registration is required. For more information, contact Chairman John Dunn at (516)378-2149 or e-mail ambertec@ieee.org.

Other Meetings

Consult the Events Calendars on the Section website: www.ieee.li and the LICN site: www.consult-li.com.

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Hybrids – Is GM Getting it Right? *––– Carl E. Schwab*

Although General Motors has had excellent Electric Power technology in both the Impact and the EV1, it's first hybrid examples have not attracted any market following.

Maybe things are about to change.

GM, Daimler-Chrysler and BMW formed an organization called **Global Hybrid Cooperation;** with the purpose of developing and sharing Hybrid Technology. The specific target vehicles include Buses, RWD trucks, FWD, AWD car/SUV and certainly the newer cross-over class vehicles.

In 2008 GM will introduce two models of SUVs that will have a hybrid configuration
wherein the emphasis is on BER, Brake Energy Recovery and as a result should have a dramatic improvement in the local driving miles-per-gallon.

Now the highway driving mileage will not improve a great deal, in fact maybe none at all, but the fuel saving per SUV per year by improving the local driving mileage will amount to a few hundred gallons per year.

Let us assume that the vehicle is driven 10,000 miles a year and it is driven 8,000 miles a year local driving and 2,000 miles a year trip driving. Further assume the trip mileage is 18-20 mpg, we'll use 19 mpg, and local mileage is 8-10mpg,we'll use 9 mpg.

A little arithmetic yields 105.26 gallons trip driving and 888.9 gallons for local!
Properly done, hybridizing should produce a local mpg of 19x1.15=21.8mpg.

The local fuel for the year drops from 888.9 to 366.1 or a reduction of 522.7 gallons—
that's fuel saved per year per vehicle.

This is what GM has realized and I hope they will do the SUV hybrid correctly this time.

Unfortunately, to make the hybrid technology more saleable, GM is adding other features that hopefully will attract more customers. This new feature is called Two Mode and uses a more complex transmission system. The subtle point is that I think it reduces the efficiency of the regenerative braking and will increase brake wear – a bad sign.

Other Things--

In another matter GM has produced the VOLT, which is quite different hybrid technology. This vehicle is more closely related to the EV1/Impact in that the mechanical drive is direct, electrical to the front differential and doesn't require a CVT transmission. A transmission and clutch are provided to permit reverse and neutral for emergency towing. Initially the VOLT, we'll call it VOLT1, had front-wheel drive, as did the EV1/Impact. But instead of battery only, it incorporated a 3-cyclinder diesel driving a generator for recharging when the Li-ion battery had been depleted. The range on the Li-ion battery was about 40-60 miles and the diesel could be started and could drive the VOLT a claimed 640 miles on 12 gallons of diesel fuel. VOLT1 was shelved for VOLT2.

VOLT2 has done away with the 3-cylinder diesel and generator and plans to replace it with a Hydrogen Fuel Cell or HFC. Additionally they have added two drive motors, one for each rear wheel, providing 4-wheel drive and braking; a nice plus. The Li-ion battery had been upgraded to provide approximately 75 mile range on electric only AND has a rapid recharge off 115VAC. The recharge current is limited to 15 amps from the 115VAC so standard outlets can be used. The recharging energy is at 1.6 kilowatt rate. A 6 hr. recharge produces 9.6 kwh of energy and full recharge of the Li-ion battery.

GM is definitely stressing the PLUG-IN feature for local comuting daily travel distances up to 75 miles per day.

The VOLT2 has off-the-line torque, as did the EV1/Impact, that is instantaneous, giving very responsive acceleration – about 7.0 seconds to 60mph. Plus, this four—five passenger sport sedan maintains passenger and cargo capabilities of a production car. The VOLT2 has driver and front passenger airbags and 4-wheel traction control. Heating and cooling of the passenger area are via heat pump.

What Is Not Being Done

What is NOT being exploited by GM at this time is the fact that the new-generation
Li-ion technology can be recharged in 15 minutes, IF YOU HAVE ACCESS TO THE AC POWER. Simple math says that to go from 6 hours to ¼ hour requires 24 x 1.6 kw or 38.4 kw. That equates to 38400/230=167 amps – within the range of a so-called 400 amp residential service.

How Much Does A Recharge Cost ?

Based upon $0.20 per kwh – (that is what LIPA charged on my last bill) – the 9.6 kwh will cost 9.6 x 0.2= $1.92 for each charge. This says that on "fuel equivalent" basis at $3.00/gal, the car achieves 40/(1.92/3)=62.5mpg.

Pie-In-The-Sky-Thought

If fuel goes and stays above $3.00/gal (pundits say we'll see $4-5/gal yet this summer) then maximizing the amount mileage on electrical power has merit.

1) It's clean; no CO2 from the car itself.
2) The car thrives on local driving
3) Brakes will last 100,000 miles at least.
4) Commute driving on electric power only is win-win situation.
5) In the area of cities, in electric mode, pollution free.

In the writer's opinion, electric final drive to all wheels with husky storage capability for storing braking energy and Rapid Recharge IS THE WAY TO GO.

So maybe the visionary Thomas Edison had it right – only took 110 years to prove it.

Rainmaking — *Richard LaRosa, sealevelcontrol.com*

The solar-powered upwelling pumps can accomplish global cooling and supply nutrients to enable phytoplankton to photosynthesize food for ocean creatures. This puts the CO2 dissolved in the ocean to constructive use and avoids the ocean acidification that interferes with shell and skeleton formation. But they won't make rain.

For years we have been dumping our fresh water into the ocean. We divert our rivers for household, industrial, and agriculture use and dump the polluted leftovers back into the river for the next user downstream. If there is any water left in the river it is allowed to drain into the ocean. Populations have settled in river flood plains and built up levees to confine the river flow. In some places, silt deposits have raised the river bed above the surrounding dry flood plains, which were formerly fertilized by flooding.

We pump water out of ancient aquifers to water golf courses in the desert, cool power plants, extract oil from tar sands in Alberta, and grow crops in Arizona. We pump enough water out of the aquifers to make their porous substrates collapse so that they can no longer hold water. Not to worry. We're not likely to find any water to replace what we took out, most of which evaporates and precipitates into the ocean.

Permanent arid conditions are predicted for our Southwest U.S. Snow melt and precipitation deficits will deprive people on the slopes of the Himalayas, Andes, and Rockies of the fresh water that they need. The situation is much worse in Africa and India, where disease, river blindness, worm infestations, and arsenic poisoning result from water that is

unfit for human use. Water sources and uses vary so much between different populations that we are not going to find a one-size-fits-all solution.

One possible solution is to use solar energy to evaporate seawater to increase the moisture carried by air that must rise up to pass over mountains. As the air increases its altitude, the pressure decreases and it expands. There is no way to transfer heat to or from the expanding air, so the expansion is adiabatic, and the air temperature decreases. If the temperature drops below the dew point, some water vapor will condense out and form a mist. If there are particles to act as nucleation centers, the mist will accumulate on these centers and form rain drops that are large enough to fall and perhaps collect more moisture on the way down. This process is called orographic precipitation, which is precipitation caused by mountains. The more water we can evaporate into the air that approaches the mountain, the more likely we are to produce rain, and the amount will be greater.

We could consider using solar evaporation to increase the orographic precipitation in the Rocky Mountains or the Andes, using floating dark-colored evaporation pans moored in the Pacific Ocean. However, there might be a problem in motivating anyone to finance the project through our market-based for-profit capitalist economy. The poor people who live up in the Andes don't have much to say about what goes on off shore in the Pacific, and I suspect that the situation is not much better in the U.S. Rockies, in spite of greater wealth.

Australia presents what I hope is a more favorable situation. The south east corner of the continent is highly developed and is threatened by drought. The east coast has a mountain range that reaches above 600 meters over a considerable fraction of the area. The rest of the continent is pretty much desert, which heats up during the day in Spring, Summer, and Fall. The desert air heats up, expands, and rises. Air flows in from the ocean to replace the rising desert air. The air coming in from the east coast must pass over the mountain range, and in the past has deposited enough rain to supply the cities along the coast and the Murray-Darling river basin to the west of the mountains. Now the rainfall is not adequate and restrictions on water use are being imposed. The Australian Bureau of Meteorology has just held a conference on cloud seeding. But cloud seeding only works if the air has enough water vapor to form raindrops. So we need to evaporate water offshore of the south east corner and the east coast of the island continent.

Here is a case where the population can benefit from solar heated evaporation pans floating in its own territorial waters. My impression is that there is enough prosperity in this part of Australia to finance the project if the design can be worked out and we can come up with a reasonable estimate of the solar collector area required and the amount of rainfall that will result. A starting point for the design might be the selection of the size and shape of the individual solar collector evaporation pan. The pan could be integral to the flotation device, in which case it would assume the slope of the wave surface. The water would collect at the lowest side or corner of the pan, which would limit the active evaporation area. The collector surface might be made up of pockets to prevent the water from flowing to the lowest point of the collector. An alternative design might be a smooth-surface pan that is gimbaled on the float so that it remains level while the float follows the contour of the wave. The latter alternative appears to present many difficulties, so for now we consider only the floating evaporator pan with pockets to retain the seawater.

We must figure out how to keep the pockets filled to the right level so that they do not run dry, and at the same time avoid replacing the water before it has a chance to heat up and evaporate. The pocketed pan must be made of metal in order to conduct heat from the dry portions to the water in the pockets. Assume the pans are square and are separated from each other by channels of open water. The edges of the pans are bent down to enable the water to flow up on top of the pan and fill the pockets under the influence of wind and waves. It will be difficult to make this work over a range of wave heights and wind speeds. We might consider allowing the bottoms of the pockets to be below sea level with check valves that allow water to rise into the pockets but not drain back out. The flotation material would also act as a thermal insulator so that the solar heat is not drained into the ocean water that supports the float.

But if the water is in deep pockets with dry collector surface between the pockets we will not have an efficient evaporator. We must wet most of the collector area in order to maximize the evaporation area. We might incorporate a small photovoltaic (PV) array and some plastic pumps driven by permanent-magnet DC motors. Our yards are full of decorative lanterns with PV arrays and they are not expensive. We don't need batteries because sunshine is required to evaporate water and the pumps only have to run when the sun is shining. The motors are also inexpensive and used in toy cars and many other gadgets.

If the reader gets the impression that I am groping my way through this design process, that would be a correct impression. I hope to eventually settle on a design that has a reasonable chance of working and surviving in sea states that will be encountered. Perhaps someone will invent a really good design, patent it, and make a lot of money. With even a mediocre design, I can estimate the sea area to be covered with solar-collector-evaporator pans and the amount of water vapor that will be evaporated. It will then be necessary to estimate the rainfall produced. Then comes the most difficult part of the job: get somebody to look at the idea and give it serious consideration.