

The Electric Island Vehicle: A Beginning

The bio-tourism island of Vieques, Puerto Rico offers a fantastic controlled environment for the testing and refinement of medium speed electric vehicles.

The widespread use of electric vehicles (or hydrogen, fuel cells, bicycles, etc.) as replacements for gasoline powered automobiles does not appear likely in the near term. There is tremendous inertia favoring the status quo including:

1. Consumer mentality in favor of today's vehicles
2. Existing road design
3. Fuel distribution and sales infrastructure
4. Auto manufacturing industry with vested interest in current practices
5. Oil industry with vested interest in current practices
6. Politics to support all of the above

It is difficult to stimulate investment and commitment in this arena because of the lack of stability in the pricing structure of fuels. What constitutes a favorable alternative with gas prices at \$4.00 per gallon dies a miserable death when the prices fall back to below \$2.50. At some point, physical resources will become more scarce, and market forces will lead to changes. The art is proper anticipation of the tipping point. Timing can be everything.

There is a saying in the military: "*Victory smiles upon those who anticipate the changes in the character of war, not upon those who wait to adapt after the changes occur.*" The counter point is that the fellows with the arrows in their backs are the pioneers. Both views reflect truth. Then how does one navigate the tricky road to innovation in an industry where one cannot control so many of the factors which impact it?

The answer may be found in the laboratory – both the one at the plant and the one in the field. A shot across the broadside of the industry would probably be a waste of time and effort. A quiet research effort could provide a technological lead and position the developer well in the competition once the transition point is reached, whenever that is. The labs at the plants are accustomed to the process, but the question of low key field testing is another issue.

A small island with 3,000 or more automobiles could provide a near perfect field lab. With no high speed highways, 35-40 mph speed limits, narrower roads, few large trucks, and no road connections to the rest of the country, the isolated community could allow for quiet testing at minimal cost. Additionally, a remote location could be an advantage from a public relations perspective until the kinks are removed from the system. One perfect island for out-of-the-way field work is Vieques, PR.

Vieques is a small (22 by 5 miles), natural, gorgeous, rural island that has a population of approximately 10,000. It is a bio-tourism destination. It formerly

had a Navy bombing range at the eastern end of the island. The speed limit on the island is 35 mph except for a mile or two which is posted at 40 mph. Roads vary from excellent to very lumpy dirt. Gasoline (a monopoly) is delivered by trucks on a cargo ferry weekly to three gasoline stations all located in one part of the island. Lines are often very long and block traffic. The weather is tropical. Wind and sun are plentiful. Automotive repair on the island is extraordinarily weak. There is no industry in Vieques. Unemployment is high. Many North Americans have retired and/or work here full time. There is no bridge or road connection from Vieques to anywhere. The island is serviced by ferries and small aircraft.

In order to use any place as a test bed, you must have a product that appeals to the market. Several parameters which are common include:

1. 35 mph top speed (minimum). Anything less may not make this feasible.
2. Ability to go up and down hills at 35 mph.
3. Range of 50 miles minimum. 110v, 15a charging capability. Full or partial charging capability.
4. Variations of roof tops and windows to allow for comfort in tropical area which includes heat, humidity, and rain. While A/C is not likely, the auto must be reasonably comfortable in varied weather situations. Long trips are not possible, so endurance of the occupants is for short periods.
5. Moisture, salt, and sand are in the air constantly.
6. The income level of the island in general is low. In order to encourage widespread participation, the program would probably need subsidizing.
7. Short is better for parking and narrow is better for navigating the existing roads.
8. Higher slung with good suspension will be favored on the many dirt or potholed roads. Adjustable suspension and adjustable clearance could make attractive options.

There are different submarkets here that clearly have different needs and values:

1. Young crowd – leaders – the macho group that sets the trends: They will want something that looks cool and accelerates to the limit extremely fast. Under 5% of the market.
2. The sport crowd: They need an off road vehicle just to go to the beach and carry two to four plus equipment (including surf boards or kayaks on roll bar roofs, or similar). Can serve as family car for some. Maybe 50% of market.
3. Family car. Approximately 40% of the market.
4. Trade vehicle: The tradesman needs a small truck for construction, delivery, and hauling with security options for any cargo. Probably 5% of the market.

5. Rental market: The tourists to the island generally prefer to rent the sport vehicle. There are currently over 200 cars available for rent either from rental agencies or from private sources such as guest houses.

The electrical service on the island is provided by a quasi government agency, AAE. The average rate is about \$.17/KWH. This is higher than most stateside rates. Vieques is physically and conceptually positioned to take full advantage of wind generated power, however, the Puerto Rican government has yet to approve net metering that would make it feasible. With ample wind year round, the rates could fall dramatically and make electrically powered vehicles extremely cost effective while demonstrating their operational effectiveness at the same time.