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EARTHRISE OBSERVATORY

Commentary on energy & environmental technology industry developments



Small Steps and Great Leaps

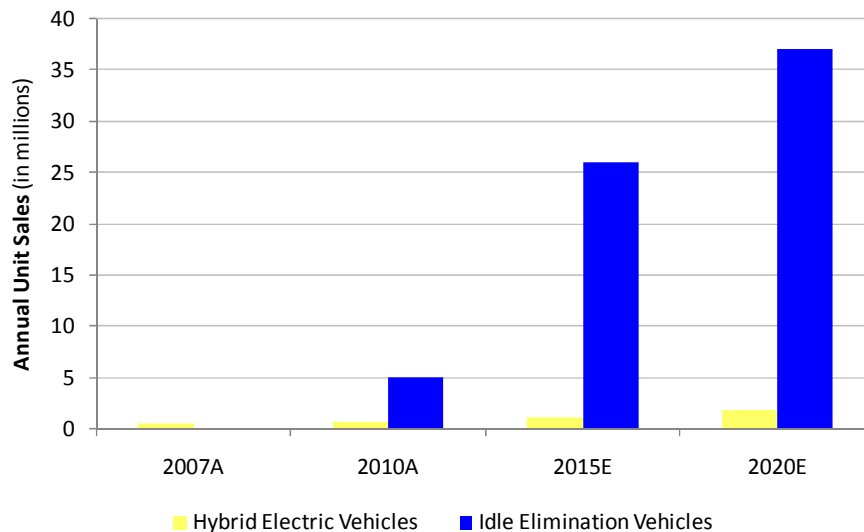
The Stealth Green Revolution in Conventional Vehicles

The pall cast by solar company bankruptcies has obscured at least three “stealth green revolutions” currently underway: The first is the secular trend of decreasing energy intensity per unit of global GDP. The second is a gradual shift away from oil and coal toward lower-carbon energy sources, such as biomass, natural gas and renewables. The third, which is the subject of this report, is the substantial fuel efficiency gains of vehicles with traditional internal combustion engines.

Without government financial support (though there is policy support such as emissions reduction mandates in Europe

and tightening mileage standards in the U.S), global sales of so-called micro-hybrid or idle elimination autos have soared for the past few years, as the accompanying chart indicates. Automakers have been initiating various technological changes that enhance fuel efficiency and reduce emissions in autos with internal combustion engines at little added cost. The micro-hybrid name is misleading since there is no electric drive train and there may or may not be regenerative braking. The changes made are not revolutionary and can be made with extra cost of only a few hundred dollars. They can enhance fuel efficiency by 5% to 25% in the newest versions.

Figure 1. Global Sales of Hybrid Electric and Idle Elimination Vehicles



Source: Earthrise Capital estimates, EV Dashboard, J.D. Power, Johnson Controls, Lux Research.

Last year micro-hybrid idle elimination autos sold about 5 million vehicles a year globally compared to about 500,000 hybrid vehicles (see Figure 1 above).

Micro-hybrids do not have to be small cars, though the initial versions are. The changes made can be minor in a small car with a manual shift. In a medium sized to larger vehicle, the usual lead acid battery must be replaced with a more advanced battery. Expensive batteries such as lithium-ion batteries and nickel chemistries work well, as do supercapacitors combined with advanced lead acid batteries, another high-cost option. Fortunately there are lower cost options as well, involving newer versions of lead acid batteries, including those made by Axion Power International, an Earthrise Capital Fund portfolio holding.

For smaller idle elimination vehicles, an advanced lead acid battery, called AGM for Absorbed Glass Mat, may be sufficient. AGM batteries provide up to 10 times the power of conventional batteries at a cost of a few hundred dollars more. However, larger idle elimination vehicles require much greater power, so AGM batteries will not be suitable for a significant portion of the fleet, especially in the U.S.

Axion Power International's solution, called a lead-carbon battery, is similar in concept to a supercapacitor used in combination with an advanced lead acid battery, but Axion's unique and elegant design incorporates both features in a single conventionally sized battery form. This solution is less expensive than a separate supercapacitor combined with a battery and offers superior performance. It has been tested for over two years by BMW and other major automakers.

Lux Research in a recent report forecasts the global sales of micro-hybrid idle elimination vehicles at 39 million vehicles annually by 2017, including about 22 million medium micro-hybrids and 8 million large micro-hybrids. This revolution is just beginning to unfold in the U.S., which is lagging Europe and Asia. We agree that the future of idle elimination is bright – the technology delivers benefits the consumer wants:

- 1) significant fuel savings
- 2) no compromise on vehicle size and safety
- 3) modest additional cost.

EARTHRISE CAPITAL PORTFOLIO OBSERVER

Earthrise recently completed a Series B investment in Forest2Market, Inc., (F2M). F2M is the premier provider of pricing data, supply chain expertise and consulting services to the forest products and biomass energy industries. Here we present an interview with Peter J. Stewart, the founder, President and Chief Executive Officer of Forest2Market. Before founding Forest2Market in 2000, Stewart led the development of the industry's first Web-based forest inventory management and mapping system, was responsible for planning and harvest schedules for \$350 million of forestland, and led acquisition projects in Argentina and Brazil. Peter Stewart received a degree in forestry from Texas A & M University and a Master's degree in forest economics from the University of Georgia.



Earthrise: How do you describe your business in one sentence?

Stewart: F2M provides data and analytics for the forest products and bioenergy industries.

Earthrise: What are your company's major sources of revenue?

Stewart: Our major product is a delivered wood pricing service for pulp and paper and solid wood customers in the U.S. South and the U.S. Northwest. Those regions represent 90% of U.S. supply, and F2M captures about 90% of those transactions. The delivered price product is being used increasingly in association with long-term pricing contracts for biomass power generation in Northwest Europe to reduce and replace the use of coal. Other products include a consulting business in woody biomass feedstock for bioenergy use.

In 2011, we launched a new product line for pricing in recycled product beginning with OCC, Old Corrugated Containers, which are cardboard boxes that are recycled into cardboard. We launched in May and already have about 45% of the U.S. market. The market is seeing rapidly growing demand from China and India, and we expect to enter the export market this year. Also in 2012, we will introduce two new recycled product lines, sorted office paper and mixed paper, which is mainly shredded office paper. The rapidly growing demand for mixed paper is driven in part by regulations such as Dodd-Frank for privacy considerations in the financial sector. These products are sold to pulp mills which

reconstitute them for use in recycled paper products.

Earthrise: What is unique about your products?

Stewart: None of our competitors captures every transaction in real time in the industry. Our data is gathered from all the major pulp and paper and solid wood customers on a mill by mill, truck by truck basis. Our customers agree to supply us with every transaction they process. We remove the name of the provider, categorize and analyze the data and sell the industry-wide data to the same customers on a subscription basis. Our data is highly vetted, qualified and audited. Our competitors simply survey the market which is much less valuable to the customer.

Earthrise: How fast do you expect your various products to grow?

Stewart: In 2012 we expect the best growth to come from our recycled product pricing service, which will likely double in size. The bioenergy service is also growing very rapidly – about 40%-50% this year. The traditional delivered product pricing business, which serves a relatively mature market, should grow about 10%-15% in 2012.

Earthrise: What other growth opportunities do you see?

Stewart: We see good opportunities for acquisitions in related forest products markets. As for geographical expansion, we are exploring the South American market, which is rapidly growing especially

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due to bioenergy feedstock exports to Europe.

We also foresee an important new market for our information to support sustainability certification. New regulations, particularly in Europe, require consumers of forest products to verify the chain of custody of their supplies and the sustainability of the resource. Utilities purchasing wood products need to provide complete data from woods to mill to customer, including each transaction along the way, who delivered it to the mill, how many miles it was driven, how the product was shipped, etc. as well as the carbon footprint. Because of our detailed

pricing data capture and our long standing consulting business on forest resources and wood products, we have all this data. It would be difficult for others to replicate it.

Earthrise: How has your staff grown recently, and what further growth do you expect?

Stewart: A year ago at this time, we employed 12 people. Now we employ 17 and we expect that number to grow to 25 by midyear 2012.

Earthrise: Thank you Peter.

EARTHRISE ACTIVITIES

- Ann Partlow will participate in a Future Energy Forum event on April 11, in New York at NYU Stern Business School. She will be judging venture innovative investment opportunities in energy and cleantech. For more information: ultralightstartups.com/futureenergy.



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Earthrise Capital Fund is a venture capital fund which invests in resource efficient technologies, including energy efficiency, clean energy, power conversion, energy storage, alternative fuels, and green chemistry.

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