

HAMILTONCLARK QUARTERLY

The Money Chase *Patrick A. Longmire*

A slicing and dicing of HamiltonClark's database of energy technology companies shows a significant need for new funding on the demand side, with an increasingly diffuse investor base on the supply side. **Page 1**

Deal Terms *John J. McKenna*

Deal terms are not getting any easier. But the problems are not simple to fix, especially when venture capital funds are being judged on three to five year internal rates of return. Down rounds present enormous challenges to company boards. **Page 7**

Technology Matters *Himesh Dhungel, PhD*

There are some great new technologies on the horizon that enhance efficiency in trucks and buses. A closer look at series, parallel and series-parallel hybrid drive systems. Also, auxiliary power is a natural with hybrids. Reduction in fuel consumption by up to 35%. Fact or fiction? **Page 10**

John J. McKenna
john.mckenna@hamiltonclark.com

Himesh Dhungel, PhD
himesh.dhungel@hamiltonclark.com

Patrick A. Longmire
patrick.longmire@hamiltonclark.com

**Hamilton Clark & Co. is a member of the NASD and SIPC.
A description of the firm and important disclosures appear at the end of this report.**

The Money Chase

The “energy technology” industry encompasses a diverse group of companies in a broad range of activities, sometimes leading to misunderstandings. We put some parameters around the energy technology industry by describing our database of companies. We then take a look at some trends in the demand and supply for equity capital within the sector. No surprises here: a lot of small, new companies looking for capital in a challenging financing environment. How to be successful in a crowded market?

Energy Technologies: A Snapshot

HamiltonClark has compiled a database of approximately 660 companies offering new and/or “clean” technologies to the energy industry, focusing on four segments: (i) renewable energy, (ii) clean energy, (iii) distributed energy, power quality and reliability, and (iv) energy “intelligence”. We have largely excluded mainstream companies from our database (e.g. utilities, mainstream boiler/turbine manufacturers etc.), and those for whom energy and clean technology is only a small part of their business. Rather, our objective has been to develop a specific census of companies “on the ground” in energy technology as a measure of the industry’s true characteristics.

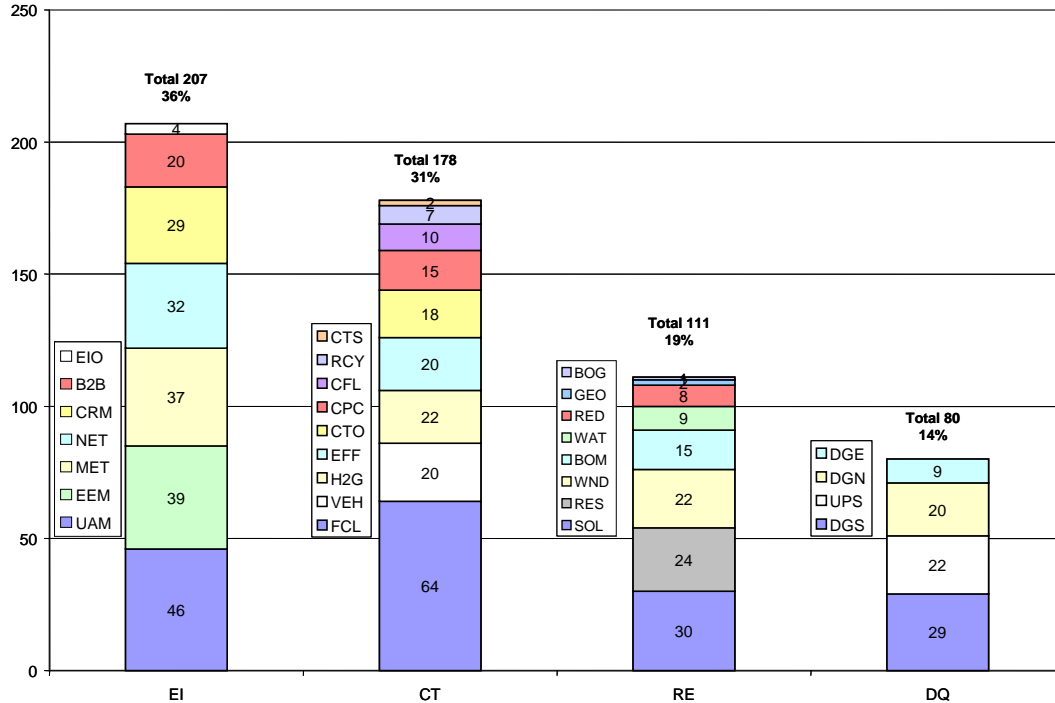
We have organized the companies in our database into the following categories:

Renewable & Sustainable Energy (RE)		Examples
BOG	Biomass/Biogas	Pyrolysis, thermal, landfill gas, coal bed methane, digesters
GEO	Geothermal	Geomagmatic, geothermal
RED	Renewable Energy Project Developer	Project developers
RES	Renewable Energy Services	Systems integrators, service providers
SOL	Solar	Photovoltaics, concentrated PV, solar thermal
WAT	Hydro	Generating equipment, wave energy, tidal energy
WND	Wind	Wind turbine technology
Clean Energy Technologies (CT)		
CFL	Clean Fuels	Methanol, ethanol, clean coal, biodiesel
CPC	Pollution Control/Clean Tech	Emissions reduction, low/zero emission combustion
CTS	Clean Water and Env. Services	Environmental services
EFF	Energy Efficiency	Efficient lights, motors, chips, HVAC, variable speed drive
FCL	Fuel Cells and Related	SOFC, PEM, air mgmt system, stacks
H2G	Hydrogen	H2 generation, storage, transportation
VEH	Clean Vehicles	Hybrids, clean engines
RCY	Recycling	Waste-to-energy
CTO	Other CT	Clean technologies not included elsewhere
Distributed Generation & Power Quality (DQ)		
DGE	DG Enabling Technologies	Power electronics, controls, embedded software
DGN	Distributed Generation Equipment	Turbines, Stirling, Brayton, internal combustion engines, CHP
DGS	DG Services and Developers	Inside-the-fence, energy service companies
UPS	Uninterruptible Power Systems	Batteries, flywheels, back-up, power conditioning/quality
Energy Intelligence & Optimization (EI)		
B2B	Market-related Software	Energy B2B, marketplaces, trading software, risk mgmt
CRM	Customer Relations/Information	Utility CIS, billing, applications service providers
EEM	Enterprise Energy Management	Building energy mgmt., DSM, reporting/analysis
MET	Metering, Submetering	Meter, submeter technologies
NET	Networks/Telecom	Gateway, wireless device, powerline technology
UAM	Utility Asset Management	Superconductor, T&D tech, asset optimization
EIO	Other EI	Energy intelligence, not included elsewhere

While we continuously add new information to our database, we also periodically separate out those companies that we find have ceased operations or have not survived as independent entities. Not surprisingly, B2B and energy management companies, many of which sprang up during the convergence of hype around the New Economy and the optimism surrounding the deregulation of the energy markets, are heavily represented (67%) on this list of now 81 "inactive" companies. A distant second on the "inactive" list are companies developing fuel cell technologies.

The breakdown by sub-sector of the remaining 576 companies in our database is as follows (see table above for description of abbreviations):

Figure 1. Database by Sector



A Closer Look

Our database is an extremely useful tool to examine issues of interest to the industry and will be the source of future data mining analyses. In this first Quarterly, we provide a closer look at the characteristics of the companies in the sector, focusing on the difficult issue of quantifying the financing needs of the privately owned companies in our database.

We approached this analysis by interviewing one third of the total population of private companies in our database. Our sample group was split into four groups representing our core sectors: 32% energy intelligence, 37% clean technologies, 19% renewables and 14% distributed generation/power quality, broadly reflecting the sector breakdown of companies in our overall database as shown above.

We believe that the characteristics of the companies in our sample represent the larger universe of companies in energy technology, including:

- The largest sub-segment is energy intelligence, populated by a large number of companies offering software (and to a lesser extent, hardware) to better manage the generation, transmission and use of energy. Within the clean technology sub-segment,

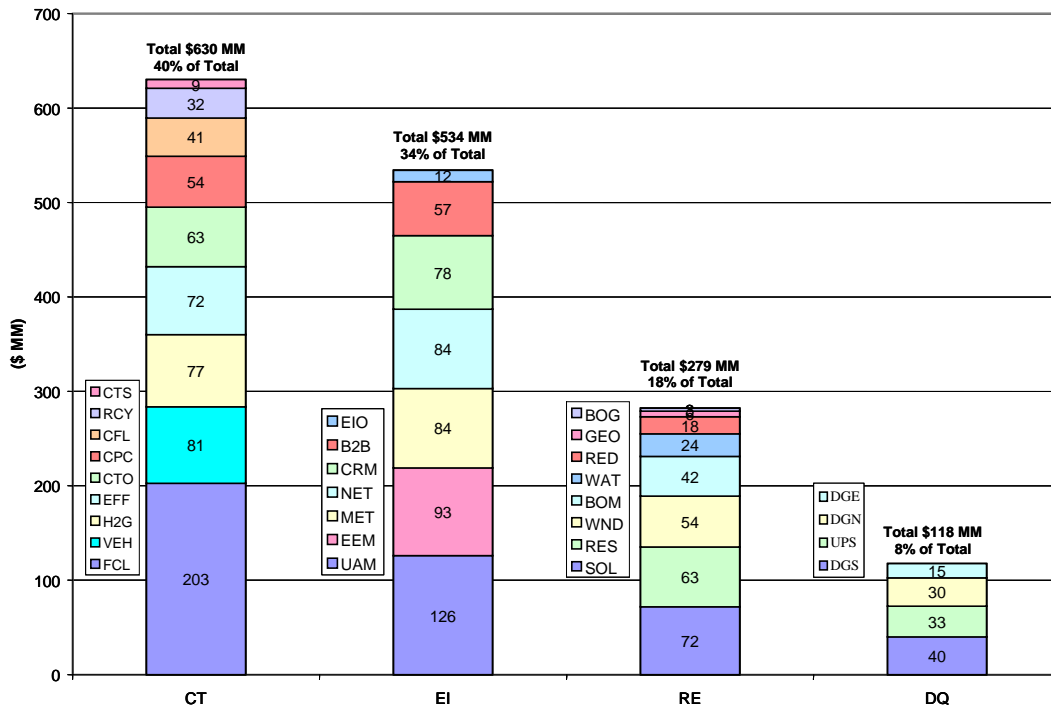
we have readily identified a large number of companies developing activities around fuel cells and the hydrogen economy.

- The sector is largely comprised of relatively young companies. The median year of incorporation for our sample group as a whole is 1999 with, perhaps not surprisingly, energy intelligence as the youngest sub-segment (median year of incorporation of 2000). Approximately 45% of our sample identified themselves as falling into the category of being either in the “development stage” or in very early commercialization, with revenues under \$1 million. Few of the companies in our sample claimed revenues in excess of \$5 million.
- Consistent with their early stage of development, most companies in our sample are also small, with a median of nine employees.
- The sector is somewhat geographically concentrated, with a disproportionate number of companies headquartered in California (15% of the total), Massachusetts (9%) and Texas (7%), three states actively promoting clean energy technologies.

As a group, our sample companies indicated that they had successfully raised a total of \$793 million in equity from external sources, with a median of \$1.4 million per company. Of this, 21 of the companies had raised equity from one of the venture capital funds in our database (see below), with the balance coming primarily from individual investors (“friends and family” and “angels”) and, to a much lesser extent, from “strategic investors”, smaller venture capital funds or from state/federal government programs.

Looking forward, based on information from our sample group we estimate a total equity financing objective in the range of approximately \$1.6 billion for the 458 privately-owned companies in our database, broken down by sector as shown in graph below:

Figure 2. Equity Objectives by Sector



Not all of these companies will be in the market actively trying to raise this capital in the immediate future. In fact, a consistent theme with many of the managers at companies in our sample group was that, given their perception of the financing environment, they are currently

focusing on growing their businesses rather than spending a lot of time on the fundraising process.

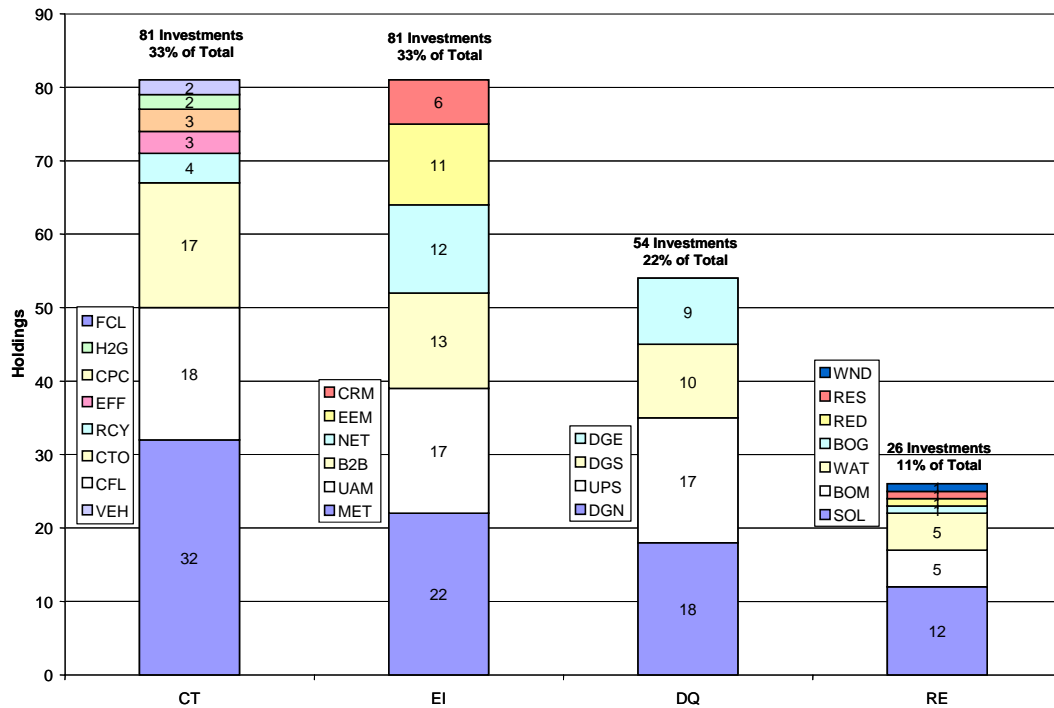
However, we believe that our estimated financing objective for companies in the sector is representative of the large number of companies in the energy technology sector that have burned through their initial funding and will need additional equity investment to “cross the chasm” to commercialization or, in many cases, just to survive. Based on the companies in our database, this overhang is particularly true of the fuel cell and energy intelligence sub-sectors that appear to be particularly crowded.

Venture Capital Funds

Another part of our database focuses on the investment activities of venture capital funds in the sector. We have dissected the portfolio holdings of 63 venture funds that are active in the energy technology sector and have identified a total of 276 fund positions in the 660 companies in our database. We count each portfolio holding as one investment, rather than each of multiple follow-on investments by a single fund in any one particular company. For example, we found Enerwise Global Technologies in four of the 63 portfolios we are tracking and, therefore, we count this company as having four of the 276 positions we have identified regardless of the total number of individual follow-on investments that were made by the four funds in Enerwise.

Of the 276 portfolio holdings that we track in our database, 34 are in companies we have moved to the “inactive” list, again with a particular concentration in internet B2B companies. The remaining 242 portfolio holdings are in 101 of the companies in our database (about 20% of our total universe), broken down by sector as follows:

Figure 3. VC Portfolio Breakdown by Sector



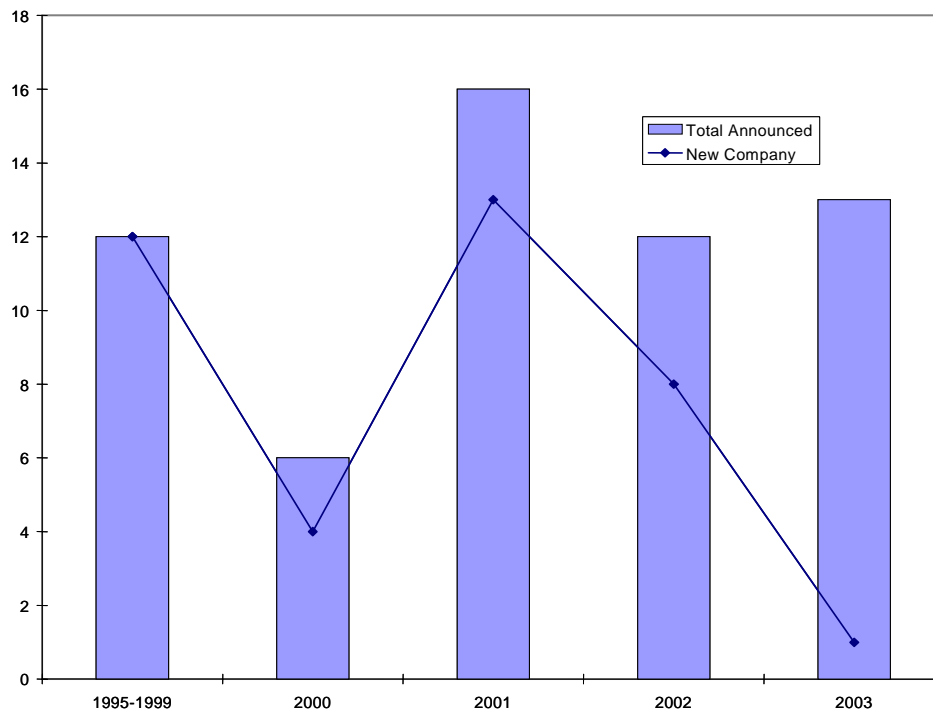
The composition of the VC portfolios we analyzed broadly mirror the sectoral breakdown of the companies in our database, with the primary variation being that the renewables segment appears under-represented in the VC portfolios (we also note that the investments in

renewables by the energy technology-focused VCs are heavily concentrated within solar). Another general comment is that the VCs move in groups: fully 138 (or 57%) of the 242 total positions are in 29 companies, some of which can count as many as eight VCs in their investor base.

Looking more closely at the venture capital activity captured in our database, we note two trends that are important to companies looking for funding:

- First, traditional energy sector VCs are focusing on their portfolios, making almost exclusively follow-on investments. We analyzed the announced transactions over the past five years by the three VC funds with the largest number of investments in the companies in our database (Arete, Hydro-Quebec Capitech and Nth Power). While the number of announced transactions for these three VC funds remained relatively constant from 2001 to 2003, the number of announced investments in *non-portfolio* companies has trended downward in the last two years, reaching only one (out of 13 total announced transactions) in 2003.

Figure 4: Announced Transactions



- Second, the composition of the VC group willing to consider investing in energy technology is changing. On the one hand, at least 13 of the 63 funds that have been active in energy technology have ceased their investment activities over the past year. On the other, we are seeing a few generalist VCs increasingly considering investments in the energy technology sector. Draper Fisher Jurvetson, as one example, made investments in Konarka, a developer of polymer photovoltaic products, and in Solicore, a developer of high energy density batteries, in 2002 and 2003, respectively.

Other Sources of Equity

Not surprisingly given the characteristics of companies in the sector, the single most often cited source of financing for the companies in our sample is individual investors, including “friends and family” and “angels”. Approximately 30% of the companies in our sample reported having

raised almost \$175 million in capital *exclusively* from this source. For many early-stage companies, this represents the only viable avenue for financing in the near-term.

In addition, companies in the sector are increasingly considering smaller, foreign public markets geared toward earlier stage ventures, including the Toronto Venture Exchange (TSX) and the AIM, part of the London Stock Exchange.

We will address some of the important issues related to individual investors and public offerings on the TSX and AIM in future Research Reports.

Conclusion

What does all this mean? Our analysis underscores the challenges faced by energy technology companies in the current financing environment. On the demand side, the sector is crowded with many early stage companies which have depleted the cash raised in their early rounds of equity during the investment boom in 1999-2001 and now need a follow-on round to fund the longer than expected path to commercialization. At the same time, the supply side of the private equity market has become more diffuse, with traditional energy technology-focused VCs tending almost exclusively to their portfolio companies or, in some cases, completely out of the market while new investor groups are taking a fresh look.

Now more than ever, we think the successful companies will be those with a compelling story told in a compelling manner, using highly professional documents to present a well-structured offering to the “right” list of potential venture capital and strategic investors. The “easy days” are long gone.

Deal Terms

Many energy technology companies are running out of cash from their Series A funding. This is causing a number of problems, the two most serious of which are the need for interim bridge financing and the desire to find a new lead investor to set the terms of the Series B round. This note discusses the issues facing a company in negotiating bridge terms and then in securing a new lead investor. Should you just prepare a new business plan, send it out and hope for the best, or should you restructure the capitalization and propose market terms even though it may be very dilutive to prior investors?

This situation is becoming more common these days as liquidity is tight for two to three year old energy technology companies that have stretched their Series A round of private equity six to twelve months longer than originally budgeted. Valuations have fallen with the significant downdraft in public market comparables (often more than 50%) since the closing of the prior “A” round, and traditional energy tech private equity funds are focused on funding their own portfolio companies. Consequently, CFOs are looking for new sources of capital from traditional VCs who understand the sector, from VCs who are new to the sector and have plenty of liquidity, and from strategic investors who have been on the sidelines for the past 18 months waiting for valuations to fall. However, to successfully close a second round of financing in today’s environment, CFOs need to negotiate from a position of strength. We believe that this requires two attributes. First, you need to have no less than six months of runway, meaning that you need cash in the bank to carry you through at least six months of preparation, marketing, due diligence and closing. Second, you may need to voluntarily recapitalize the company in order to make it appealing to new investors.

Bridge Finance the Runway

Invariably, bridge financing is the only source of capital for early stage companies seeking a lead investor for the next round. Also true is the fact that bridge lenders are almost always the lead investors in the first round. “I’m not financing this company unless everyone invests pro-rata”, is the statement by the key investor(s). “If you don’t pay, you don’t play”.

Here are HamiltonClark’s key suggestions for negotiating the terms of a bridge loan with key investors:

- **Get an independent director on the board immediately.** This is important for everyone’s benefit. Typically the key investors (who are often directors) will be negotiating a financing with the company that is not at arm’s length. This means that directors who are also lenders will actually have to negotiate terms and then vote to accept or reject these terms. If there is an independent director who has not invested in the company or does not have options, she or he can act as a true independent member and can chair a special committee to negotiate and approve the terms of the bridge loan.
- **Hire a financial advisor who can render a fairness opinion.** This sounds like a commercial, but it’s not. In negotiating bridge loans the CFO and the CEO are in a very precarious position. They need the financial liquidity from the bridge loan in order to negotiate the Series B round from a position of strength, but they also need to keep the enthusiasm of their major shareholders and fellow board members. Also, the independent director, if there is one, may not be a sophisticated financial expert and may need the assistance of someone who can run numbers and offer suggestions as to how to structure difficult issues. Lastly, every board member will benefit from having the terms of the financing reviewed by an independent financial advisor and, if appropriate, have the terms opined as being fair from a financial point of view. HamiltonClark is experienced in rendering such fairness opinions.

- **Focus on the terms of the bridge.** Bridge terms are and should be draconian. This is due to the inherent risk that the Series B round will not come together, or that the new lead investor will not permit the bridge to be rolled into the Series B. Consequently, the bridge lender needs to be rewarded but not to the point that it takes down the company. Here are our suggestions. First, never secure the loan with inventory or receivables. If you do, the trade will smell blood and may cut the company off from additional trade credit. Use a negative pledge instead. Second, be willing to pledge the intellectual property but be sure that the amount of the bridge is sufficient runway. If the amount of the bridge financing is not sufficient to carry you to a Series B closing, then it is hard to get a second tranche of the bridge if you have already pledged the IP. Third, watch out for the effect that warrants or bonus shares of Series B stock will have on non-lending shareholders. This needs to be negotiated with fairness in mind. Not all shareholders will be in a position to commit additional capital and it is important not to overstep the cram-down effect of the financing.
- **Consider hiring special counsel.** This might be a good time to retain special counsel to assist in documenting the transaction. Company counsel certainly has a role in the transaction, but special counsel, expert in the technicalities of bridge loans and the rights of the minority can be very helpful in briefing directors and responding to shareholder concerns.
- **Offer the same terms to all investors after the closing.** After the bridge loan closes, prepare an information memorandum including all the terms of the transaction. Include the proposed terms of the Series B financing into which the bridge will convert. Send it to all non-subscribing shareholders (even the small investors, but only those who are accredited), and give them the right to invest for their pro-rata share. This rights offering often includes the right of the shareholder to have their shares repurchased by the company (appraisal rights) at the appraised value at that time.

Voluntarily Recapitalize the Company before Marketing the Series B

Although all companies are different and special situations always trump general advice, at HamiltonClark we believe that a voluntary recap is often appropriate in today's environment of down round financing. But this not always clear to the Board. Also, a voluntary recap without a term sheet from a new investor can seem like private equity suicide if the down round valuation is severe. And, once done, it is almost impossible to unscramble the eggs and go back to the original capitalization.

Here are some of the issues and suggested steps in a voluntary recapitalization prior to a down round financing.

- **What is the correct pre-money valuation?** This is the most contentious issue in seeking a lead investor in a follow-on round of financing. However, we find that many companies are often unaware of the basic valuation yardsticks that are used by private equity investors in negotiating pricing. In down rounds a company must be pragmatic with respect to both relative valuation and absolute valuation. For example, relative valuation requires that a company look at valuations of other publicly traded companies within the sector, the relative price reduction of comparable public companies since the last round of the company's private equity, and the pre-money valuations of other private financings that have recently taken place for companies in a similar stage of development. Absolute valuation means that the company must look at its own business, determine its own growth rate and the internal rate of return (IRR) that an investor will demand, what the correct terminal value multiple should be for its particular business and when the terminal event is likely to take place. This allows the company to estimate its pre-money valuation based on the amount of capital it needs to raise and the expected IRR that the private equity investor is seeking. Using relative and

absolute valuation, the company's financial advisor can assist the board in its determination of an appropriate pre-money valuation for the Series B round.

- **Will the anti-dilution provision work?** In theory, the anti-dilution provision is supposed to take care of the dilution suffered in a financing at a valuation less than the previous round. But, in serious down rounds where there are common and Series A preferred shareholders, the formula approaches infinity and it is impossible to issue enough new shares to the preferred in order to make them whole. However, in less serious cases the anti-dilution provision will work. So try it out. If it works then there is no need for a recap. If it does not work then the only solution is to have your financial advisor negotiate a new capital structure between the common and preferred. The objective would give some reasonable continuing interest to the common but recognize that the preferred is essentially entitled to own the entire company and are voluntarily giving up ownership in order to prevent internecine warfare and proceed with the Series B financing.
- **What is the impact of the liquidation preference?** The liquidation preference of the Series A often conflicts with the value of the Series B if the company is sold. Company management often does not fully understand liquidation preference or how it actually is computed in the event of a sale of the company. A typical 1x (one times) liquidation preference in a typical issue of participating preferred means that if a company is sold, the preferred gets paid the original value of its investment plus dividends (if cumulative and declared) and then participates with the common shares as if the preferred had converted to common stock. The proverbial double dip. In a 2x participating preferred, the preferred gets two times the original investment and then participates with the common. As a result, if there is a large liquidation preference resulting from a previous high-priced Series A financing, new investors face a no win situation. Often, they simply do not want to deal with the problem and therefore demand that the Series A convert to common. Companies that have a complicated common and Series A structure with a large liquidation preference would be advised to have the Series A voluntarily convert to common at the closing of the new round or give up their liquidation preference altogether.
- **Are the employee options still appropriate?** Employee options are often upside down and need to be refreshed. This can be complicated since employees need to be motivated but new investors will want a say in the terms of the incentive package. A resolution of this problem can be accomplished by agreeing the size of a new stock option plan, indicating how it will be allocated but not agree the full terms of the plan until the first compensation committee meeting after the Series B closes. Also, since options are often out of the money during the offering period for the Series B, an offer to buy the company during the offering period might not have the full support of management if their options have no value. Enlightened boards often put a special bonus plan in place to reward management in the event of a sale during the offering period. Because of the liquidation preference, this also requires approval of a requisite percentage of the affected preferred stock.

Conclusion

The take-away from this note is that a lead investor in a second or third round financing is generally not very eager to get involved in the complexity of these issues. For this reason it is difficult and often impossible to find new lead investors in the overhang of a Series A financing that requires a reorganization of the capital structure. Better to voluntarily recap the company and choose a mark-to-market pre-money valuation prior to seeking new investors.

Technology Matters

The effect of a 77% increase in the price of oil since January 2002 has been dramatic and painful for U.S. motorists, fleet operators and New Englanders who generally rely on heating oil to heat their homes. What is particularly painful for fleet operators is not just the price of oil but also the volatility of prices because planning is more difficult and earnings can fluctuate, especially if fuel prices have not been adequately hedged. For example, during the period January 2002 to February 2004, the monthly oil price increased from \$19.67 per barrel \$34.74 per barrel, with an estimated annual volatility of 27%. For a commercial truck fleet operator with 30,000 delivery trucks, that could mean an annual swing in the fuel cost of as much as \$28 million (assuming diesel price volatility is half that of crude price volatility).

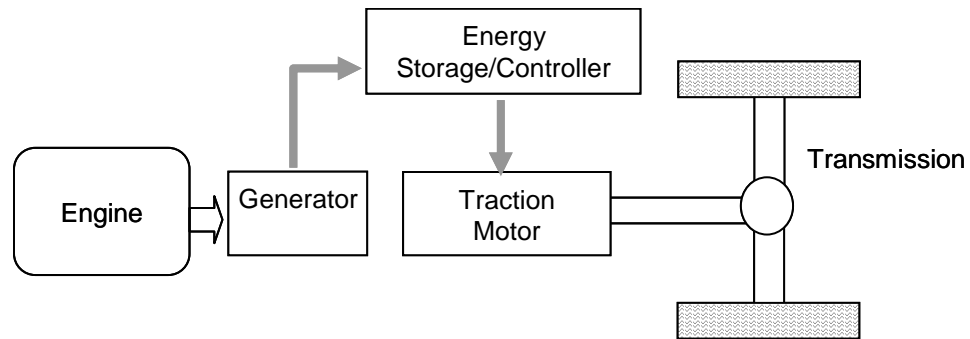
The problem of high and volatile oil prices is compounded by the dramatically tighter particulate matter (PM), nitrogen oxide (NOx) and non-methane hydro carbons (NMHC) emissions regulations from the EPA beginning in 2007. Although the EPA believes that engine manufacturers can meet the demand for cleaner engines by 2007 at an incremental cost of up to \$1,900 per engine, fleet operators are concerned about the overall economics. They are fully aware of the potentially higher O&M costs of new emissions technologies and their effect on engine efficiency, fuel expenses and, ultimately, on earnings.

While heavy duty engine manufactures and fleet operators are bracing for the 2007 regulations, the power industry is also getting ready for stringent NOx, carbon dioxide (CO) and volatile organic compound (VOC) standards from California Air Resources Board (CARB) and Texas Natural Resources Conservation Commission (TNRCC) for non-emergency generators. In fact, the Regulatory Assistance Project (RAP), a non-profit organization that provides technical, regulatory and analytical assistance to regulators, is promoting the idea of a national emissions standard for on-site generators that are similar to CARB and TNRCC regulations. The proposed emissions standards from CARB, TNRCC and the RAP would require engine manufacturers to implement new emissions control technologies.

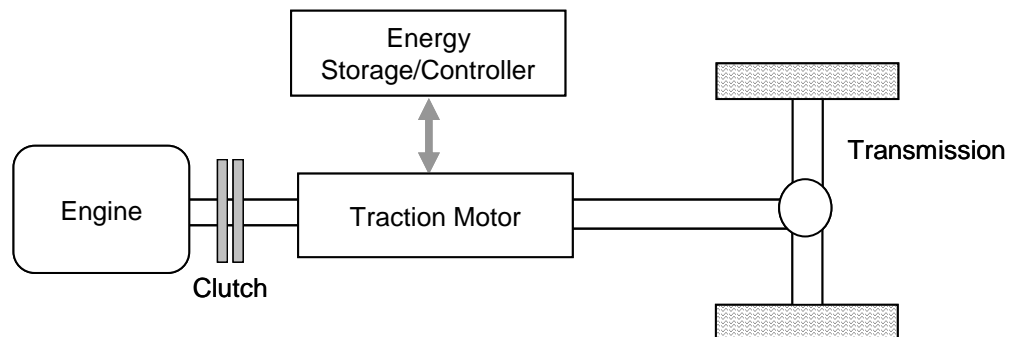
These regulatory requirements and higher than normal energy prices are the driving force behind the development and commercialization of cleaner, more efficient engines and drive systems, such as hybrid electric vehicles (HEV). Truck and bus fleet operators' interest in HEVs has been heightened by the success of passenger HEVs and because these vehicles are based on conventional internal combustion engines (ICE) rather than new and unproven technologies. This is important because fleet operators are not interested in taking the technology risk. What is new in HEVs is the application of energy storage devices (batteries and ultra-capacitors), electric motors and sophisticated control logic to optimize the operation of the IC engine over the entire duty cycle.

HEVs can be series, parallel or a combination of the two. The choice of configuration depends on the application.

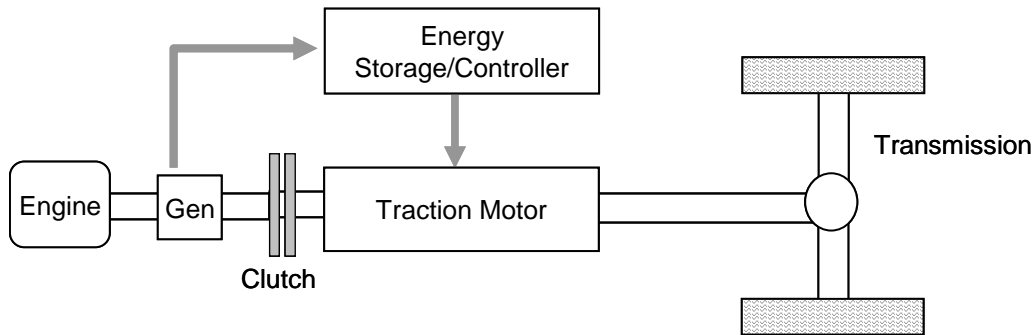
- **Series or "Range Extender" Hybrids.** In a series hybrid vehicle, the engine is never connected to the road. Instead, the vehicle's conventional ICE runs at an optimum point to drive a generator. The generated electricity is used to charge an energy storage device such as a bank of batteries or ultracapacitors. Electricity from the energy storage device is used to run electric motors, which provide the necessary motive power (torque and speed) for the vehicle. Because of the configuration, the ICE never idles in a series hybrid, which reduces vehicle emissions. While series hybrids have excellent low-speed efficiencies, they require larger systems, cost more and tend to have lower high-speed efficiency compared to parallel hybrids. Series hybrids have lower environmental signatures than conventional engine vehicles and are ideal for silent mobility for military applications.

Figure 1: Series Hybrid Configuration

- Parallel or “Power Assist” Hybrids.** In a parallel hybrid vehicle, the engine is always operating and connected to the road. In such hybrids, the engine works in parallel with the traction motor, thereby allowing more power to be delivered. Because power is delivered simultaneously by the engine and the electric motor, the engine is smaller than a comparably sized conventional vehicle. Unlike series hybrids, parallel vehicles do not have to have a separate electric generator. Because power is directly coupled to the road, parallel hybrids have lower electrical losses and therefore can be more efficient than a series hybrid. The system size and cost are generally lower than that for a comparable series hybrid. However, parallel hybrids are more complex because electric motors have to operate in sync with the vehicle’s prime power source. Consequently, the management of power and smooth operation is the most challenging aspect of parallel hybrids. Parallel hybrids are suitable for vehicles that require short bursts of power but are otherwise operated at constant power output (or speed).

Figure 2: Parallel Hybrid Configuration

- Series Parallel Combination Hybrids.** By employing the series hybrid drive for city operation and parallel hybrid drive system for highway and high load driving, it is possible to maximize fuel economy with minimum engine, generator, and traction motor power requirements. Such a configuration is possible in a combination series parallel vehicle. Combination series hybrid vehicles are superior to pure series or pure parallel hybrids because they maximize the advantages of each type of technology.

Figure 3: Series Parallel Combination Hybrid Configuration

The end result of allowing electric motors, power electronics, energy storage devices and intelligent control logic to manage the operation of the engine is that (a) the engine's most efficient operation is maximized, and (b) the engine size can be reduced without compromising its torque performance. Consequently, HEVs have lower fuel consumption, better environmental signatures and lower engine wear and tear than conventional engine vehicles. HEV system developers and integrators claim reductions in fuel consumption of 30% or higher, and reductions in NOx emissions of up to 90%. Several large truck fleet operators have announced that they are currently testing hybrid trucks.

Fuel Economy. Fuel savings is the most compelling argument for hybrids. In the consumer automotive market, the Japanese auto makers have already introduced hybrid vehicles (Toyota with Prius and Honda with Insight and Civic). Ford and General Motors have entered the picture with Ford announcing its first hybrid SUV for delivery this year and GM in a two page color spread advertisement announcing the delivery of hybrid buses. GM claimed fuel savings of up to 60% over diesel fueled conventional buses. GM further claimed that if the "nine largest U.S. cities replaced their 13,000 buses, they would save over 400 million gallons of fuel annually." The greatest benefit will be felt in Class 3 to 7 delivery trucks (FedEx, UPS, USPS, Frito Lay/Pepsi, Coke, etc.) and in buses because stop and go traffic in an urban duty cycle allows for regenerative braking to charge the batteries or ultracapacitors and take the load off the prime mover, resulting in greater fuel efficiency.

Emissions. Emissions is also an issue but less tangible for fleet operators than fuel savings. Although in some ozone non-attainment regions this could be the long pole in the tent. For example, in the Houston-Galveston area it is rumored that that if smog levels are not reduced, certain fleets will just be reduced outright. Also this month's ruling by EPA relative to the smog level in 474 U.S. counties (159 million population) will put additional pressure on fleet operators in major metropolitan markets. For a full review of the benefits of heavy hybrids see www.harc.edu under clean air programs, which describes potential emissions reductions by hybrids in the Houston-Galveston region.

Silent mobility, low thermal signature, low noise and low tailpipe smoke are of great tactical importance to the military. A pure series or a combination series parallel hybrid could provide the military the desired characteristics for deployment in the battle zone.

Export Power. One major by-product of hybrid vehicles is the auxiliary power (export power) capability. Inverters, batteries, and sophisticated embedded controls for power management inside a hybrid are similar to those found in auxiliary power units used for emergency backup. The military has found this to be of strategic importance because electricity at variable voltage and frequency can now be delivered in the battlefield without the need to tow a 3,000 lb. specially constructed Tactical Quiet Generator (TQG). The military is currently looking at

equipping their High Mobility Multipurpose Wheeled Vehicles (HMMWV or humvee) and Family of Medium Tactical Vehicles (FMTV) with export power modules.

Payback. Our survey of fleet operators indicates that these customers are looking for a two to five year payback on their investment in new technology such as hybrids, provided the technology meets their performance criteria. For a Class 7 delivery truck operating 30,000 miles per year in an urban duty cycle with 7.5 miles per gallon fuel mileage, a hybrid system with 35% efficiency improvement can deliver fuel savings of approximately 1,040 gallons per year. At \$1.9 per gallon diesel fuel price, fuel savings is approximately \$1,975 per year. There are also one time savings of approximately \$3,000 from smaller engine size and the elimination of certain components such as the starter motor. For a 2.5 year payback, the total system price of a Class 7 series parallel hybrid drive system needs to be approximately \$11,400. For the military, the savings are even more dramatic because in the battle zone (e.g. Afghanistan), the delivered price of fuel can be as high as \$400 per gallon. Payback can be as little as 6 months for annual mileage of just 1,000 miles in such an environment.

Conclusion

Despite the performance claims, truck and bus operators have been slow to adopt the technology for three reasons: (a) the technology is still evolving; (b) the price-performance of available HEV systems do not meet fleet operators' payback target; and (c) the complex structure of the truck and bus industry means there are no obvious champions of this technology. However, we believe that fleet operators prefer having multiple suppliers, hence there is unlikely to be one standard or product type. In terms of payback target, we believe there are hybrid drive system developers who can meet fleet operators' price and performance metrics. Finally, we believe that in the era of higher oil prices and stringent environmental regulations, the value proposition of hybrids is compelling enough for engine manufactures, drive system developers and integrators to work together.

Authors' Certification

We, John J. McKenna, Dr. Himesh Dhungel and Patrick A. Longmire certify that the views expressed in this report to the best of our knowledge, accurately reflect our personal views about the subject companies and their securities, and that we have not been, are not, and will not be receiving direct or indirect compensation in exchange for expressing the specific recommendations or views in this report.

This report is based on information obtained from sources which Hamilton Clark & Co. (HamiltonClark) and Venture Capital Advisors LLC (VCA) believe to be reliable, but we do not represent or warrant its accuracy. The opinions, estimates and recommendations contained in this report represent the views of HamiltonClark and VCA as of the date of this report and may be subject to change without prior notice. HamiltonClark and VCA may seek compensation for investment banking and consulting services from companies whose technologies are mentioned in this report. (In the case of Solectria Corporation, both HamiltonClark and VCA have been retained by the company for investment banking and consulting services). Our firm would expect to receive compensation for investment banking and consulting services and such compensation would benefit each of us personally. No compensation is received by any of us personally for writing this report, however, our total compensation is based on (among other things) our firm's investment banking and consulting revenues. Neither HamiltonClark nor VCA are or will be responsible for the consequence of reliance upon any opinion or statement contained in this report. This report is confidential and may not be reproduced in whole or in part without the prior written permission of HamiltonClark and VCA. This report is not an offering of securities.

Hamilton Clark & Co.

www.hamiltonclark.com

1660 International Drive, Suite 400

McLean, VA 22102

(703) 288-5277

John J. McKenna john.mckenna@hamiltonclark.com

Himesh Dhungel, PhD himesh.dhungel@hamiltonclark.com

Patrick A. Longmire patrick.longmire@hamiltonclark.com

1301 Travis Street, Suite 1210

Houston TX 77002

(713) 658-8080

Ross F. Crawford ross.crawford@hamiltonclark.com

HamiltonClark is an investment bank that assists clients in private equity, project finance, merger, acquisition and sale assignments, corporate spin-outs and fairness opinions. It is a member of the NASD and SIPC. Venture Capital Advisors www.venturecapitaladvisors.com is a financial advisory firm that also makes direct investments in start-up companies.
