Los Angeles for 2006

Florida H2 Challenge
President Bush may not make it here this week, but Florida Gov. Jeb Bush and Bill Ford were among those helping break ground for a Chevron Texaco fueling station in Orlando. Florida's eyeing a generous package of tax breaks for hydrogen industry development and for sales of hydrogen energy products.

Likened to Apollo...
NHA 2005 gets underway with a new drive toward the hydrogen economy likened to the Apollo program of the 1960s: North Dakota Senator Byron Dorgan has proposed a 10-year, $7.9 billion hydrogen research program. His bill would boost President Bush's hydrogen program fivefold.

“‘We have only just begun to explore the potential of hydrogen fuel cell technology,’ Dorgan says. “This bill would help jump-start the industry.””

This week's meeting in Washington boasts the biggest-ever H2 vehicle ride-and-drive, too.

Ovonic's Enablers
Stan Ovshinsky's ECD Ovonic is promoting enabling technologies including solid hydride storage and a brand new regenerative fuel cell.

Racing into the Future – BMW has brought its record-setting H2R with hydrogen-fueled monster V-12 to NHA 2005. ‘Technology gleaned at the track often ends up in regular production BMW models,’ says the company, which has vowed to make its flagship 760i with the same 6-liter engine, hydrogen-fueled, available to the public.

Man with a Mission
Mitchell Pratt of Clean Energy isn't here to promote hydrogen, but rather what he says is the only way to make it real: via natural gas.
Natural Gas for Vehicles — Springboard to Hydrogen

The hydrogen future is certain. But why wait 20 years for it to arrive?

With natural gas vehicles, we have developed a powerful bridge technology that leads directly to the future, today. We are building a broad, gaseous fueling infrastructure for natural gas and HCNG that will evolve seamlessly to the hydrogen economy. We are working to transition society from its petroleum addiction to prepare for and embrace the hydrogen future.

As we seek to make this transformation through public policy initiatives, increased funding, infrastructure growth and further technology development, why wait? With natural gas, the future is now.

How is this possible?

Natural gas (CH4) is mostly hydrogen, with a broad range of vehicles available today. HCNG, the new 20/80 hydrogen/natural gas fuel blend, which can be used in today’s efficient natural gas vehicles without any modifications, brings pollutants to near zero. Until the day comes when we can economically make hydrogen from water, reforming or separating it from natural gas as the feedstock is the most efficient way to produce hydrogen.

Get on the road today with natural gas for vehicles — the springboard to the hydrogen future.
More than 100 auto, energy, fuel cell, component and technology companies, universities and government agencies believe the hydrogen future is coming fast.

They are the members of the National Hydrogen Association.

They are investing in their and our future, attracting capital to expand, and developing customers to sustain their development.

They are deploying learning demonstrations, validating concepts and putting their products in customer hands.

In the last year we have seen a substantial expansion in portable and stationary applications as well as over 200 hydrogen vehicles deployed around the world. These vehicles use liquid and compressed gaseous hydrogen in the tank. They use fuel cells and internal combustion engines for propulsion, and some of them are hybrid with a battery or ultracapacitors for peak performance.

A dozen or more new hydrogen fueling stations have opened this past year.

The first retail combined gasoline and hydrogen fueling stations opened in Singapore and then in Washington, D.C. Hydrogen fuel cell systems kept the only power going in Maryland and in the Bahamas for secure loads when the grid went down in the hurricane devastation.

New small-scale reformers are being tested by several companies. Cold weather testing of a hydrogen fuel cell car and a hydrogen ICE bus has been completed.

A university has licensed its fuel cell technology to a remote power equipment manufacturer.

State and regional initiatives are developing to ensure that their areas are among the first to enjoy more secure and environmentally attractive energy use. They also see new businesses developing and jobs being created.

As just one example, a new alternative energy R&D center is starting up in Michigan.

Please see what our members have to offer at the Hydrogen Expo–USA exhibition, and enjoy the 16th National Hydrogen Association Annual Hydrogen Conference.

Chairman, Board of Directors
National Hydrogen Association

Ballard Road Map Is Released

Ballard unveiled its Technology Road Map yesterday, outlining the fuel cell developer’s commitment to demonstrate commercially viable fuel cell stack technology by 2010. The Road Map comprises technology trend lines and targets for durability, freeze-start, cost, and power density.

The Vancouver company says its Road Map “validates Ballard’s technology leadership and five-year path towards non-compromised fuel cell stack technology performance.” Ballard is at Booth 720 here.

GM Says It’s Got No Choice

Officials of General Motors are spelling it out: environment aside, fuel cells will be necessary if today’s big automakers want to be big automakers tomorrow. Oil will be too costly to maintain large vehicle sales in any other way.

GM detailed progress on solid metal hydride storage this month in California.
Don’t waste your energy on anything else.

The natural-gas Honda Civic GX has it all. And then some. The GX uses no gasoline and generates nearly zero emissions. It doesn’t rely on oil, imported or otherwise, so it helps support our government’s energy-security goals. And, while we’re on the subject of saving oil, the GX only needs an oil change once every 10,000 miles.* And because the EPA recognizes it as the cleanest-burning internal-combustion vehicle on the planet, the GX can also help you comply with federal EPACT or local clean-air mandates. So, go ahead, put the GX to work for you, and you can experience fuel-cost savings, the value of tax incentives† access to carpool lanes** and the goodwill of your community for being so environmentally conscious. Of course, you’ll also save energy. Yours and the world’s. For more information, log on to civiegx.com or call us at 1-888-CC-Honda.

*Refer to your owner’s manual. †For more detailed information, please consult an IRS tax representative and/or official IRS publications. **Check local and state laws. ©2005 American Honda Motor Co., Inc. civiegx.com
**SNAPSHOTS**

**Ballard Claims Big PEM Gains**
Ballard (Booth 720) is claiming progress in fuel cell freeze start capability, durability and cost reduction “without compromising performance.” The company claims an improved stack design that can start repeatedly at -20°C (-4°F) and operate for more than 2,000 hours at substantially reduced cost and no performance tradeoff. “We achieved a technology hat trick,” Ballard R&D VP Charles Stone says in a release. “We believe we are the first fuel cell developer to successfully demonstrate these key technology milestones simultaneously in a single fuel cell stack, [and are] well on our way to meeting our goals for a commercially viable fuel cell stack by 2010.” Costs were lowered in large part by reducing platinum catalyst loading by some 30%.

**Compressors Need Not Apply**
Milford, Conn.-based Avalence is promoting an electrolysis-based hydrogen unit that uses a simple fluid electrolyte and yields fuel at high pressure—eliminating the need for a compressor, even for 10,000 psi. “This single innovation significantly reduces the cost of our product lines and, perhaps more importantly, eliminates a complex and high maintenance component found in all other high-pressure electrolyzers,” the company says. Avalence seeks to ally itself with companies involved in hydrogen infrastructure, renewable energy use, and fuel cell applications.

**Hydrogen at the HAMMER**
The Pacific Northwest National Laboratory in Richland, Wash. is planning to add hydrogen to the training curriculum at its Hazardous Materials Management and Emergency Response, or HAMMER facility. HAMMER's Awareness-Level Hydrogen Safety Training curriculum is aimed at fire fighters and emergency responders, fire marshals, building code officials, regulators, fleet managers and elected officials. Such training amounts to “a very important element in assuring people that hydrogen is just another substance,” says National Hydrogen Association president Jeff Serfass, who toured HAMMER last week. NHA chairman Mike Davis is associate laboratory director for PNNL’s Energy Science and Technology Directorate.

**ISE HHICE Bus Said First Ever**
San Diego’s ISE Research reports completion of two months of cold-weather trials of its HHICE (hybrid hydrogen internal combustion engine) drivetrain, said to be the world’s first in a transit bus, in Winnipeg. The 40-foot New Flyer with a modified V10 engine from Ford successfully endured temperatures as low as minus 30, and after stops in Michigan, New York, and New Jersey is at NHA 2005 this week. ISE is active in fuel cell and other electric drive buses too (see page 12).

**BMW Likes Hydrogen for ICES, Fuel Cells for Auxiliary Power**
BMW, an enginemaker among automakers, comes to NHA 2005 believing that hydrogen-fueled internal combustion engines should be used for motive power, with fuel cells for auxiliary power units to support vehicle electronics and accessories.

BMW also comes to Washington with high-level plans to make a hydrogen- and gasoline-fueled luxury sedan based on an existing Series 7 vehicle available to the public.

“Just as technology gleaned at the track often ends up in regular production BMW models, the lessons BMW has learned in building the H2R will surely find their way in the hydrogen cars of the near future.”

The $110K 760i, which has the same V-12 engine as the H2R, is the likeliest model to be released as a hydrogen-gasoline bi-fuel vehicle. It’s designated, at least for now, the H7.

**UTC: Cars, Buses, Stationary**
UTC Fuel Cells (Booth 210) is promoting its cold-weather-capable PEM cells here at NHA 2005.

The United Technologies unit supplies fuel cells for vehicles including Georgetown University buses, developmental Santa Fe and Tucson fuel cell sport utility vehicles at Hyundai, Nissan’s X-Trail fuel cell SUV, and Van Hool buses with Siemens Elfa drives by San Diego’s ISE Research.

**Next Stop on Your H2 Hwy?**
Arno Evers and his Fair-PR organization are again helping companies take their hydrogen fuel cell messages to a larger audience, as they will host a special section in Hall 13 of the Hannover Fair, which is being held April 11-15 in Hannover, Germany.

Russian President Vladimir Putin will join German Chancellor Gerhard Schröder to open the Fair on April 10.

The Hannover Fair is expected to draw more than 6,000 exhibitors from 60 countries taking up more than 2 million square feet of space.

Exhibit space via Fair-PR starts at $11,900.

Evers is also hosting a Hydrogen & Fuel Cells on Their Way to Commercialization conference on April 12, and a networking evening on April 14.

Fair-PR is working China’s Shanghai International Industry Fair, too: November 10-15.

Check it all out at www.fair-pr.com
Florida is considering an aggressive program to foster the use of hydrogen in the state, including tax credits to cover 75 percent of investment costs (with no cap) and a full exemption from sales taxes on hydrogen products, both to be valid through mid-2009.

“The governor wanted to do something bold,” Allen Bedwell said at the California Hydrogen Business Council’s general meeting late last month.

The week before, with Bill Ford on hand, Gov. Jeb Bush broke ground for a Chevron Texaco hydrogen fueling installation in Orlando.

“We are encouraging new corporate investment, creating new jobs and protecting the state’s air quality,” Bush said. Three new Florida hydrogen projects were announced last week.

“It’s great to see what they’re doing,” California EPA Secretary Alan Lloyd told Show Times. “It’s good to have that competition.”

Bedwell is deputy secretary for regulatory programs and energy with Florida’s Department of Environmental Protection. Gov. Bush has earmarked $15 million for this budget to encourage investment, his office says.

“We desperately need to establish energy independence,” Bedwell said at the CaHBC meeting hosted by American Honda in Torrance.

The ideal of making clean energy onsite took on added urgency following this past autumn’s spate of hurricanes, Bedwell said.

Florida is concentrating its hydrogen development efforts in the Orlando area to build what he called “critical mass” there.

Florida earlier this year became the first customer for Ford’s new 12-passenger hydrogen shuttle bus, ordering eight. The vehicle has a range of up to 150 miles on one compressed H2 fill-up, and near-zero emissions.

Expect an announcement from California officials—including Gov. Arnold Schwarzenegger—on the progress of the Hydrogen Highway there. New maps showing hydrogen fueling stations clustered in Los Angeles and the San Francisco Bay Area will reflect thinking evolved from the state’s original every-20-miles approach. The new network will build on an existing natural gas fueling infrastructure.

The map at left, with existing stations in green, is from the California Fuel Cell Partnership. CaFCP’s revamped website, fuelcellpartnership.org, features an interactive list of hydrogen fueling stations.
Until now largely a collection of volunteers, the four-year-old California Stationary Fuel Cell Collaborative is moving to establish itself as a more structured organization, with dues and a budget.

In what they’re calling a bold step forward, organizers released a Roadmap to an Updated Strategic Plan and invited stakeholders to sign on to a new advisory panel.

“Fuel cells have great potential to improve the state’s economic and environmental health, and facilitate the development of the California Hydrogen Highway,” says CaSFCC co-chair and director of the National Fuel Cell Research Center (at UC Irvine) Scott Samuelsen. “But the early market for deployment is challenged by high capital costs, undemonstrated durability and reliability, and the regulatory and policy hurdles associated with distributed generation.

“The strategic plan is designed to advance the deployment and commercialization of stationary fuel cells,” Samuelsen says.

The CaSFCC plan includes identifying and addressing technology hurdles; establishing and implementing a systemic demonstration plan; establishing and implementing large scale deployment projects; supporting the Hydrogen Highway initiative; identifying, addressing and implementing policy, regulatory, and legislative incentives; conducting key distributed generation and life cycle cost analysis studies; and developing and implementing an outreach program.

Industry members are invited to participate at any of three levels. CaSFCC is co-chaired by Dr. Alan Lloyd, who has just taken over as California EPA secretary after running the agency’s Air Resources Board.
Honda’s modern gasoline vehicles are Good, its hybrids are Better, the dedicated-CNG Civic GX is the Best, and hydrogen fuel cell vehicles are the Ultimate.

That’s the latest summation of the automaker’s hydrogen transition strategy, as espoused by alt fuels chief Steve Ellis.

Fuel cell vehicles will obviously need new fueling infrastructure, which is one reason Honda is sticking with its dedicated-compressed natural gas Civic GX—said to be the world’s cleanest car on a well-to-wheels basis.

Honda has begun offering the Civic GX not only to fleets but to consumers. Honda is bankrolling Canada’s FuelMaker in developing a home CNG fueling appliance, dubbed Phill.

The idea is to get people accustomed to a gaseous fuel, using vehicles that are available today. In that way, Ellis says, you get “a large class of apprentices ready to step into hydrogen... Phill users are hydrogen apprentices.”

Phill goes on sale at 17 Honda dealers in California this week. It will debut later this spring in Europe.

“You can drive one away.”

American Honda, which claims bragging rights to the first road-certified fuel cell vehicle (note regular Swiss license plates on the vehicle above), the FCX, says it will lease the hydrogen-fueled car to anyone who wants one for just $500 per month.

Honda’s FCX fuel cell vehicles have been placed in Las Vegas, Las Vegas; Chula Vista, CA; Hokkaido, Japan; and San Francisco, CA. The FCX cars in Hokkaido will also see sub-freezing conditions. Los Angeles and nearby Chula Vista have FCXes too, as does the South Coast Air Quality Management District, LA’s clean air agency. San Francisco has the first two placed by a regular Honda dealer.

This past year saw delivery of more than a dozen Honda FCX fuel cell vehicles in Japan and the U.S.

The most recent placements were in Las Vegas, where the vehicles will experience extreme desert heat (and where Mayor Oscar Goodman said he’d likely appropriate one for his own use), and Albany, N.Y., where there is ample opportunity for sub-zero evaluation: New York got the first FCXes with Honda’s own, more cold-weather-capable fuel cell stacks.

FCX cars in Hokkaido will also see sub-freezing conditions.

American Honda alt fuels chief Steve Ellis in front of ShowTimes editor Rich Piellisch’s house in San Francisco after delivering two of the vehicles to Mayor Gavin Newsom last year.

Honda has placed more than a dozen of its FCX vehicles in the U.S. and Japan, and said earlier this year that it would lease the hydrogen fuel cell car to consumers for $500 per month.

Among the deliveries were the first FCX cars with Honda’s own fuel cell stacks (to New York), for which it claims numerous manufacturing, performance and durability advantages.

Aromatic electrolyte membranes yield greater durability and power generation at temperatures ranging from minus 4F to 203F, Honda says. A stamped metal separator structure and newly developed electrolyte membranes serve to reduce the number of parts by almost 50%. The combination makes the Honda stacks simpler. They are expected to work better in very cold weather, last longer, and to make for a vehicle that’s 10% more efficient.

Honda is using ultracapacitors for the regenerative braking function in its latest FCXes.
Clean Energy Sounds Import Clarion Call

Mitchell Pratt, VP
Marketing & Business Development
Clean Energy Fuels, Inc.

If it’s serious about hydrogen, the federal government should embark immediately on a fleet conversion effort specifying gaseous fuel vehicles—starting with proven natural gas and moving to hydrogen blends and hydrogen—specifying too that automakers supply vehicles with compressed fuel tanks as an integral part of the chassis rail structure.

“We need them buying dedicated natural gas and dedicated hydrogen vehicles.” So says Mitchell Pratt, public affairs and business development VP for Los Angeles-based Clean Energy Fuels.

Clean Energy, the former Pickens Fuels, has built capacity and bought it, and claims now to be the leading supplier of natural gas fuel for vehicles in North America, with more than 160 fueling facilities in service.

“It’s going to be companies like mine that are going to figure out the economic framework to make this work,” Pratt says of hydrogen. He's here at NHA 2005 with a message: natural gas is the best path to a hydrogen future—and there won’t be a hydrogen future without a more activist policy posture.

“The whole notion of fuel neutrality is not a reasonable or sensible approach for a society that is facing an energy crisis,” he says. “Fuel neutrality equals no progress.”

“There is a supply-of-oil reality,” he told ShowTimes.

“The ability to increase our refining capacity is limited. We need to start embracing a new energy dynamic in the United States.

“We need something to balance our growing thirst for petroleum fuels.

“We have a long-term need to start this transition now,” Pratt continues. The alternative? “A huge economic train wreck.”

“The federal government has thus far missed the chance to establish a viable gaseous fuels industry, he says, buying flex- and bi-fuel vehicles to meet alt fuel fleet requirements and failing to run them on the alternative fuel.

“If we can’t resolve the issues on CNG,” says Pratt, "we’re never going to make it to hydrogen.”

With few exceptions, Pratt says, automakers don’t appreciate the full ramifications of a hydrogen changeover, which will require “full integration of every Mom-and-Pop auto shop.”

“Fundamental acceptance into society is not going to happen quickly and the cost of upgrading every facility is not going to be absorbed quickly,” he warns.

“It’s essential that government fleets start stepping up and ordering dedicated gaseous fuel vehicles.” They could run on CNG, hydrogen, or blends of the two. The dedicated fuel tank chassis structure (such as that found on Europe’s popular Fiat Multipla, shown here) allows for more fuel to be stored unobstrusively on a vehicle, something that’s necessary with CNG and will be even more necessary with hydrogen.

Drawing on existing NGV fueling installations and experience is “a sensible approach to growing an infrastructure,” Pratt says: “a way to systematically integrate this into society.”

“It’s misleading to think you’re going to jump straight to hydrogen,” he says, in reference to automakers (think Ford) that have dropped NGVs. “To drop gaseous fuel products altogether and say we’re going to start making hydrogen internal combustion engines is a farce.”

“Natural gas is a key play and we need to start as a society to embrace it,” Pratt says.

“We already have an established infrastructure and the fuel costs less.”

“Natural gas is the natural transition to the hydrogen future. It is the lowest cost option today.”

Lessons to Learn

Clean Energy’s Mitchell Pratt will talk about Lessons Learned during years of natural gas vehicle market development in a conference session here Thursday afternoon.

Steve Ellis of Honda will moderate. The other scheduled panelists are Michael Mackey of General Physics Corp, Allen Spivey of the Gas Technology Institute, and Rich Kolodziej of Washington’s NGV Coalition.

Gas Standards Experts Tackle Similar Issues for Hydrogen

Experts from the natural gas vehicles industry are working toward a workable system of world standards for hydrogen.

“It’s a huge yawn for a lot of people but it’s the heart and soul of getting this stuff into the market,” says Jeff Seisler, an American who heads the Amsterdam-based European Natural Gas Vehicle Association.

“It’s a huge imperative,” Seisler says, noting that just as much effort is necessary to make sure they are the basis of real-world regulations that work.

Groups like ISO develop standards, which are codified into regulations by governments and the UN.

“We are working with industry to provide consensus and then bring it to the United Nations,” says Randy Dey, president of CCS Global, of Toronto.

His firm can provide companies with guidance through the confusing world of international accords. Hydrogen standards are now being developed through the TC 197 committee of ISO, for example, with various sub-designations for things like electrolysis, reformers, and storage devices.

“We believe that standards facilitate technology,” Dey says. “Everyone gains.”

His next TC 197 will be at this year’s Fuel Cell Seminar in Palm Springs, which runs Nov. 14-18.
Air Products & Chemicals is working to parlay decades of experience in industrial hydrogen, the bulk of it made from natural gas, into a leadership position in hydrogen fuel for vehicles.

“The key to rolling out the energy infrastructure,” says Dave McCarthy, the company’s future energy solutions commercial manager, “is tapping into the industrial infrastructure.”

Air Products has mobile fueling units to support today’s vehicle test projects, where it is already applying its own dispensing technology. The latest mobile fueler, the HF 150, has capacity of 150 kilograms of hydrogen, which it can pump at 350 bar, or 5,000 psi.

Air Products can supply hydrogen made onsite from natural gas too, using reformers from other suppliers and applying its own PSA (pressure swing absorption) purification technology.

Besides supporting NHA 2005 this week—that’s an Air Products dispenser at Shell’s Benning Road station here in Washington—Air Products has supplied onsite hydrogen at numerous trade exhibitions and public events, including the most recent world electric vehicles meeting in Long Beach, Calif.

Benning Road is the first public-access hydrogen station at a retail gasoline station in North America.

“This is a milestone demonstration project,” Air Products future energy solutions director Tama Copeman said in a release when it opened, “North America’s first integrated hydrogen and gasoline station.”

The world’s first is at a BP station in Singapore. Both employ “Air Products technology that’s wrapped in the customer’s brand,” McCarthy says.

Air Products mobil fuelers made it possible for a Honda fuel cell car to be driven from Los Angeles to its new home in Las Vegas last month, where an Air Products installation will be used to fuel it for Mayor Oscar Goodman.

Air Products supplies hydrogen to the California Fuel Cell Partnership in West Sacramento and to the nearby Institute of Transportation Studies at UC Davis, to the Santa Clara Valley Transportation Authority in Milpitas, Calif. for three Gillig buses with Ballard fuel cells, and to researchers across the country at H2VRC, the Hybrid and Hydrogen Vehicle Research Center at the Pennsylvania Transportation Institute, part of Penn State.

“We’ve got more than 30 hydrogen fueling stations in operation,” McCarthy says. “We believe we’re the leader.”

Air Products maintains a website with extensive information on hydrogen as a vehicle fuel. The company is active in training too, with a program dubbed KnowH2ow.

But don’t look for rosy accounts of hydrogen’s prospects in the firm’s latest annual report.

There is, in fact, no mention of hydrogen as a vehicle fuel at all. Yet Air Products will make between $850 million and $900 million in capital outlays this year, “driven primarily by the growing hydrogen market.” How so? The firm is already smack in the middle of successful efforts to reduce vehicle emissions.

Most of the hydrogen Air Products sells to refiners, produced in more than 60 large-scale facilities, is used to remove sulfur and other contaminants from conventional fuels.

As such the company already has a clean air impact that dwarfs anything happening in the alternative vehicles sector of today.

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Hydrogenics Now Includes Stuart Energy

Pierre Rivard
President & CEO
Hydrogenics (Booth 345)

Hydrogenics comes to NHA 2005 as a much larger company, having acquired Stuart Energy via a stock swap deal that was announced in November and closed last month.

Hydrogenics, which already had hydrogen production capability, now has far more of it, picking up the Stuart and Vandenhorne industrial H2 supply businesses.

Hydrogen production from the former Stuart, electrolysis-based, now accounts for about half of Hydrogenics revenues.

Hydrogenics is working with ChevronTexaco, says president and CEO Pierre Rivard, on making hydrogen by reforming natural gas.

Hydrogenics can produce hydrogen, dispense it, and use it in fuel cell modules ranging from seven to 65 kilowatts for applications ranging from forklifts to yachts, including power backup.

There is already a business case for H2 forklifts and mine vehicles, Rivard says. Forklifts powered by his firm’s fuel cells have been tested by General Motors at its sprawling Oshawa plant and will next be evaluated by FedEx.

Rivard describes a design strategy of using ultracapacitors to minimize the size of the fuel cell in a given vehicle. The Hyster forklifts with HyPM10 modules, for example, are capable of bursts of 40-watt power with just a 10-kilowatt Hydrogenics fuel cell pack. “We cater to the peak using ultracaps,” Rivard says.

Fuel cells are closer to commercialization than most people understand: “We’ve been achieving 50 percent cost reductions year after year,” Rivard claims. The ambient-pressure Hydrogenics design is conducive to long stack life.

Rivard says he’s in talks with Los Angeles-based Ebus about fuel cell buses, and notes that Hydrogenics now has a California office (manned by Kevin Harris). Delivery vehicles fueled at the wind-powered Hydrogen Village in Toronto are already showing lower per-mile costs than conventional vehicles, Rivard claims.

Hydrogenics also makes test equipment, having bought Greenlight Energy in 2003. The testing business counts some 450 installations among 55 customers, and is a good way of building alliances to be in place when Hydrogenics fuel cell products achieve real commercial status. “It fosters alliances,” he says. “It’s a reputation-builder.”

Rivard says it’s a mistake to think that relatively cheap oil will stifle hydrogen. “The Stone Age did not end for a lack of stones,” he says. “We’re moving toward an increasingly fast fuel for an increasingly fast economy.”

There’s No Altruism In It

General Motors sees fuel cell vehicles as necessary to maintain its position in coming decades.

With hydrogen fuel cells, “We can give our customers absolutely everything they aspire to have,” says technology VP Larry Burns.

To keep on selling big premium vehicles in a world with costlier conventional fuels and increasing greenhouse gas emission pressures, GM has to shift to electric drivetrains, and the automaker sees hydrogen fuel cells as the key to getting the power and efficiency it will need.

Fuel cells, in other words, represent the only way to sustain a profitable personal mobility business—with zero-emission vehicles that drive like today’s cars with 300-mile range and are competitively priced—as new markets emerge in a world that’s fast using up a finite supply of oil.

“With fuel cells you can have your cake and eat it too,” GM fuel cells commercialization director Tim Vail said after GM took reporters to the Sandia Lab in Livermore, Calif. two weeks ago. Burns and Vail, and GM chemical and environmental sciences laboratory director Jim Spearot, were among the officials who met with the media in a so-called “deep dive” into hydrogen storage technology.

Vail said it will take the financial muscle of an automaker to come up with workable fuel cell solutions, intimating that non-OEM fuel cell suppliers, and the carmakers who depend on them, will be left behind.

He said GM’s fuel cell people face regular grueling sessions with CEO Rick Wagoner and vice chairman John Devine.

“The auto industry is 98 percent dependent on petroleum,” said technology VP Burns. “We don’t think that’s a very robust position to be in.” He pointed to Brazil, China, India, Mexico and Russia as markets that will help take the world’s current world vehicle population of some 730 million vehicles to 1.1 or 1.2 billion by 2020.

GM took reporters to the Sandia Lab in Livermore and to the GM-, Boeing- and Raytheon-owned HRL Labs in Santa Monica.
A Milestone Bus Takes to the Road
San Diego’s IESE Research is outfitting a bus from Belgium’s Van Hool with an electric drivetrain including fuel cell stacks from UTC Fuel Cells (Booth 230), and Siemens Elfia motors and controllers, for Oakland, Calif.’s AC Transit.

Astris Energi Likes Alkaline Fuel Cells
Mississauga, Ont.-based Astris Energi is promoting alkaline fuel cells, claiming such advantages as cheaper materials (there is a liquid electrolyte, thus no costly membrane), tolerance of lower-cost, commercial-grade hydrogen as fuel, and higher energy efficiency.

Astris unveiled a golf cart it said is the first in the world to be powered by AFCs at the most recent Fuel Cells Canada (Booth 130 here) meeting in Toronto, and reported a deal with Italy’s Electronic Machining that could lead to near-term application of the Astris alkaline fuel cell technology in devices for stationary and distributed generation.

“...As well as generating immediate revenue through the sale of our consulting services and products to ElMa, there is a great potential market in Italy and Europe for Astris’ alkaline fuel cell technology,” Astris VP David Ramm said in a release. “ElMa provides us with a beachhead from which to exploit this market.”

Quantum Seeks Manufacturer for Versatile Fueler
Quantum (Booth 510 here) is looking for licensees to manufacture portable hydrogen fueling units for which it secured U.S. patent rights last year. Quantum claims rights to portable and transportable hydrogen fuelers that accept low pressure hydrogen from external sources, and can compress and dispense at either 5,000 or 10,000 psi. The firm is promoting the units under the HyHauler and HyHauler Plus brandnames. They are covered by U.S. patent number 6,755,225. Quantum is “commercializing these refuelers with the major automakers and the U.S. Army, and is interested in licensing the technology to other manufacturers,” says president and CEO Alan Niedzwiecki.

‘Vital’ Fideris for Critical Test Equipment & Service
“...You probably spend from 25 to 40 percent of your development budget on testing,” says Fideris president and COO Jeff Bentley. The fuel cell industry spends upwards of $400 million per year on testing, Bentley said at this month’s Global Alternative Fuels Forum in Berlin. Fideris claims the world’s first onsite calibration service for fuel cell test equipment, whether Fideris-built or from another manufacturer. Fideris technicians make house calls, so test cells don’t have to be disassembled nor equipment shipped.

“...Downtime is reduced from weeks to days or even hours,” Bentley says. Fideris has opened an office in Zurich, too. Dr. Pankaj Agarwal is managing director of Fideris Test Solutions GmbH.

VTA Fuel Cell Buses Are Entering Service at Last
Three Gillig buses with Ballard fuel cell drives entered service with the Santa Clara Valley Transit Authority in Northern California late in February, following delays involving at least one hydrogen leak and a fire, and at least one false alarm, all of which prompted serious concern on the part of local fire authorities—and delay on the part of an ultra-cautious VTA. The 40-foot hydrogen-fueled vehicles, the heart of an $18.8 million, multi-year, California Air Resources Board-mandated effort, were to have been operational this past summer or autumn (F&E, September 20).

German ‘Charly’ Scooter Shows Dana Expertise
Ohio’s Dana, a $7.9 billion company with operations in 30 countries, is talking up development of its own fuel cell stack componentry, including bi-polar plates and seals it says can help make fuel cells more efficient and economical. The Dana products were shown on a German-built scooter displayed at this past autumn’s Ford-sponsored Convergence 2004 SAE automotive electronics show in Detroit.

H2Gen Investigating Ethanol as a Hydrogen Feed
Northern Virginia’s H2Gen Innovations has new funding from investors, as well as from partners involved in a $5.4 million Department of Energy program aimed at finding cheaper ways to make hydrogen, for which H2Gen is the prime contractor. H2Gen specializes in production of hydrogen via natural gas reformulation. The DoE program seeks to apply reformulation technology to other feedstocks, notably ethanol. “Hydrogen made at the fueling station from renewable alcohol fuels is the least costly option to produce renewable hydrogen today,” says an H2Gen release. Investors include Air Products, Chrysalis, SoCal Gas, and Japan’s Itochu.

ePower Synergies Is Born of John Deere ePower
Bruce Wood, formerly of John Deere ePower Technologies, has formed ePower Synergies, which is effectively taking over Deere’s work on fuel cell vehicles. ePower’s goal is to be a Tier One supplier of hydrogen fuel cell systems for off-road work vehicles, not only for the Deere line, Wood told F&E, but for companies like TorO that compete with Deere. Cordova, Ill.-based ePower maintains close ties to fuel cell developer Hydrogenics. Wood says he expects to release word on several projects at the EVS-21 world electric vehicle show in Monte Carlo next week.
ChevronTexaco’s Leveraging Natural Gas

Rick Zalesky
President (Hydrogen)

ChevronTexaco Technology Ventures

ChevronTexaco is applying technology loosely derived from the steam reforming prevalent in the refineries to onsite hydrogen production for vehicle fueling.

Engineering, in terms of catalyst choice and process steps, is an entirely new challenge, says Rick Zalesky. He presides over hydrogen development at CTTV, ChevronTexaco Technology Ventures.

CTTV is working under DoE contracts, one involving Hyundai and UTC Fuel Cells aimed at testing approximately 30 vehicles in real-world conditions. CTTV will supply fuel at as many as half a dozen sites, most of them to be based on natural gas.

The just-opened station at Hyundai’s technical center in Chino, Calif. will employ an auto-thermal reforming process using oxygen instead of steam to extract hydrogen from methane. The single-reactor CTTV Halias processor can run on propane as well as natural gas.

A station at the University of California, Davis, will be based on steam reforming.

The Davis station and probably at least one other will include stationary fuel cells designed to demonstrate the efficiencies of distributed electricity generation: hydrogen that’s made onsite from natural gas will be used onsite to make electricity.

CTTV will set up a hydrogen station with fuel derived via electrolysis for SoCal Edison.

“Since we don’t know how to do this (establish hydrogen as an economically viable fuel), we’re trying to explore all the pathways,” Zalesky says.

The DoE program with Hyundai and Connecticut-based UTC may include a hydrogen station in the Northeast to test performance under winter conditions.

Future hydrogen stations may also be located at existing natural gas stations. “I don’t know how much of the infrastructure is re-usable as we have not studied this,” Zalesky says. “Obviously the raw material is available at the site.”

ChevronTexaco H2 station supports Hyundai cars, public.

CTTV is hoping to be able to test a single-step reforming process now in development under a separate DoE pact at one of the stations being built for the Hyundai vehicle trials too.

ChevronTexaco’s Kevin Nguyen will discuss the production of hydrogen by steam reforming natural gas at a session this Wednesday afternoon. It’s titled, “Chicken... Meet the Egg! A Cost Effective Hydrogen Supply Solution.”

“Ours corporate strategy is focused on natural gas as being the primary feedstock to the hydrogen economy, at least in the early years,” says hydrogen infrastructure VP John Brady.

April 24, EVS21, the 21st Worldwide Battery, Hybrid and Fuel Cell Vehicle Symposium & Exhibition. Grimadli Forum’s Space Ravel in Monte Carlo, Monaco. Act Now for Sustainable Mobility theme. Georges Dick is general secretary. EVS21, Simone Mira, +377-97-77-54-22; simonemirates@evs21.org; www.evs21.org

April 11-14, SAE World Congress organized by SAE International. Billed as the world’s premier automotive trade show and conference. Cobo Center in Detroit, Mich. SAE Customer Service, 724-776-4970 or U.S.-Canada toll-free 877-606-7323; customerservice@sae.org; www.sae.org/congress

April 13-15, the Hannover Fair in Hannover, Germany. Includes a special section on hydrogen and fuel cells hosted by Germany’s Fair-PR. Fair-PR, Anna Evers, +49-8151-99892-3; anna@fair-pr.com; www.fair-pr.com; www.hannovermesse.de

May 3-5, Eleventh National Clean Cities Conference & Exhibition. Wyndham Palm Springs Hotel in Palm Springs, Calif. Clean Cities Coachella Valley Region to host in partnership with the Las Vegas-based Alternative Fuel Vehicle Institute. Clean Cities Coachella, Bert Kommler, 760-325-1577, ext 111; fax 760-325-8549; kmmler@pschamber.org or, for AVF, Anallynd Thomason, 702-254-4180; info@avf.com; www.eere.energy.gov/cleancities; www.avf.com/palm springs

May 4-6, FCTI 2005, Fuel Cell Technology Institute and Hydrogen Workshop immediately following. Clean Cities at the Wyndham Palm Springs Hotels. Organized by the National Fuel Cell Research Center at the University of California, Irvine. UC Irvine FCTI, 949-824-1999, ext 212; fcti@nfrc.uci.edu; www.nfrc.uci.edu/fc2005

May 6, First International Hydroly Conference, aimed at advancing railway technology powered by hydrogen fuel cells, Renaissance Charlotte Suites, Charlotte, N.C. $150 registration fee. Appalachian State University, Dr. Dennis Grady, 828-262-6827; gradydo@appstate.edu; www.hydral.org

May 20, General Meeting of the California Hydrogen Business Council. Hosted by California EPA in Sacramento. CHBC, Catherine Rips, 760-341-2924; catherine@ipspconsulting.com or info@californiahydrogen.org; www.californiahydrogen.org


June 7-8, Fuel Cell 2005 Conference & Exhibit on Advancements in Fuel Cell Applications & Technology. Hyatt Regency in Minneapolis, Minn. Organized by Fuel Cell magazine, Greg Schriener, 720-528-3770 or toll-free 800-803-9488; fax 720-528-3771; gregs@infowebcom.com; www.fuelcell-magazine.com

June 8-12, 11th annual meeting of the European Natural Gas Vehicle Association: World Fair of Natural Gas & Hydrogen Vehicles with A Profitable EURenvironment for NGVs theme. Bolzano (Bozen), Italy. ENGA, Jeff Seisler, +31-23-554-3050; info@enga.nl; www.enga.net

## Conference Schedule

### Wednesday, March 30, 2005

<table>
<thead>
<tr>
<th>Time</th>
<th>Event Details</th>
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</thead>
<tbody>
<tr>
<td>7:30 AM – NOON</td>
<td>Registration</td>
</tr>
<tr>
<td>8:00 AM – 10:45 AM</td>
<td>Plenary I</td>
</tr>
<tr>
<td>10:00 AM – 5:00 PM</td>
<td>Hydrogen Expo USA</td>
</tr>
<tr>
<td>11:00 AM – NOON</td>
<td>National Hydrogen Learning Demonstration Recognition Event</td>
</tr>
<tr>
<td>12:15 PM – 1:45 PM</td>
<td>Lunch</td>
</tr>
<tr>
<td>2:00 PM – 5:15 PM</td>
<td>Special Session Coolidge</td>
</tr>
<tr>
<td>2:00 PM – 3:00 PM</td>
<td>Parallel Session I</td>
</tr>
<tr>
<td>3:45 PM – 5:15 PM</td>
<td>Parallel Session II</td>
</tr>
<tr>
<td>5:45 PM – 7:00 PM</td>
<td>NHA Annual Corporation Meeting</td>
</tr>
<tr>
<td>7:00 PM – 8:00 PM</td>
<td>Interest Group Meetings</td>
</tr>
<tr>
<td>8:30 PM – 10:00 PM</td>
<td>Board of Directors Dinner Meeting</td>
</tr>
</tbody>
</table>

### Event Details

- **Parallel Session I**
  - Storage — Overview (rm: Harding)
  - Analysis — Overview (rm: Wilson B)
  - Safety — Fueling Quality and Procedures (rm: Wilson A)
  - Production — Overview (rm: Cotillion North)
  - Idea Forum — Hydrogen from Renewables: Timing and Economics (rm: Cotillion South)
  - Demonstrations — Transportation Validation (rm: Wilson C)

- **Parallel Session II**
  - Storage — Novel I (rm: Harding)
  - Analysis — Production and Delivery (rm: Wilson B)
  - Safety — Safety Validation (rm: Wilson A)
  - Production — High Temperature and thermochemical Production (rm: Cotillion North)
  - Demonstrations — Bus Demonstrations (rm: Wilson C)
  - Idea Forum — Refining the Hydrogen Message (rm: Cotillion South)

- **Interest Group Meetings**
  - Universities Interest Group Meeting — (rm: Wilson A Conference)
  - Small Business Interest Group Meeting — (rm: Wilson B Conference)
  - Utilities Interest Group Meeting — (rm: Wilson C Conference)
  - Transit and Fleets Interest Group Meeting — (rm: Harding Conference)
  - State and Regional Hydrogen and Fuel Cell Initiatives Interest Group Meeting — (rm: Cotillion North School Room)

### Thursday, March 31, 2005

<table>
<thead>
<tr>
<th>Time</th>
<th>Event Details</th>
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<tbody>
<tr>
<td>7:30 AM – NOON</td>
<td>Registration</td>
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<tr>
<td>8:30 AM – 10:00 AM</td>
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<tr>
<td>10:00 AM – 5:00 PM</td>
<td>Hydrogen Expo USA</td>
</tr>
<tr>
<td>10:30 AM – NOON</td>
<td>Plenary III</td>
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<tr>
<td>12:15 PM – 1:45 PM</td>
<td>Awards Luncheon</td>
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<tr>
<td>2:00 PM – 3:45 PM</td>
<td>Parallel Session III</td>
</tr>
<tr>
<td>3:45 PM – 5:15 PM</td>
<td>Parallel Session IV</td>
</tr>
<tr>
<td>5:30 PM – 7:30 PM</td>
<td>Industry Reception and Poster Session</td>
</tr>
<tr>
<td>7:45 PM – 8:35 PM</td>
<td>Show: Capital Steps</td>
</tr>
</tbody>
</table>

### Event Details

- **Parallel Session III**
  - Storage — Novel Storage II (rm: Harding)
  - Analysis — Infrastructure (rm: Wilson B)
  - Safety — Storage and Separation (rm: Wilson A)
  - Production — Hydrogen Delivery (rm: Cotillion North)
  - Demonstrations — ICES Around the World (rm: Cotillion South)
  - Idea Forum — Lessons Learned from the Natural Gas Industry (rm: Wilson C)
  - Idea Forum — What is the Role of Congress in Building a Hydrogen Economy? (rm: Coolidge)

- **Parallel Session IV**
  - Analysis — Environmental Impacts (rm: Wilson B)
  - Analysis — International Hydrogen Perspective (rm: Coolidge)
  - Demonstrations — Hydrogen and CNG with ICES (rm: Wilson A)
  - Demonstrations — Renewable Production Demonstrations (rm: Cotillion South)
  - Idea Forum — Implementing Global Technical Regulations (rm: Wilson C)
  - Production — Novel Hydrogen Production (rm: Harding)
  - Production — Solar Production (rm: Cotillion North)

### Friday, April 1, 2005

<table>
<thead>
<tr>
<th>Time</th>
<th>Event Details</th>
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<tbody>
<tr>
<td>8:30 AM – 9:15 AM</td>
<td>Plenary IV</td>
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<tr>
<td>9:30 AM – 10:45 AM</td>
<td>Plenary V</td>
</tr>
<tr>
<td>10:45 AM – 11:45 AM</td>
<td>Idea Forum Conclusions</td>
</tr>
<tr>
<td>11:45 AM – NOON</td>
<td>Closing Remarks and Raffle</td>
</tr>
<tr>
<td>1:00 PM – 4:00 PM</td>
<td>Interagency Hydrogen R&amp;D Task Force SBIR/STTR Workshop</td>
</tr>
</tbody>
</table>

### Event Details

- **Idea Forum Conclusions**
  - Moderator: Jeffrey A. Serfass, National Hydrogen Association
  - Ideas will be presented from the collective wisdom of forum participants addressing issues surrounding hydrogen implementation.
11th Annual Clean Cities Conference & Exposition

Guiding Transitions: From Alternative Fuels to Fuel Cells

www.afvi.org/palmsprings/
FOLLOW US TO THE FUTURE
AT HYDROGEN EXPO USA 2005
MARCH 30—APRIL 1

RIDE & DRIVE
MARCH 30, 12:30—2:00 PM
MARCH 31, 2:00—3:30 PM

TOYOTA

www.toyota.com/environment