



EDI News

Archived News and Events

FIRST COMPACT, INLINE, TRIPLE-FUNCTION, PLUG-IN VEHICLE DRIVETRAIN LAUNCHED BY EDI

The All-In-One Drivetrain Functions in Two Hybrid and Two Pure Electric Modes

PALO ALTO, Calif., November, 19, 2012 – Efficient Drivetrains, Inc. (EDI), a global leader in advanced, high-efficiency PHEV and CVT solutions, today announced it has completed the development and initial functional testing of the world's first Parallel-Series-Electric powertrain system that is less complex, more efficient, less costly, and lighter than the competition.

The new EDI drivetrain, which incorporates components from GM, A123, and UQM, was integrated into a light-duty GM pickup truck to create the demonstrator vehicle. The drivetrain, which is scalable to light, medium, and heavy-duty applications, utilizes no power split gears and features special clutching



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systems.

EDI designed the drivetrain in an inline form factor to make it highly adaptable to existing front engine, rear wheel drive vehicles, reducing the need to make significant changes to existing vehicle designs.

"For manufacturers and consumers alike, this is the most adaptable automatic vehicle drivetrain in the world, and the vehicle has performed extremely well in initial testing," said Joerg Ferchau, Co-founder and CEO of EDI. "It's scalable, less complex, and lighter than the competition. When conditions warrant, it can operate as either a pure EV for trips around the neighborhood, or as a Series Hybrid, optimum for stop-and-go city traffic conditions, or as an efficient Parallel Hybrid that is ideal for the highway. It also features an EV+ Mode for hill climbing and added acceleration."

EDI has created a new, second-generation PHEV concept. It has higher overall efficiency than its predecessors, featuring a larger battery pack and a motor system that incorporates fewer parts and smaller, more efficient gasoline/bio-fuel engines. To further increase efficiency, an EDI Turbo-generator system can make it the most efficient powertrain in the world, for a given power.

"We've taken a lot of complexity out of the PHEV side of the equation," said Professor Andy Frank, Co-founder and CTO of EDI. "And because it has an Inline form factor it is highly adaptable to existing front engine, rear wheel drive vehicles, thus reducing the need for significant existing vehicle design changes."

The drivetrain has been in development since early 2011. The concept leverages EDI IP in the area of hybrid drivetrain design and controls, and has also generated new IP, which will be covered in several new patent applications. Vehicle product testing and refinement will continue over the next quarter.

"This is the simplest, most elegant, most efficient design possible to capture the three basic modes of vehicle operation," said Ken Baker, CEO of TechBroker LLC, EDI Advisory Board member, and GM EV-1 creator. "This goes a long way to proving EDI and their technology as a viable option for industry, as well as commercial partners."

EDI will soon announce its first commercial contract to implement the system into a full size, heavy-duty bus project in China, and is also in discussions with multiple OEM truck manufacturers and upfitters at the current time.

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About EDI:

Efficient Drivetrains, Inc. (EDI) develops and markets a range of state-of-the-art proprietary drivetrain products and technologies that have direct application in PHEVs, HEVs, and BEVs worldwide. EDI's leading edge hybrid electric drivetrain systems and technologies provide significant cost and efficiency advantages for parallel and series hybrid drivetrain architectures across nearly all platform classes and configurations. In addition, EDI has developed a game-changing technology for new types of continuously variable transmissions (CVT) that are the most efficient and largest capacity transmissions of their type in the industry today. EDI is currently active in automotive projects throughout North America and the APAC region. More information about EDI is available at <http://www.efficientdrivetrains.com>.

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SOURCE: Efficient Drivetrains, Inc. (EDI)

EDI Triples Size of PHEV and CVT Development Center Increased Number of Projects Drives Staff and Facilities Expansion

PALO ALTO, CA, Aug 07, 2012 Efficient Drivetrains, Inc. (EDI), a global leader in advanced, high-efficiency PHEV and CVT solutions, today announced it has expanded its Dixon, CA Research, Development & Demonstrations Center to accommodate an expanding staff and number of projects for 2012.

A second Dixon development facility will be used to house new projects, test equipment, and demonstration gear for EDI's continuously variable transmission (CVT) systems and drivetrains. The expansion will also provide the space needed for the construction of a series of vehicles being designed for global market opportunities.

"EDI has enjoyed a strong working relationship with the City of Dixon," said Joerg Ferchau, CEO of EDI. "They have supported and believed in us since our start-up days back in 2008, and we are excited about opening a second center here. This will accommodate our growing engineering unit, which has doubled in size."

By tripling the facility size and expanding the R&D team, EDI is well prepared to support new market and customer opportunities. This follows closely on the heels of the opening of the EDI New Energy Automotive Technology Company (EDI NEAT), located in Wuxi, China, where EDI is working closely with government and auto manufacturers following the China Government's mandate to manufacture New Energy Vehicles (NEVs) that will use electricity instead of gasoline and Diesel.

The additional workspace and personnel in Dixon will give EDI the capacity to complete development programs and pursue customer opportunities through several new programs. The company is currently developing hybrid drivetrain systems, new drivetrain software and components, next generation continuously variable transmissions, and conducting ongoing New Energy Vehicle research.

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SOURCE: Efficient Drivetrains, Inc. (EDI)

EDI GOES GLOBAL; NOW OPEN FOR BUSINESS IN CHINA

PALO ALTO, Calif., June. 14, 2012 – Efficient Drivetrains, Inc. (EDI), a global leader in advanced, high-efficiency PHEV, BEVs, HEVs, and CVT solutions, today announced that it has completed the registration and initial capitalization effort for its China venture, EDI New Energy Automotive Technology Company (NEAT), located in Wuxi, China—the first part of a multi-phase plan to expand globally. An official opening of the EDI NEAT office is planned for later this year.

"Wuxi was the logical first step in our global expansion," said Joerg Ferchau, CEO of EDI. "First, because China is second only to the United States as the largest source of new technology auto industry research and development. Second, because the Wuxi Government's '530' Plan to attract advanced, high-tech overseas entrepreneurial businesses to the city made it a very attractive proposition." EDI views its presence in China as a key component of its global strategy, Ferchau added.

EDI has developed leading edge hybrid electric drivetrain systems and technologies that provide significant cost and efficiency advantages for parallel and series hybrid drivetrain architectures across nearly all platform classes and configurations, as well as game-changing technology for new types of continuously variable transmissions (CVT) that are the most efficient and largest capacity transmissions of their type in the industry today.

China, one of the most advanced countries in the world in the drive to reduce dependence on fossil fuels, has as a main objective to reduce imported oil to zero, and get off of coal in a period of 25 years. As part of their drive they have mandated the manufacture of New Energy Vehicles (NEVs) that will use electricity instead of gasoline and Diesel.

EDI has received backing for this venture from Silicon Valley China Venture Management LLC (SVC). SVC helped EDI secure the backing of the Wuxi Government, and has provided EDI with funding.

"With the rapid rise of China as a major force in NEVs, EDI and SVC have been very active in considering ways to partner and engage with China's automotive research and development

community," said Winston Xu, President of SVC. "We are extremely pleased with this latest development."

EDI and new NEAT personnel will promote EDI NEAT products and services to Chinese automotive companies, engineers in universities, and government-sponsored automotive research institutes. "One goal is to increase the number of automotive engineers in China who know of our advanced NEV technologies," said Professor Andrew Frank, CTO of EDI. "We want to help support important research in related automotive fields that is taking place in China."

In other news, EDI has announced the expansion of its Research, Development & Demonstrations Center in Dixon, California to accommodate an expanding staff and number of projects for 2012.

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SOURCE: Efficient Drivetrains, Inc. (EDI)

KENNETH R. BAKER, ELECTRIC VEHICLE EXPERT, JOINS EDI BOARD OF ADVISORS

PALO ALTO, Calif., March 30, 2012 – Efficient Drivetrains, Inc. (EDI), a global leader in advanced,

high-efficiency PHEV and CVT solutions, today announced that Kenneth R. Baker, President and Chief Executive Officer of TechBroker LLC, joined its Board of Advisors.

Mr. Baker has had a four-decade career in the automotive industry, where he has become a well-known expert on transportation electrification. He is perhaps best known as the 'father' of the EV-1, General Motors' groundbreaking all-electric vehicle. Mr. Baker was also recognized by A.D. Little as one of the leading research executives in the world, and by Ernst and Young as a finalist in the Entrepreneur of the Year competition.

"I am extremely excited to join the exceptional team at EDI," Mr. Baker stated. "As an innovator and leader in the development of electric drivetrain technology, as well as its transformative work with CVTs, EDI has enviable business prospects and is poised to make a significant impact on electric vehicle development," added Baker.

"It's great to have Ken on the Board. He's a pioneer in this industry, and we couldn't be more pleased," said Joerg Ferchau, CEO of EDI. "He'll be an invaluable addition to EDI as we expand globally."

Mr. Baker joins Advisors Felix Kramer, founder of the California Cars Initiative, and Lawrence G. Norris, a well-known high-tech patent attorney and intellectual property expert.

In addition to his role with TechBroker LLC, an independent technology broker in the areas of alternative energy and advanced transportation, Mr. Baker served as President and CEO of the Altarum Institute, a not-for-profit research institution from 1999 through 2007, was founding Chairman of the United States Advanced Battery Consortium, and served in a variety of engineering, research and executive management positions with General Motors Corporation, including Program Manager of the Electrovette and EV1 programs, Vice President of Global Research and Development, and Vice President/General Manager of its Distributed Energy business venture. Mr. Baker is on the boards of directors of AeroVironment and Ener1, Inc., serves on the Board of Advisors of Gridpoint, Inc., and is an internationally recognized consultant on business strategy for transportation electrification. Mr. Baker has a B.S. in mechanical engineering from Clarkson University.

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products and technologies that have direct application in PHEVs, HEVs, and BEVs worldwide. EDI's leading edge hybrid electric drivetrain systems and technologies provide significant cost and efficiency advantages for parallel and series hybrid drivetrain architectures across nearly all platform classes and configurations. In addition, EDI has developed a game-changing technology for new types of continuously variable transmissions (CVT) that are the most efficient and largest capacity transmissions of their type in the industry today. EDI is currently active in automotive projects throughout North America and the APAC region. More information about EDI is available at <http://www.efficientdrivetrains.com>.

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SOURCE: Efficient Drivetrains, Inc. (EDI)

EDI OPENS FOREIGN INVESTMENT ENTERPRISE OFFICE IN WUXI, CHINA

PALO ALTO, Calif., Feb. 22, 2012 – Efficient Drivetrains, Inc. (EDI), a global leader in advanced, high-efficiency PHEV and CVT solutions, today announced its continued expansion into China with the opening of an office in Wuxi, last December. Once final approval is obtained from China's Bureau of Industry & Commerce, the office will serve as EDI's base of operations for China sales and business development, technical support, and future development.

"We're about half way through the approval process," said Joerg Ferchau, CEO of EDI. "Our office opened last month, and is busy working on obtaining company registration from the Bureau of Industry & Commerce. We're expecting full operations to begin in the first quarter of this year."

One of a number of EDI ventures in China, this foray is driven by a relationship with Silicon Valley China Venture Management LLC (SVC). SVC targets and invests in promising U.S.-based technology companies with significant untapped market potential in China, and provides a range of support to its portfolio companies, helping them enter the Chinese market and expand their presence, to ultimately

enhance their liquidity options.

SVC helped EDI secure the backing of the Wuxi Government through the Wuxi '530' Plan. The '530' Plan is a program to attract advanced, high-tech overseas entrepreneurial businesses to the city, helping to solidify the city's brand as a leader in scientific and innovative economic development.

SVC has provided EDI with the first \$1 Million in funding that will help back the first phase of EDI's road map to establish operations in Wuxi, and help pave the way for EDI's further expansion into the China market. In addition, the Wuxi '530' Plan will introduce EDI to local grant opportunities and provide other local support. The Wuxi Government will also play a role in assisting EDI form Joint Ventures (JVs) with major Chinese auto industry enterprises. EDI's first plan is to raise enough funds to finance a range of activities to attract JV partners.

Some of EDI's other business in the China market includes working with Ankai Bus on a project to jointly develop a plug-in hybrid electric bus, and a partnership with Envirotek, working on an engine and vehicle development project.

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SOURCE: Efficient Drivetrains, Inc. (EDI)

EFFICIENT DRIVETRAINS AND TOYOTA MOTOR CORP. REACH AGREEMENT ON PENDING PATENT LITIGATION

PALO ALTO, Calif., Feb. 21, 2012 – Efficient Drivetrains, Inc. (EDI), a global leader in advanced, high-efficiency HEV, PHEV, and CVT solutions, today announced that EDI and Toyota Motor Corp. (Toyota) have resolved a dispute regarding a portfolio of patents owned by the University of California (UC), which originates from the work of Dr. Andrew A. Frank, Ph. D., at the University of California-Davis (the Frank/UC Portfolio).

Dr. Frank is a co-founder of EDI, the exclusive licensee to the Frank/UC Portfolio.

On July 20, 2011, Toyota filed a federal declaratory judgment action against EDI in San Jose, California, seeking certain relief regarding the Frank/UC Portfolio, styled as Toyota Motor Corp. v. Efficient Drivetrains Inc. and the Regents of the University of California, File No. 11-cv-03570. That case has now been voluntarily dismissed in view of the settlement.

The terms of the agreement are confidential, but it includes an amicable resolution of all disputes related to the Frank/UC Patent Portfolio, and provides Toyota with freedom to operate.

"EDI is happy that this case has now been resolved," said Joerg Ferchau, CEO of EDI. "We look forward to continuing our work in the green vehicle industry. We are excited about the future of fuel-efficient technologies."

EDI is represented by Jan Conlin, Matthew Woods, and Peter Surdo of Robins, Kaplan, Miller & Ciresi L.L.P.

About EDI:

Efficient Drivetrains, Inc. (EDI) develops and markets a range of state-of-the-art proprietary drivetrain products and technologies that have direct application in PHEVs, HEVs, and BEVs worldwide. EDI and Professor Frank have developed leading edge hybrid electric drivetrain systems and technologies providing significant cost and efficiency advantages for parallel and series hybrid drivetrain architectures across nearly all platform classes and configurations. In addition, EDI has developed a

game-changing technology for new types of continuously variable transmissions (CVT) that are the most efficient and largest capacity transmissions of their type in the industry today, including patents directed to charge depletion control, fuel consumption control, CVT technology, and turbocharger generation. Dr. Frank has been referred to as the "father of the modern plug-in hybrid electric vehicle." EDI is currently active in automotive projects throughout North America and the APAC region. More information about EDI is available at <http://www.efficientdrivetrains.com>.

About Robins, Kaplan, Miller & Ciresi L.L.P.

Robins, Kaplan, Miller & Ciresi L.L.P. (www.rkmc.com) is one of the top trial firms in the country. The firm represents some of the world's largest companies, most innovative start-ups, and individuals. Robins, Kaplan, Miller & Ciresi L.L.P. is frequently engaged in high-stakes, complex litigation with significant bottom-line implications for their clients. The Intellectual Property Litigation Group is the largest practice group and includes over 100 lawyers and ten Ph.D. Science Advisors. In 2009, Law360 ranked the firm in the top 5 list of general practice firms with the largest IP practice in the United States. In 2004, The American Lawyer named the firm the "IP Litigation Department of the Year" for 2003. The firm has more than 250 lawyers located in Atlanta, Boston, Los Angeles, Minneapolis, New York and Naples (FL).

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SOURCE: Efficient Drivetrains, Inc. (EDI)

EDI and Silicon Valley China Venture Management, August 2011

Efficient Drivetrains Partners With Silicon Valley China Venture Management Securing WUXI Government Backing for Operations

PALO ALTO, Calif., Aug. 31, 2011 – Efficient Drivetrains, Inc. (EDI), a global leader in advanced, high-efficiency PHEV and CVT solutions, today announced its formal agreement with Silicon Valley China Venture Management LLC (SVC) to invest in and assist EDI expand its presence in China. EDI's highly

unique and advanced hybrid electric vehicle technologies will help Chinese companies leap frog long, costly technology development timelines to quickly provide globally competitive, sustainable vehicles.

SVC targets and invests in promising U.S.-based technology companies with significant untapped market potential in China, and provides a range of support to its portfolio companies, helping them enter the Chinese market and expanding their market presence, to ultimately enhance their liquidity options.

EDI also announced that SVC has helped EDI secure the backing of the Wuxi Government through the Wuxi '530' Plan. The '530' Plan is a program to attract advanced, high-tech overseas entrepreneurial businesses to the city, helping to solidify the city's brand as a leader in scientific and innovative economic development.

"China, as the world's largest producer of passenger cars and commercial vehicles combined, recognizes the energy saving and environmental benefits of transitioning its vehicle manufacturing industry to PHEV and Electric propulsion," said Joerg Ferchau, CEO of EDI. "And with great foresight, SVC and the Wuxi Government have seen the tremendous upside of becoming change agents toward reaching that goal. We are proud to be included in their plans."

SVC has provided EDI with the first \$1 Million in funding of a larger financial commitment that will help back the first phase of EDI's road map to establish operations in Wuxi, and further expansion into the China market. In addition, the Wuxi '530' Plan will introduce EDI to local grant opportunities and provide other local support. The Wuxi Government will also play a role in assisting EDI form Joint Ventures (JVs) with major Chinese auto industry enterprises. EDI's first plan is to raise enough funds to finance a range of activities to attract JV partners.

"An SVC mandate is to invest in and introduce to China the most promising emerging energy technology companies that we believe have the ability to support China's growing technology base," said Winston Xu, President of SVC. "We see great potential for success in introducing EDI's highly innovative technology to the domestic China vehicle industry, and we have been backed in that assessment by the government of Wuxi."

EDI is currently doing other business in the China market. They are working with Ankai Bus on a

project to jointly develop a plug-in hybrid electric bus, and they are in partnership with Envirotek, working on an engine and vehicle development project.

"According to the latest Ernst & Young Alternative Powertrain survey in 2010, China demonstrates the strongest interest by far in new vehicle technologies with 60% of respondents showing a strong interest in purchasing a PHEV or EV — nearly five times that of the US, Germany, UK and Japan..." said Professor Andrew Frank, EDI's CTO. "We couldn't be more pleased to collaborate with some of the country's top manufacturers and government entities as we believe China represents a great market opportunity for EDI."

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About SVC:

SVC generates superior returns by targeting promising U.S.-based technology companies with significant un-tapped market potential in China, and then providing support to enter the China market and mitigate the risks associated with operating in China. SVC invests in U.S. companies specializing in the development of semiconductors and semiconductor-related innovation, new energy technology, and information technology. SVC is invested in NeuroSky, Consensic, CalSys, Kinetic, EDI, ApaceWave and Cadeka Microcircuits. Founded in 2009, its main office is located in San Jose, CA, with offices in both Shanghai and Wuxi, China. For more information, call Winston Xu at +1-408-573-6200.

About Wuxi '530' Plan

The Wuxi '530' Plan was developed by the city of Wuxi, which was designated in 2008 as one of

China's Five National High-tech Zones. The city implemented the Plan in 2006 to specialize in incubating talent and businesses specializing in the areas of science and technology innovation. The '530' Plan attracts both foreign educated Chinese nationals to return to work in Wuxi's High-tech industries, and also attracts advanced, high-tech overseas entrepreneurial businesses to set up start-up operations in Wuxi. The '530' Plan targets talent and businesses specializing in environmental protection, new energy, bio-technology, and other related fields. For more information, visit: <http://en.wuxi.gov.cn/web1111/Events/530Plan/530ServiceCenter/898346.shtml>.

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SOURCE Efficient Drivetrains, Inc. (EDI)

ETET EDI Dec 2010

EnviroTek & Efficient Drivetrains Join Forces: "Smart Power" Engines with Hybrid Drivetrains December 15, 2010

EnviroTek Engine Technologies (ETET) has entered into an agreement to supply Efficient Drivetrains, Inc. (EDI) with a family of advanced engines to provide the needed Smart Power in EDI's modular hybrid drivetrains. An agreement has also been reached to supply a family of Smart Power engines for inclusion in EDI's state-of-the-art hybrid drivetrains developed for global use.

EnviroTek will begin supplying engines to EDI in the next 90 days for inclusion into prototype vehicles - the forerunners of the drive systems for production vehicles. The EVT-90 engine is a mere 9.5 inches

wide, the most suitable engine for transverse mount drivetrains of most vehicles, including minivans and trucks. Although compact, the EVT-90 family of engines supply an impressive range of horsepower and torque, ranging from 75 to 200 horsepower, while delivering high mileage and low emissions. The mileage is anticipated to reach 100 miles per gallon in some configurations.

These advanced systems are comprised of numerous modules, and are matched based on the size of the vehicle and the power required. In order to maximize the available space for such a system, the engine was designed to be both compact and powerful, coupled with a flexible modular system capable of handling a wide range of vehicles and applications.

For more information:

ETET: Margaret Baggerly: Margaret@etet.com

EDI: Jeanne Cox: jcox@efficientdrivetrains.com

[Download PDF here](#)

EVT-90 Smart Power Engine Debut

EVT90 "Smart Power" Engine Drive Train wows VIPs at the International Industry Fair SHANGHAI, China

Under the roof of the beautiful Shanghai New International Expo Centre, [EnviroTek Engine Technologies](#) (ETET) and Efficient Drivetrains Inc. (EDI) wowed guests and VIPS at their booth and press conference with the debut of the EVT90 "Smart Power" Engine Drive Train. The drive train utilized EnviroTek's EVT90 one liter engine mated to a 40kw motor to deliver the first green hybrid Porsche Speedster. This unique drive train will be coupled with an EDI hybrid drive train and CVT (Constantly Variable Transmission) to power a number of small and medium sized future vehicles. This configuration results in a small and ultra clean fuel-efficient drive system that will allow auto companies to meet and surpass their future emission and mileage requirements. The two companies, in conjunction with Green Auto Technologies (GAT), a "new energy" vehicle technology firm, displayed the first of a future line of products using a mild hybrid drive train installed in a Porsche Speedster.

This revolutionary system is a powerful small package that is not available in any other hybrid drive system. The compact size will allow manufacturers to easily install the system in their vehicles within a space that would normally house only the internal combustion engine. In a small vehicle this configuration achieves an impressive 100 mpg fuel economy. [Download PDF here](#)

Headline: September 28, 2010: AMP's Mystery Partner; O'Dell Surveys The Conversion Scene; Birthday News

HAPPY BIRTHDAY TO ANDY FRANK: This year he'll get quite a birthday present. Often described as "the father of the modern plug-in hybrid," Andy has spent more than half his life imagining, designing, prototyping, and educating about PHEVs. He's travelled the world, usually on his own dollar, promoting the concept to automakers, suppliers, and governments. His continuously variable transmission technology has attracted much attention, and some of his dozens of patents have been described as fundamental. It's been said that "Andy has been working on plug-ins so long, he's solved problems others don't even know exist." For decades, he's been on the Mechanical and Aeronautical Engineering faculty at the [University of California at Davis](#). His award-winning "Team Fate" retrofit projects under the Future Car, Future Truck and Challenge X programs showed the potential of PHEVs. His program's graduates play important roles in the auto and utility industries. A few years ago he co-founded and became chief technologist at Efficient Drivetrains Inc. to advance these technologies. [Read more](#)

Headline: August 31, 2010: Electric Car Infrastructure

With all of the focus on the next generation of cars powered by electricity, is enough attention being paid to the infrastructure needed to keep them on the road? **BNN** finds out with engineering professor **Andrew Frank** of the University of California, Davis, who is considered by many to be the 'godfather' of plug-in cars. [See more](#)

Efficient Drivetrain (EDI) at the 2010 Plug-in conference

"**Joerg Ferchau, CEO of EDI** talked to Driving the Nation at the 2010 Plug-in conference in San Jose, CA., about how **EDI** makes transmissions more efficient with better power-to-weight ratios. Most car companies don't include CVTs in their battery electric vehicles, so **EDI** is looking to educate potential customers on the benefits of doing so. Listen in to see how much better mileage you could get with this technology. [See more.](#)

Energy Independence in 15 Years?

Not only is it possible, says Professor Frank, who teaches in the Department of Aeronautical and Mechanical Engineering at UC Davis, but it's simple. All we need is free level 1 charging - the kind you get from a standard household plug. That and a fleet of plug-in hybrid cars equipped with bi-directional chargers that can cycle power between the cars' batteries and the electric grid, in order to level the renewable power supply that we'll be getting.

Frank has an economic interest in making plug-in hybrids successful because he holds patents on the technology - he's co-founded a company in Palo Alto called Efficient Drivetrains Inc. and has been working on plug-in hybrids for 30 years.

"If we took the production of the Chevy Volt and sold it to Hawaii, in 15 years we'd have enough plug-in hybrids to store energy from wind and get the entire state off fossil fuels entirely" he said last month at an electric car conference in San Jose.

Here's how he'd do it.

Consider the island of Hawaii, where nearly 90 percent of electricity comes from petroleum. Make all cars plug-in hybrids (UC Davis's PHEV Center has been converting gas-fueled cars to plug-ins for years) and plug the cars in whenever they're not being used - about 21 hours a day.

The average car in Hawaii drives about 20 miles a day and would need about 10 kilowatt-hours of electricity, Frank figures, which it could get from a standard electrical plug in about six hours.

Plugs would be everywhere, and charging your car would be free. Frank points out that the Bay Area Rapid Transit system (BART), for instance, would incur no cost by letting commuters charge 3,500 cars in its parking lot and could even save \$1.5 million per year, based on the amount of power it pays for now.

That's because BART has to predict its electrical loads and pay for them ahead of time, and it tends to overestimate what it needs so it doesn't run out, he says.

Then make sure that the electricity is generated from renewable energy - in Hawaii, that would be wind. (Frank calculates how many wind turbines would have to be built in Hawaii to accomplish this in 15 years).

Since wind and solar power vary with weather and time of day, use the plugged-in cars' batteries to store energy for the grid and level the power supply. Cycle energy between the batteries and the grid by using a bidirectional charger that can convert stored energy from the batteries (DC) into AC energy and vice versa. If the cars need extra range, run them on biofuels instead of gasoline.

Frank figures that a typical home would have two hybrids - one short range and one longer range. One car could be charging at home while the other car charges at work.

"These vehicles can be integrated into the existing vehicle fleet a year at a time, or continuously over a 15-year period," Frank writes in a white paper he's published on this scheme. **"...the public would not replace an existing vehicle until it is worn out, which is about 15 years. This rollout period for the plug-in hybrid replacing the entire fleet in a 15-year period is reasonable due to the buying habits of the public and the life of the cars."**

Convinced? It could work if we were all willing to forgo trading in our cars for new models! Frank's paper is not online, but if you want to see his calculations, you may be able to get the paper [here](#).

Reference Article:

<http://www.smartplanet.com/technology/blog/thinking-tech/energy-independence-in-15-years/4890/>

Ankai Automobile Developing Plug-in Hybrid Bus for US

June 23rd 2010

The state-owned Chinese vehicle maker Ankai Automobile Co. Ltd. is developing a plug-in hybrid electric bus for the US market. Ankai is China's third-largest bus company; it has partnered since 1993 with Daimler Buses, producing Setra brand buses under license for the Chinese market.

Ankai is working with Efficient Drivetrains Inc. (EDI) in Palo Alto, CA to develop the plug-in hybrid's drive train. EDI was co-founded by Professor Andy Frank at UC Davis, to commercialize plug-in vehicle drivetrain components developed at UC Davis. The technology draws mainly on decades of work by Andy Frank, professor of mechanical and aeronautical engineering at UC Davis.

EDI was founded in 2006 to commercialize Frank's technology. The company plans to partner with auto designers and manufacturers so that they can rapidly introduce advanced plug-in hybrid technology into their vehicles. The company also hopes to establish its own automotive research and development center in Davis, said Joerg Ferchau, the company's chief executive officer.

The licensing package also includes an intelligent, continuously variable transmission that automatically selects the right power ratio and eliminates gear shifting.

Frank has been working on developing fuel-efficient vehicles for more than 30 years. He advises a team of UC Davis students that has designed and built a series of award-winning vehicles to take part in the Futurecar, Futuretruck and ChallengeX competitions, sponsored by the US Department of Energy and leading companies in the auto industry.

Reference Articles:

<http://www.busworld.org/news/article/940>

http://www.chinabuses.org/news/2010/0623/article_3352.html

<http://www.globalatlanta.com/article/23978/>

Taken from Siemens AG, Pictures of the Future, The Magazine for Research and Innovation | Spring 2010.

From Concepts to Companies Siemens' Technology-to-Business Centers are providing support to a range of young companies. On tap are energy-savvy LEDs capable of outshining metal halide lamps, PV panels that use one tenth the silicon of conventional models, battery-powered vehicle detection systems that last ten years, and an ultra-efficient transmission.

EDI: MORE POWER FOR HYBRID VEHICLES

Professor Andy Frank's laboratory in Dixon, California looks a lot like the kind of place you'd take your car for a tune up. But the people who are driving in for service are not looking for spark plugs or an oil change, but rather to get an entire industry on the road. Otherwise known as "the father of the plug-in hybrid electric vehicle" (see [Pictures of the Future, Spring 2008](#), page 22) Frank, who is Director of Hybrid Vehicle Research at the University of California-Davis and founder of Efficient Drivetrains, Inc.

(EDI), has put together a test vehicle whose fuel economy is 80 percent better than that of a comparable conventional vehicle. It is also capable of operating all-electrically for about 70 km without using any liquid fuel. "As a result," says Frank, "with gasoline priced at roughly \$3.00 per gallon and electricity at about 10 cents per kilowatt-hour, a typical user would pay about 75 cents per gallon-equivalent when operating our vehicle electrically." Behind EDI's results is a continuously variable transmission (CVT) protected by multiple patents that is smaller, lighter, and considerably more efficient – 96 percent – than any other CVT or automatic transmission. Part of the reason for this is that EDI's CVT uses only 60 parts, compared to up to 2000 parts in a conventional 7 to 8 speed transmission; the other is that it is based on a patented chain from a European partner that transfers power with extreme efficiency from the motor (be it electric or conventional) to the rest of the drive train.

"An average automatic or manual transmission will have five to seven speeds," says Frank. "But ours has an infinite number of gearing ratios." He explains that this is particularly important for hybrid vehicles "because electric motors are designed to operate at high torques and speeds. But by adding a transmission, you expand the torque-speed range, meaning that the motor can operate at maximum efficiency across a much wider spectrum of load conditions." Working closely with Siemens' Technology-to-Business Center in Berkeley and with Siemens' Drive Technologies Division, EDI has steadily harmonized its transmission to become an integral part of a drivetrain for hybrid and electric vehicles that can be easily scaled up or down in size depending on a manufacturer's requirements.

“We expect that our collective research will result in a Siemens electric motor and EDI continuous variable transmission that can be sold as one, integrated package,” says EDI CEO Joerg Ferchau.

“We estimate that our package will cost one third less than a motor and a conventional transmission in hybrids and electric vehicles.” Although applicable to the automotivemarket, EDI’s technology is initially being focused on the needs of the light- medium- and heavy-duty hybrid commercial vehicle market, which includes everything from delivery trucks and airport shuttle vans to hybrid buses and excavators. “Our CVT is rated at 220 kW, which makes it one of the biggest around. But it can easily be scaled up to 1,000 kW,” says Frank.

[Download full PDF here:](#)

http://www.siemens.com/innovation/pool/en/publikationen/publications_pof/pof_spring_2010/pof-1-2010-e-doppel.pdf

EDI ENTERS INTO \$150K BUSINESS LOAN AGREEMENT WITH THE CITY OF DIXON, CA

DIXON, Calif., February 6, 2009 - At a new facility ribbon cutting ceremony here today, Efficient Drivetrains, Inc. (EDI), a Silicon Valley-based PHEV (Plug-In Hybrid Electric Vehicle) and EV (Electric Vehicle) technology provider, announced it has entered into a \$150 thousand business loan agreement with the City of Dixon, through the city's Community Development Block Grant Program (CDBG).

EDI is headquartered in Palo Alto, but this loan will be used exclusively to set up and run the company's technology research and development center, which will be located here in Dixon.

"We are so pleased to have found a community in which to locate that brings together such wide-ranging strengths," said Joerg Ferchau, chief executive officer of EDI. "Not only is Dixon 'green conscious,' which was a big plus for us, but you are strategically located within easy reach of major business and learning centers, and provide easy access to a transportation. We couldn't be more pleased to be a part of your community."

The foundation of EDI’s offerings includes significant concepts and technologies developed through

several generations of vehicle design by Professor Andy Frank, who is credited as being the "Father of the PHEV." Professor Frank has spent over 30 years developing breakthrough vehicle technology, much of it as professor of Aeronautical and Mechanical Engineering at neighboring U.C. Davis. The company's intellectual property assets also include a licensing agreement for the related patents from the University of California, Davis.

"We hope to help Dixon carve out a little larger space on the map, as we also help to expand the concepts behind green vehicles around the world," said Professor Andy Frank, founder and chief technology officer of EDI. And for many reasons, we couldn't have a better community from which to do it, but I am most pleased that access to some of the best engineering minds couldn't be better."

"The Dixon business community is very excited that EDI has chosen Dixon as the home for its technology research and development center for hybrid electric vehicles," said City of Dixon Mayor Jack Batchelor, Jr. "This company's products will bring forth a new breed of vehicles that will significantly reduce carbon emissions and provide clean and efficient transportation, while providing local employment."

The loan is subject to the Dixon Revolving Business Loan Fund Guidelines. The funds will be used for securing working capital, and purchasing machinery and equipment for the business, which is in a 3,600 ft. leased facility located at 1150 Business Center Drive, and a part of the Central Dixon Redevelopment Area.

"The City of Dixon is excited about the business expansion and quality technology jobs associated with EDI," said Mark Heckey, Economic Development Director for the City of Dixon. "We look forward to their success and future expansion of Dixon's role in the movement towards the new Green Technology Industrial Sector."

About EDI

Efficient Drivetrains, Inc. (EDI) is a pioneer and leader in the development and commercialization of advanced Plug-In Hybrid Electric Vehicle (PHEV) technologies that will radically displace liquid fuels with cheaper, more environmentally friendly electricity. EDI's wide range of proprietary solutions and technologies has direct applications in PHEVs, Hybrids, and Electric Vehicles (EV), across nearly all

platform classes and configurations. Its Patent Portfolio includes new patents, as well as an exclusive licensing arrangement with UC Davis for the University's related broad patent portfolio. With headquarters in Palo Alto, CA, EDI has an R&D center located in Dixon, CA. For more information, visit <http://www.efficientdrivetrains.com>.

Efficient Drivetrains is a member of the Dixon Chamber.

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SOURCE Efficient Drivetrains, Inc.

EDI COMMERCIALIZES UNIQUE RANGE OF ADVANCED PLUG-IN HYBRID AND ELECTRIC VEHICLE PRODUCTS, TECHNOLOGIES, AND SERVICES

Technology Offers Global Automotive Industry Significant Competitive Advantages to Develop Most Efficient, Most Affordable, and Fast-Time-to-Market Plug-in Hybrid Electric Vehicles

Offers Consumers the Ability to Average over 100 MPG for a Specified Distance or Provide an Extended All Electric Range, Reducing Fuel Consumption and Emissions by up to 90%

PALO ALTO, Calif., December 2, 2008 -- Efficient Drivetrains, Inc. (EDI), a Silicon Valley-based PHEV (Plug-In Hybrid Electric Vehicle) and Electric Vehicle (EV) technology provider, is offering its products and services to the global automotive industry.

At the center of EDI's PHEV architecture and design approach is the ability to create vehicles that can radically displace gasoline with much cheaper and environmentally friendly electricity, but with the same range, performance, and level of affordability that consumers are currently accustomed to.

EDI is offering a wide range of innovative drivetrain solutions and technologies that have direct

applications in PHEV vehicles, Hybrids, and Electric Vehicles (EVs), across nearly all platform classes and configurations, such as light-, medium-, heavy-duty, 2WD and 4WD, and two-and-three wheel applications.

The foundation of EDI's solutions include significant concepts and technologies developed through several generations of vehicle design by Professor Andy Frank, who is credited as being the "Father of the Plug-In Hybrid Electric Vehicle. Professor Frank has spent over 30 years developing breakthrough vehicle technology, much of it as professor of Aeronautical and Mechanical Engineering at U.C. Davis. He holds world records in fuel economy, has designed nine generations of PHEVs, is a four-time winner of USDOE Advanced Vehicle Design competitions, holds over 30 patents, and is recognized by Congress. The company's intellectual property assets also include an exclusive licensing agreement for the related patents from the University of California, Davis.

"The automotive industry is being driven to develop environmentally friendly vehicles by major forces like fuel costs and the environmental call for reduced emissions," said Dr. Frank, co-founder and chief technology officer of EDI. "I've studied this area for years, and other green vehicle approaches just can't address these problems in the significant way that the PHEV can. They require either great technological advances and/or infrastructure development, or they can't offer the features needed to do the job completely."

EDI's solutions include PHEV drivetrain development, software and controllers, high efficiency transmissions, and other critical drivetrain components. In addition, in partnership with select providers, EDI offers battery modules and integrated electric motors in order to be able to provide a complete end-to-end design. These solutions have direct applications with vehicle design firms and manufacturers, OEM producers, systems and component suppliers, conversion companies, and government and military contractors located in all geographies.

"EDI's technology significantly raises the industry bar with more sophisticated solutions that allow consumers to reap the maximum benefit of the PHEV, but with a greater degree of affordability," said Joerg Ferchau, chief executive officer of EDI. "Our aim is to market EDI's products and solutions to vehicle designers and manufacturers to empower them with competitive advantages, decreased development costs, and faster time to market, as well as providing access to enabling intellectual property. We plan to collaborate with vehicle companies worldwide."

EDI's primary PHEV solutions support both parallel and series implementations that run in charge-depleting and charge-sustaining modes. And its architecture emphasizes dramatically downsized internal combustion engines, lightweight and intelligent continuously variable transmissions (CVTs), sophisticated control algorithms, and bigger electric motors and battery packs.

EDI's foremost objectives are the continuous development, commercialization and transfer of its proprietary PHEV and Electric Vehicle (EV) enabling technology, its growing IP portfolio and its know-how, and to pursue commercial agreements, long-term contracts, and regionally based joint ventures (JVs) with companies that are pursuing PHEV markets in their respective countries and regions.

“EDI has a strong and deep PHEV IP portfolio,” said Larry Norris, former partner at Rothwell, Figg, Ernst & Kurtz, now an independent patent attorney and intellectual property consultant, and a member of EDI's Advisory Board. “I would think that many vehicle companies would rather take advantage of EDI's knowledge than have to invest in the immense R&D effort that it would take to create solutions equal to EDI's. In the meantime, EDI is continuing to extend its portfolio with the registering of advanced and new technology patents.”

The company is operating from initial seed funding and early customer revenues, and is currently seeking expansion funding to increase staffing, expand facilities, service customer opportunities, and to broaden its line of solutions and technologies.

“EDI has a big mission,” said Dr. Frank. “It is to establish EDI as the global leader for advanced high-efficiency PHEV and EV solutions, including integration with the grid and personal renewable energy sources. We want to collaborate with vehicle manufacturers and suppliers to enable them to build the most efficient and affordable PHEVs and EVs available in the market today.”

About EDI

Efficient Drivetrains, Inc., (EDI) is a pioneer and leader in the development and commercialization of advanced Plug-In Hybrid Electric Vehicle (PHEV) technologies that will radically displace liquid fuels with cheaper, more environmentally friendly electricity. EDI's wide range of proprietary solutions and technologies has direct applications in PHEVs, Hybrids, and Electric Vehicles (EV), across nearly all platform classes and configurations. Its Patent Portfolio includes new patents, as well as an exclusive

licensing arrangement with UC Davis for the University's related broad patent portfolio. With headquarters in Palo Alto, CA, EDI has an R&D center located in Dixon, CA. For more information, visit <http://www.efficientdrivetrains.com>.

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