Docket No. 08-ALT-1
for AB118 Program

From YUANPING ZHAO <heihetech@gmail.com>
To AB118@energy.state.ca.us
Date Mon, Apr 13, 2009 at 11:08 AM
Subject **Most Cost-Effective and Most Affordable Energy Conservation Solution**

Dear AB118 Program Officer,

Energy consumption in transportation sector consumes 69% of fossil fuel energy in US and contributing major CO2 emission in CA. Normally, it's hard and expensive to reduce CO2 from transportation sector, even Big 3 auto makers don't have affordable solution. Now I have invented an engine fuel saving solution called "DCD Air-Hybrid". Please read the attached "DCD Air-Hybrid Controller" product brief for details. Presentation and live vehicle demonstration available.

Carbon Economy Analysis has been made for DCD Air-Hybrid technology which demonstrates by math that DCD Air-Hybrid technology is the most cost-effective and most affordable energy conservation and CO2 reduction technology under the sky.

Based on the attached math forms, DCD Air-Hybrid technology requires only $385 (for 4-cylinder engine) to $812 (for 8-cylinder engine) to reduce one metric-ton CO2 per year, enjoying 3 to 5 years' payback time. Other known green vehicle technologies may need 8 or even 13 times of expense to remove the same amount of CO2, suffering 52 years of payback time.

Obama claims $7500 tax incentive to electric vehicles. With this amount of money, the buyer could not even afford half of the required battery. But when the same amount is applied to DCD Air-Hybrid Technology, it is enough to retrofit up to 10 vehicles, reducing up to 19.5 tons of CO2 per year!!!

So Obama's Energy Fund for economy recovery should budget more percentage onto such an economy-magic DCD Air-Hybrid technology. For this purpose, please kindly forward this email to your energy officers and fleet managers who receive and consume Obama's Energy Fund in $351.5M for State of California.

A special program is also expected to promoted "DCD Air-Hybrid" technology in California, along with other AB118 programs.

Thanks,

Yuanping Zhao

Yuanping Zhao
www.heihetech.com

HEIHE TECHNOLOGY, INC.
1947 Trenton Dr. San Jose, CA 95124, USA 1-(408) 879-9902 heihetech@gmail.com

"DCD Air-Hybrid Controller" Product Brief

Product Name: DCD Air-Hybrid Controller

Product Catalog: Internal Combustion Engine (ICE) displacement reduction apparatus; ICE variable displacement control; Dynamic Cylinder Deactivation (**DCD**) control; Electronic fuel saving control for ICE; **"Air-Hybrid"** control for ICE; 21st Century top invention for energy conservation.

Product Application Fields: Various vehicles, vessels and engineering machineries powered by Internal Combustion Engine (ICE).

Fuels Supported: Various fossil fuels, including gasoline, diesel, heavy oil and natural gas. Various man-made fuels, including ethanol, bio-diesel, man-made gas, propane and hydrogen.

ICE Structure Supported: Reciprocating 4-stroke multi-cylinders, with multiple-point electronic controlled fuel injection.

Product Implementation: Electronic control for ICE applications.

Weight, Size and Power Consumption of the Product: Neglect-able compared with those of DCD controlled vehicles, vessels and engineering machineries.

Service Life of the Product: No less than twenty (20) years. No mileage limitation.

Energy Saving Result of the Product: 20% to 40%, depend on the loading condition of ICE. The larger the power redundancy of ICE, or the smaller the load of ICE, such as vehicle cruising along the highway, or vessel traveling along with the wind and the stream, the better the energy saving result.

Reference Product Prices for US Market:

4-Cylinder ICE ------ From $600 to $900.
6-Cylinder ICE ------ From $1200 to $2000.
8-Cylinder ICE ------ From $2000 to $2500.

Key Technology of the Product: [1] Dynamic Cylinder Deactivation, or **DCD** for short. [2] High-Lambda Engine combustion technology. [3] **Air-Hybrid** powertrain.

Technical Backgrounds of the Product: Electronic control applications to industry and machinery; ICE technology and its related thermodynamics and mechanics; as well as **HEIHE** (High Efficiency Integrated Heat Engine) technology.

Technical Excellence of the Product: Worldwide leading innovation. Based on the operating theorem of HEIHE, Mr. Yuanping Zhao, an ICE efficiency expert and HEIHE inventor, first introduced "**DCD Air-Hybrid**" technology in August, 2008. From theory to practice, such an invention is unique and incomparable with any existing engine efficiency technologies. It would definitely become the most economic beneficial, the most social beneficial, most cost-effective and most affordable and pragmatic energy conservation technology during the 21st Century.

Prize won by the Key Technology: First Prize of "Rev Up Fuel Efficiency" design contest from Convergence 2008 on Transportation Electronics held in Detroit, MI, October 2008.

Patent Status of the Key Technology: US patent pending; Chinese patent pending.

Operating Principle of the Product: "DCD Air-Hybrid Controller" utilizes means of electronic control to reduce the equivalent displacement of the engine, thus reducing the fuel consumption and obtaining energy conservation result. As we know, any vehicle, vessel or engineering machinery has been designed with power redundancy, but from time to time it operates under partial load condition, such as vehicle cruising on highway with constant speed, or diesel generator driving half of electrical load. Under these partial load conditions, engine efficiency will be lower than that of full load, consuming more fuel. In such a case, just by applying DCD control in time, so as to decreasing engine displacement in real time, we could reduce fuel consumption while keeping engine's operating speed and bringing the active cylinders to almost full load. As a result, engine efficiency would be greatly increased, and the residual heat inside the cylinders would be recovered through "**Air-Hybrid**" mechanism. Meanwhile, engine emissions and pollutants would be reduced.

Test Driving Result of the Product: Base on the test driving result from the first **"DCD Air-Hybrid Controller"** installed on a passenger car with a 4-cylibder 1.6L gasoline engine and automatic transmission, before installation, the test vehicle could only be driven 330 miles for a tankage of gasoline; after installation, the test vehicle could be driven 410 miles for the same tankage of gasoline, yielding a fuel economy gain of 24%. Such a result still has the room to go higher by improving control parameters. The latest driving test result shows that the mileage driven by the same tankage has reached up to 435 miles, yielding 34.78 MPG.

Features of the Product: Small in size, light in weight, low power consumption, easy to install, high reliability, long service life. Convenience to use and flexible to handle, easy to operate, multiple adjustable control extends. DCD control duty can be turned on or off, high or low according to the driving requirement, as to obtain the best suitable engine displacement. DCD control can be cancelled at any time, so as to recover the original engine performance, which will be absolutely guaranteed, along with the original vehicle acceleration. Reducing fuel consumption without reducing engine speed. Keeping high speed running while still saving the fuel. Very affordable price, could find wide applications everywhere in a short time.

Special Performance of the Product: Implementation of **"Air-Hybrid"** with cylinder residual heat recovery. Under the control of the present product, cold inlet air will become the working fluid of the engine under DCD control, absorbing residual heat inside the cylinders, thus expanding and contributing positive engine work. Such an innovative **"Air-Hybrid"** mechanism would not only increase engine efficiency, recover residual heat and obtain extra power, but also could implement forced internal air-cooling result inside the cylinders, avoiding engine knocking and partial over-heating, and reducing the heat loss from the radiator.

User Benefit of the Product: Saving fuel, reducing the expense for fuel. Saving energy while reducing engine emissions. Extending engine service life. One time investment to install will yield life time enjoyment of fuel saving and life time benefit of money saving. Very high performance to price ratio, along with very short investment payback time.

Social Benefit of the Product: Reducing fossil fuel consumption, decreasing engine emissions. Reducing engine pollutants, protecting environment, decreasing greenhouse effects. Following governments' energy conservation polices, decreasing the demand for foreign oil imports, strengthening strategic national energy security. Meanwhile, a lot of jobs will be created to develop, produce, distribute and install the present product.

Reference Technology of the Product: In 1980, General Motors first introduced cylinder deactivation technology onto its Cadillac product. Such a technology was implemented by traditional means of mechanics, electromagnet or hydraulics, obtaining some gains with cost and sophistication, yet far from wide attractions and adaptations, partially due to super low fossil fuel price during the previous two decades. However, cylinder deactivation is a proven, effective and long-lasting engine fuel saving technology, which is being paid more and more attention during the recent years due to the intention of energy conservation and emission reduction, as well as the sky-rocketing fossil fuel price. More and more vehicles are adapting cylinder deactivation technology these days.

Comparison with Other Vehicle Energy Conservation Technologies: [1] **Turbo Charging** makes use of exhaust energy, resulting larger engine equivalent displacement, hard to reduce fuel consumption yet causing increased payload weight and size. [2] **Fan Charging** also results larger engine equivalent displacement, adverse to reducing fuel consumption, even has to consume extra electrical energy. [3] **Hydrogen Injection** is equivalent to fuel additive, which improves combustion, promoting combustion efficiency and decreasing engine emissions, yet causing more efforts to maintain, consuming extra electrical energy, and possessing limited service life. [4] **Traditional Cylinder Deactivation** obtains some gains with cost and sophistication, presenting thermodynamic loss twice per engine cycle, resulting limited benefit. [5] **Electric-Hybrid** combines two kinds of powertrain together, adding cost, sophistication and extra weight plus size, yet the battery has limited service life. Its braking energy regeneration feature could only be obtained under the condition of stop-and-go driving on city roads, such a benefit will be disappeared once it travels along the highway. [6] **Battery Powered Vehicle** is very expensive, yet both battery service life and energy density are limited, yielding constrained driving range. [7] **Fuel Cell Vehicle** has unaffordable cost, yet the fuel cost higher with limited source.

About DCD Air-Hybrid Technology Owner: HEIHE Technology, Inc. is a green engine technology company specialized to patent, prototype, development, design, manufacture and market innovative fuel efficient green engine technologies related to High Efficiency Integrated Heat Engine, or **HEIHE**. The company takes HEIHE as long-term strategic target. HEIHE technology will fulfill the current need in improving engine fuel consumption by promoting fuel conversion efficiency based on advanced compound cylinder structure, by both compound cycle and combined cycle with power strokes driven by expansions of multiple working fluids such as air-fuel combustion products, and compressed air, which also reduces fuel carbon content and carbon emissions. HEIHE Technology's recent product is **"DCD Air-Hybrid Controller"** introduced by this product brief. This product is an affordable and affective fuel saving electronic gadget for Internal Combustion Engine (ICE). HEIHE Technology could benefit whoever or wherever a fuel combustion power generating engine is required. It is inherently scalable from civil automobiles to military vehicles; from engineering power horses to industry power plants; form garden tools to ocean-going vessels. HEIHE has been designed to adopt with no-carbon renewable fuels such compressed air or liquid air, so as to provide fuel consumption reduction solution that could compete in any segment of the $250 billion combustion engine market.

Contacts:

Company Name:	HEIHE Technology, Inc.
Address:	1947 Trenton Drive, San Jose, CA 95124, USA
Web-Site:	www.heihetech.com
Email:	heihetech@gmail.com
Phone:	1-(408) 879-9902

(2009-04-08)

Yuanping Zhao

Analysis of $1,000,000 Energy Investment and Returns in Green Vehicle Technologies

 April 08, 2009 www.heihetech.com

Technology	Unit	DCD Air-Hybrid	CNG	Electric-Hybrid	Battery Electric
Product		DCD Control Kit	CNG Retrofit Kit	Toyota Prius	GM Volt
Vehicle Size		Standard Truck	Standard Truck	Mid-Size Sedan	Mid-Size Sedan
CO2 Reduction	%	25%	18%	45%	49%
Unit Price (Per Vehicle)	USD	$2,500	$15,000	$22,200	$40,000
Vehicle Quantity Covered		400	67	45	25
Original Unit Fuel Spending	$ / Year	$2,000	$2,000	$1,200	$1,200
kWH Required	kWH/Year				4380
Retrofitted Unit Fuel Spending	$ / Year	$1,500	$2,694	$660	$438
Retrofitted Unit Fuel Saving	$ / Year	$500	-$694	$540	$762
Total Annual Saving	$ / Year	$200,000	-$46,517	$24,324	$19,050
Payback Time	Year	5.0	-21.5	41.1	52.5
Original Annual Unit CO2	Metric Ton / Year	12.32	12.32	7.30	7.30
Retrofitted Annual Unit CO2	Metric Ton / Year	9.24	10.13	4.00	3.58
Unit CO2 Reduction	Metric Ton / Year	3.08	2.19	3.30	3.72
Annual Total CO2 Reduction	Metric Ton / Year	1232.00	146.62	148.65	93.04
Cost Factor	Times	1.00	8.40	8.29	13.24
Unit CO2 Reduction Cost	$ / Metric Ton-Year	$812	$6,820	$6,727	$10,748

Analysis of $1,000,000 Energy Investment and Returns in Renewable Energy Technologies

© HEIHE Technology, Inc. April 08, 2009 www.heihetech.com heihetech@gmail.com

Technology	Unit	DCD Air-Hybrid	Solar Energy	Solar Energy	Wind Energy	Hydroelectricity
Product		DCD Control Kit	Solar Panels	Thermal Collector	Wind Turbines	Small Hydropower
Unit Price (kW)	$ /kW		$10,000	$3,500	$2,600	$2,000
Capacity Covered	kW		100	286	385	500
Utilize Factor			20%	20%	30%	45%
Annual Power Generation	kWH/Year		175200	500571	1010769	1971000
Unit Green Power Cost	$ /kWH		$0.25	$0.15	$0.12	$0.07
Total Annual Power Income	$ / Year	$200,000	$43,800	$75,086	$121,292	$137,970
Payback Time	**Year**	**5.0**	**22.8**	**13.3**	**8.2**	**7.2**
Unit Power Generation CO2	g /kWH		817	817	817	817
Annual Total CO2 Reduction	Metric Ton / Year	**1232.0**	**143.1**	**408.8**	**825.5**	**1609.7**
Cost Factor	**Times**	**1.00**	**8.61**	**3.01**	**1.49**	**0.77**
Unit CO2 Reduction Cost	$ / Metric Ton-Year	**$812**	**$6,989**	**$2,446**	**$1,211**	**$621**

Analysis of $7500 Energy Investment and Returns in DCD Air-Hybrid Technology

 April 08, 2009 www.heihetech.com

Technology	Unit	DCD Air-Hybrid	DCD Air-Hybrid	DCD Air-Hybrid	DCD Air-Hybrid
Engine Cylinders		4-Cylinder	6-Cylinder	8-Cylinder	Average of Left 3 Kind of Vehicles
Vehicle Size 1		Mid-Size Sedan	Large-Size Sedan	Large-Size Sedan	
Vehicle Size 2			Light Pickup Truck	Standard Truck	
CO2 Reduction	%	23%	25%	27%	25%
Unit Price (Per Vehicle)	USD	$750	$1,500	$2,500	$1,583
Vehicle Quantity Covered		10	5	3	6
Original Unit Fuel Spending	$ / Year	$1,200	$1,700	$2,000	$1,633
Retrofitted Unit Fuel Spending	$ / Year	$924	$1,275	$1,460	$1,220
Retrofitted Unit Fuel Saving	$ / Year	$276	$425	$540	$414
Total Annual Saving	$ / Year	$2,760	$2,125	$1,620	$2,168
Payback Time	Year	2.7	3.5	4.6	3.63
Original Annual Unit CO2	Metric Ton / Year	8.48	10.72	12.32	10.51
Retrofitted Annual Unit CO2	Metric Ton / Year	6.53	8.04	8.99	7.85
Unit CO2 Reduction	Metric Ton / Year	1.95	2.68	3.33	2.65
Annual Total CO2 Reduction	Metric Ton / Year	19.50	13.40	9.98	14.29
Unit CO2 Reduction Cost	$ / Metric Ton-Year	$385	$560	$752	$525

Analysis of Packaged $7500 Energy Investment and Returns in DCD Air-Hybrid Technology

© HEIHE Technology, Inc. April 08, 2009 www.heihetech.com heihetech@gmail.com

Technology	Unit	DCD Air-Hybrid	DCD Air-Hybrid	DCD Air-Hybrid	DCD Air-Hybrid
Engine Cylinders		4-Cylinder	6-Cylinder	8-Cylinder	Total/Average of Left 3 Kind of Vehicles
Vehicle Size 1		Mid-Size Sedan	Large-Size Sedan	Large-Size Sedan	
Vehicle Size 2		Light Pickup Truck	Light Pickup Truck	Standard Truck	
CO2 Reduction	%	23%	25%	27%	25%
Unit Price (Per Vehicle)	USD	$750	$1,500	$2,250	$1,500
Vehicle Quantity Covered		3	2	1	6
Sub-Total	USD	$2,250	$3,000	$2,250	**$7,500**
Original Unit Fuel Spending	$ / Year	$1,200	$1,700	$2,000	$1,633
Retrofitted Unit Fuel Spending	$ / Year	$924	$1,275	$1,460	$1,220
Retrofitted Unit Fuel Saving	$ / Year	$276	$425	$540	$414
Total Annual Saving	$ / Year	$828	$850	$540	**$2,218**
Payback Time	Year				**3.4**
Original Annual Unit CO2	Metric Ton / Year	8.48	10.72	12.32	10.51
Retrofitted Annual Unit CO2	Metric Ton / Year	6.53	8.04	8.99	7.88
Unit CO2 Reduction	Metric Ton / Year	1.95	2.68	3.33	2.65
Annual Total CO2 Reduction	Metric Ton / Year	**5.85**	**5.36**	**3.33**	**14.54**
Unit CO2 Reduction Cost	$ / Metric Ton-Year	**$385**	**$560**	**$676**	**$516**

Year 2004 Vehicles and Their EPA Fuel Economy Data Chosen for Analysis

 March 30, 2009 www.heihetech.com heihetech@gmail.com 12.728861

Cyl.	Code	Vehicle	Make	Model 1	Model 2	Engine	Trans.	City	Hwy	Comb.	Math	Fuel	CO2	CO2/Gallon
						Litter		MPG	MPG	MPG	MPG	Barrel/Year	MT/Year	kgCO2/Gallon
4	4PC	Passenger	Chevy	Malibu		2.2	A4	21	31	25	25.50	13.7	7.3	12.6868
4	4PF	Passenger	Ford	Focus		2.3	A4	21	28	24	24.15	14.3	7.7	12.8205
4	4PD	Passenger	Dodge	Stratus		2.4	A4	19	26	21	22.15	16.3	8.7	12.7082
4	4TC	Truck	Chevy	Colorado	2WD	2.8	A4	16	23	18	19.15	19.0	10.2	12.7820
4	4TF	Truck	Ford	Ranger	2WD	2.3	A5	19	24	21	21.25	16.3	8.7	12.7082
4	4SF	SUV	Ford	Escape	2WD	2.0	M5	20	25	22	22.25	15.6	8.3	12.6679
					Average	2.333		19.333	26.167	21.833	22.408	15.867	**8.483**	**12.7301**

Cyl.	Code	Vehicle	Make	Model 1	Model 2	Engine	Trans.	City	Hwy	Comb.	Math	Fuel	CO2	CO2/Gallon
						Litter		MPG	MPG	MPG	MPG	Barrel/Year	MT/Year	kgCO2/Gallon
6	6PC	Passenger	Chevy	Impala		3.8	A4	18	28	21	22.50	16.3	8.7	12.7082
6	6PF	Passenger	Ford	Taurus		3.0	A4	17	24	20	20.15	17.1	9.2	12.8098
6	6TC	Truck	Chevy	Silverado	1500	4.3	A4	14	19	16	16.25	21.4	11.4	12.6836
6	6TF	Truck	Ford	F-150	2WD	4.2	A4	19	24	21	21.25	21.4	11.4	12.6836
6	6SC	SUV	Chevy	TrailBlazer		4.2	A4	13	18	15	15.25	22.8	12.2	12.7402
6	6SF	SUV	Ford	Explorer	2WD	4.0	A4	14	19	16	16.25	21.4	11.4	12.6836
					Average	3.917		15.833	22.000	18.167	18.608	20.067	**10.717**	**12.7156**

Cyl.	Code	Vehicle	Make	Model 1	Model 2	Engine	Trans.	City	Hwy	Comb.	Math	Fuel	CO2	CO2/Gallon
						Litter		MPG	MPG	MPG	MPG	Barrel/Year	MT/Year	kgCO2/Gallon
8	8VC	Cargo Van	Chevy	Express	1500/2500	5.3	A4	14	18	15	15.80	22.8	12.2	12.7402
8	8PF	Passenger	Ford	Crown	Victoria	4.6	A4	15	23	18	18.60	19.0	10.2	12.7820
8	8TC	Truck	Chevy	Silverado	2WD	6.0	A4	13	16	14	14.35	24.5	13.1	12.7308
8	8TF	Truck	Ford	F-150	2WD	5.4	A4	14	18	15	15.80	22.8	12.2	12.7402
8	8SC	SUV	Chevy	Tahoe		5.3	A4	13	17	14	14.80	24.5	13.1	12.7308
8	8SF	SUV	Ford	Expedition	2WD	5.4	A4	12	16	14	13.80	24.5	13.1	12.7308
					Average	5.333		13.500	18.000	15.000	15.525	23.017	**12.317**	**12.7409**