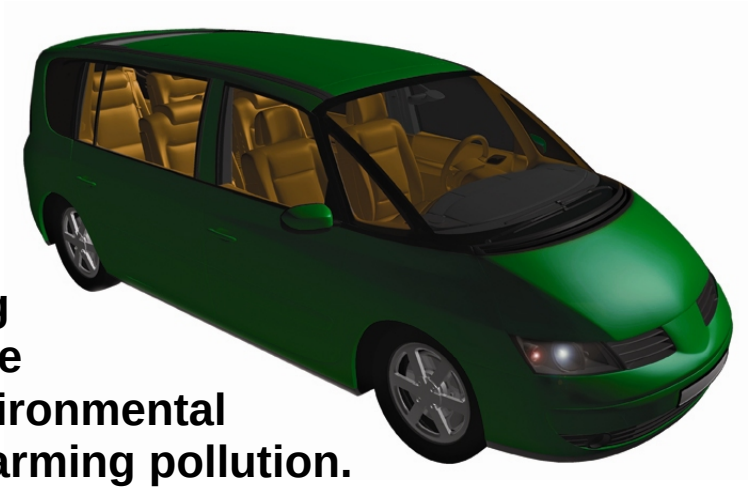
Union of Concerned Scientists
Citizens and Scientists for Environmental Solutions

fact sheet

UCSVanguard 2009

Everything you want in a car...and less (global warming pollution)



From families to farmers, drivers across the nation have been waiting for "no compromises" vehicles—cars and trucks that can help keep America running strong while countering the health, economic, and environmental threats posed by global warming pollution.

Existing technology and fuels make it possible for us to enjoy cleaner but still affordable cars, pickup trucks, SUVs, and minivans today. The global warming emission reduction law for vehicles adopted by California and 14 other states actually requires automakers to start making these cleaner vehicles. Unfortunately, automakers are attempting to block these laws, and refuse to make the clean and affordable vehicles Americans want. That's why the vehicle engineers at the Union of Concerned Scientists set out to show what you're missing.

The Vanguard is a minivan blueprint developed by UCS engineers that meets California's global warming emission standards simply by using existing technologies and fuels, saving money at the pump while maintaining the levels of safety and performance that drivers expect. Many cars and trucks on the road today already use at least one of the climate-friendly components used in the Vanguard, but none come close to matching the potential benefits of the full Vanguard package.

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Performance. Safety. Reliability. Lower Emissions. We can have it all—with technologies available today

ENGINE

- **Cylinder deactivation** shuts down some of the cylinders in a large engine when full power is not needed.
- **Turbocharging** uses the waste heat from the vehicle's exhaust to compress the air entering the engine's combustion chamber. This boosting of the inlet air pressure results in higher engine power output, which allows the vehicle designers to select a smaller engine with less global warming emissions.

FUEL SYSTEM

- **Stoichiometric direct injection** places the gasoline directly into the combustion chamber, thereby allowing better mixing of the fuel and air and improved control over the combustion process.
- **Variable valve lift and timing** reduces engine losses by better controlling the flow of the air and fuel into the engine—leading to more efficient combustion and better performance.

TRANSMISSION

The transmission propels a vehicle forward by transferring power from the engine to the wheels. The addition **of more gears** allows the engine to operate near its optimal performance level a greater percentage of the time. **Automatic manual transmissions** allow the direct transfer of power from the engine to the transmission without interruption, combining the efficiency of a manual transmission with the convenience of an automatic transmission. **Continuously variable transmissions** essentially have an infinite number of gears allowing the engine to run at its optimal speed all of the time.

IMPROVED A/C

Improved hoses and better connections can significantly reduce the amount of hydrofluorocarbons—concentrated global warming pollutants— that leak from a vehicle's air conditioning system. Switching to a **less harmful refrigerant** will also help; HFC-152a, for example, has a much lower global warming potential than common hydrofluorocarbon refrigerants.

LOAD REDUCTION

Better aerodynamics–better shaping of the vehicle so it slips through the air with less energy can reduce the amount of fuel it takes to drive, especially at highway speeds. **Tires with low rolling resistance** use improved materials and tread design to reduce the amount of energy wasted as a vehicle's tires roll down the road. Upgrading mechanical components such as power steering with more **energy-efficient electrical components** can reduce engine load and, in turn, global warming emissions. When this electrification of components is coupled with a high-efficiency advanced alternator, global warming emissions can be reduced even further.

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By applying the Vanguard's features to each of these vehicle classes, we can meet the clean car standard while saving money and reducing our global warming emissions.

Small Car*
Example Vehicle: Volkswagen Jetta
Fuel: Gasoline
Increase in Purchase Price $1,410
Lifetime Consumer Savings $2,043
Payback Time 3.6 Years

Midsize Car*
Example Vehicle: Chrysler Sebring Sedan
Fuel: Gasoline
Increase in Purchase Price $1,352
Lifetime Consumer Savings $2,338
Payback Time 3.1 Years

Minivan* (UCSVanguard)
Example Vehicle: Honda Odyssey
Fuel: Gasoline
Increase in Purchase Price $696
Lifetime Consumer Savings $1,769
Payback Time 2.3 Years

Midsize SUV *
Example Vehicle: Chevrolet Trailblazer
Fuel: Gasoline
Increase in Purchase Price $809
Lifetime Consumer Savings $2,262
Payback Time 2.1 Years

Fullsize Pickup Truck*
Example Vehicle: Ford F-150
Fuel: Gasoline
Increase in Purchase Price $829
Lifetime Consumer Savings $2,385
Payback Time 2.1 Years

* Other models in these vehicle classes could expect similar savings with the Vanguard package. The calculations in this analysis use $2.50 per gallon gasoline prices. Vehicle technology packages, their global warming emission reductions, and associated costs are based on studies published by the Union of Concerned Scientists and the California Air Resources Board. Specified emissions reductions reflect targets that average to the 2016 clean car standard.

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"So why can't I get a Vanguard right now?"

Instead of employing their talented engineers to install the Vanguard's full complement of cost-effective global warming reduction features on their own vehicles, automakers are spending millions on lawyers and lobbyists to thwart consumer and government demand for cleaner vehicles, all while taking billions in taxpayer dollars. Their strategy—overturning existing laws intended to reduce global warming pollution in California and 14 other states—would deny drivers the "no compromises" vehicles we all desire. It's time for automakers to stop spinning and suing, and instead create safe, affordable, and cleaner cars and trucks (and the jobs that come with them).

Here is just a selection of the vehicles that use some cleaner car components*

Electric Steering
Audi A3, A4
Chevrolet Equinox
Chevrolet Malibu
Chevrolet HHR
Ford Escape
Ford Escape Hybrid
Ford Fusion
GMC Yukon Hybrid
Honda Civic Hybrid
Honda Fit
Honda S2000
Lexus IS-F
Mercury Mariner
Mercury Mariner Hybrid
Nissan Altima Hybrid
Nissan Rouge
Nissan Sentra
Nissan Versa
Pontiac G5, G6
Saturn Aura
Saturn Aura Greenline
Saturn Vue
Saturn Vue Greenline
Scion xB, xD
Toyota Camry Hybrid
Toyota Corolla
Toyota Highlander
Toyota Highlander Hybrid
Toyota Prius
Toyota RAV-4
Toyota Yaris

Direct Injection
Audi A3, A4, A6, A8
Audi Q7, R8, RS4
Audi S5, S6, S8
BMW 335
Cadillac CTS
Cadillac STS
Chevrolet Cobalt
Chevrolet Express
Chevrolet HHR
Chevrolet Silverado
Chevrolet Avalanche
Chevrolet Suburban
Chevrolet Tahoe
Chevrolet Trailblazer
Dodge Ram
Dodge Sprinter
GMC Sierra
GMC Savana
Jeep Grand Cherokee
Lexus GS 350, GS 460
Lexus IS 250, IS 350, IS-F
Lexus LX 570
Mazda CX-7
Mercedes-Benz GL330
Pontiac Solstice
Saturn Astra
Saturn Sky Redline
Volkswagen EOS, GTI
Volkswagen Jetta
Volkswagen Passat
Volkswagen Touareg
Ford F250/F350

Cylinder Control
Buick LaCrosse
Chevrolet Impala
Chevrolet Tahoe
Chevrolet Tahoe Hybrid
Chrysler 300C
Chrysler Aspen
Dodge Charger
Dodge Durango
Dodge Magnum
Dodge Ram
GMC Envoy
GMC Sierra
GMC Yukon
GMC Yukon Hybrid
Honda Accord
Honda Odyssey
Honda Pilot
Hummer H3
Jeep Commander
Jeep Grand Cherokee
Pontiac Grand Prix
SAAB 9-7X

Variable Valve Control
Acura RL, TL, TSX
Audi A3, A4, A5, A6, A8
Audi Q7, R8, RS4
Audi S4, S5, S6, S8
Audi TT
BMW 1, 3, 5, 7 Series
BMW Alpina B7
BMW M, X, Z Series
Buick Enclave
Buick LaCrosse
Cadillac Escalade
Cadillac STS, SRX, XLR
Chevrolet Cobalt
Chevrolet Colorado
Chevrolet Impala
Chevrolet HHR
Chevrolet Malibu
Chevrolet Silverado
Chevrolet Suburban
Chevrolet Tahoe Hybrid
Chrysler Sebring
Dodge Avenger
Dodge Caliber
Dodge Viper
GMC Sierra
GMC Yukon
GMC Yukon Hybrid
Honda Accord
Honda Civic
Honda Civic Hybrid
Honda CR-V
Honda Element
Honda Fit
Honda Odyssey
Honda Pilot
Honda Ridgeline
Honda S2000
Infiniti EX35, FX 35, FX 45
Infiniti G35, GS37
Infiniti M35, M45
Jeep Compass
Jeep Patriot
Mercury Milan
Mercury Sable
Nissan Altima
Nissan Altima Hybrid
Nissan Armada
Nissan Frontier
Nissan Maxima
Nissan Pathfinder
Nissan Quest
Nissan Rouge
Nissan Sentra
Nissan Titan
Nissan Versa
Nissan Xterra
Pontiac G5, G6, G8
Pontiac Solstice
Pontiac Vibe
Saturn Astra
Saturn Aura
Saturn Aura Greenline
Saturn Outlook
Saturn Sky
Saturn Vue
Saturn Vue Greenline
Scion tC, xB, xD
Toyota 4Runner
Toyota Avalon
Toyota Camry
Toyota Camry Hybrid
Toyota Camry Solara
Toyota Corolla
Toyota FJ Cruiser
Toyota Highlander
Toyota Highlander Hybrid
Toyota Land Cruiser
Toyota Matrix
Toyota Prius
Toyota RAV-4
Toyota Sequoia
Toyota Sienna
Toyota Tacoma
Toyota Tundra
Toyota Yaris

Turbocharging
Acura RDX
Audi A3
Audi A4
Audi TT
BMW 135, 335, 535
Chevrolet Cobalt
Chevrolet Express
Chevrolet HHR
Chevrolet Silverado
Chevrolet Veyron
Chrysler PT Cruiser
Dodge Ram
Dodge Sprinter

Dodge Caliber
Ford F250
GMC Savana
GMC Sierra
Jeep Grand Cherokee
Mazda CX-7
Mercedes-Benz ML320
Mercedes-Benz GL 330
MINI Cooper, Clubman
Mitsubishi Lancer
Pontiac Solstice
Porsche Cayenne
SAAB 9-3, 9-5
Saturn Sky
Subaru Forester
Subaru Impreza
Subaru Legacy
Subaru Outback
Volkswagen EOS
Volkswagen GTI
Volkswagen Jetta
Volkswagen Passat
Volkswagen Touareg
Volvo C30, S80, V50

Continuously Variable Transmission
Audi A4
Audi A6
BMW X6
Chevrolet Tahoe Hybrid
Ford Escape Hybrid
GMC Yukon Hybrid
Honda Civic Hybrid
Jeep Compass
Jeep Patriot
Lexus RX 400h
Lexus GS 450h
Lexus LS 600h L
Mazda Tribute Hybrid
Mercury Mariner Hybrid
MINI Cooper
Mitsubishi Lancer
Mitsubishi Outlander
Nissan Altima
Nissan Altima Hybrid
Nissan Maxima
Nissan Rogue
Nissan Sentra
Nissan Versa
Toyota Camry Hybrid
Toyota Highlander Hybrid
Toyota Prius

Automatic Manual Transmission
Audi A3, A8, TT
BMW M3, M5, M6
BMW X3, X5, X6, Z4
Bugatti Veyron
Mitsubishi Lancer
Volkswagen Eos
Volkswagen GTI
Volkswagen Jetta
Volkswagen R32

* List represents Model Year 2008 vehicles

The UCSVanguard 2009 technology package puts these cost-effective components together in a way that could give Americans cleaner cars in every vehicle class. It is time for the automakers to do the same.

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