



Easy How-to Guide

Join the Culver's® Veggie oil-fueled fleet



**It's time to recycle your waste vegetable oil
to power your vehicle.**

You'll save money on fuel.

You'll gain positive public attention and personal satisfaction.





© 2005 Madison Environmental Group, Inc. developed this How-To Guide in partnership with Culver's restaurants and Culver Franchising System, Inc. This project was made possible through a technology feasibility grant from the Wisconsin Department of Administration, Division of Energy, Alternative Fuels Program.

Culver Franchising Systems, Inc. ("CfSi") is excited to collaborate with Madison Environmental Group, Inc. CfSi does not, however, warranty, endorse or recommend any machinery, parts, kits, installers, or any information or recommendations provided to Culver's® franchisees by Madison Environmental Group, Inc. or any third party in connection with this program. Further, CfSi does not guarantee that participation in this program will save Culvers® franchisees money.

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Benefits to You

You can save thousands of dollars each year by switching to vegetable oil fuel.

Let's say your restaurant produces 20 gallons of waste oil per week:

- You could drive a diesel Volkswagen Beetle 900 miles per week or a diesel pick-up truck 400 miles per week.
- You would save up to \$2,600 per year after initial installation costs (with diesel and gasoline at \$2.50 per gallon).
- You would eliminate waste oil disposal costs.

You can secure your future.

The price of gasoline and diesel will continue to rise as global fossil fuel supplies begin to decline in coming years. You can enjoy security and independence during this uncertain time by taking advantage of a free fuel resource that already exists in your Culver's restaurant, used fryer oil.

You can gain public attention and personal satisfaction.

- You and Culver's will receive national attention as pioneers for turning a waste product into a cleaner burning, renewable fuel.
- You will help preserve Wisconsin's air quality by providing a cleaner alternative to burning fossil fuels.

And it's easy.

This guide provides all the information you need to operate your own Culver's "Blue & Green Enviro Machine" by modifying a diesel engine to run on straight, unprocessed vegetable oil. Once the car undergoes a simple vegetable oil conversion (described in the following pages), you can transfer filtered vegetable oil out of your restaurant fryer directly into the fuel tank of your car or truck.

Listen to what some of your fellow Culver's owners have to say:

"Driving on vegetable oil is great for the environment and our business. In the first six months we have driven the car 13,000 miles and saved over \$1,000 on fuel costs. We have enough oil at our restaurants to fuel several vehicles so we plan to convert more in the near future."

-Russ Trzebiatowski, Culver's of Marshfield, Stevens Point, Clintonville and Green Bay

"Six months after converting my diesel Ford Excursion, I recouped the cost of the conversion kit and installation with over \$2,000 in saved fuel costs. Every time I flip the switch on the dashboard [to switch over to vegetable oil], I feel satisfaction knowing that I am not paying \$3.00 per gallon of diesel fuel. I can do anything in the converted Excursion that I could do in a diesel truck, such as off-roading and hunting. Also, it fits eight people and I'm often the designated driver on group activities because my family and friends enjoy riding in the vegetable oil vehicle!"

-Ben Hoffman, Culver's of Antigo and Minoqua



Step 1 Acquire a Vehicle

Why diesel?

Although we typically think of diesel engines as running on petroleum-based diesel fuel, they are in fact designed to run on a variety of fuels including vegetable oil. The diesel engine works on the principle of compression ignition, meaning fuel is injected into a chamber of pressurized air. Because diesel engines contain no electrical ignition components (spark plugs), they are generally more reliable than gasoline engines. They are able to run on thick, viscous fuels like vegetable oil as long as the fuel is heated to a high enough operating temperature (this process is discussed in Step 2). New diesel engines use turbo direct injection (TDI) technology and are cleaner and quieter than the older engines. However, the older engines tend to be extremely durable and reliable, and make good candidates for conversion.

New or used?

We recommend that you purchase a used diesel vehicle rather than buying a new one for several reasons. First, if the car is a few years old, you won't have to worry about voiding the warranty when you modify the engine. Second, the Volkswagen TDI vehicles introduced new engineering in late 2004 that is less adaptive to vegetable oil conversion. Finally, purchasing a used car is a better environmental choice and will save you money.

Based on availability and suitability to vegetable oil conversion, here are our recommendations for late model used diesel vehicles:

U.S. Diesel Vehicle Models Suitable for Vegetable Oil Conversion Based on 2005 data				
Make	Model	Class	Model Years	Price Range*
Volkswagen	Beetle TDI	Compact	1998-2004	\$10-20,000
Volkswagen	Golf TDI	Compact	1998-2004	\$ 8-20,000
Volkswagen	Jetta TDI	Small sedan / Small wagon	1998-2004	\$ 8-20,000
Mercedes	300 D/TD	Midsize sedan	1995-1999	\$13-20,000
Dodge	Ram 2500-3500	Pickup	1995-2004	\$15-38,000
Ford	Excursion	Large SUV	2000-2004	\$18-40,000
Chevrolet	Suburban	Large SUV	1994-1999	\$10-15,000
Jeep	Liberty	Midsize SUV	2005	\$20-26,000

In addition to the newer models listed above, options for older (pre-1990) diesel vehicles include: Audi 5000, Datsun 300, Isuzu I-mark, Isuzu Pickup, Mercedes 300, 240 and 190; Nissan Maxima, Toyota Pickup, Volkswagen Rabbit, Jetta, Golf, Quantum, Scirocco, Fox, Vanagon and Pickup; and Volvo DL. Also visit http://journeytoforever.org/biodiesel_UScars.html for a list of diesel models available in the U.S.

If you are interested in exploring future possibilities, note that manufacturers will be producing a wider selection of diesel vehicles starting in model year 2007 in response to the U.S. government's mandate for the use of low-sulfur diesel fuel.

(continued on next page)

Did you know?

Vegetable oil fuel is an excellent option for people who:

- Regularly drive trips of more than 20 miles
- Have some (even a little!) mechanical interest and ability



(continued)

How do I find a diesel vehicle?

Diesel vehicles are still relatively rare in the United States, but with a little bit of patience and persistence you will be able to find one. With rising fuel prices, fuel efficient diesels are selling fast, so know what you're looking for and be prepared to act quickly when you track one down.

Local dealerships are a good place to start. Call the local Volkswagen, Dodge, Mercedes, Ford, Chevy or Jeep dealer and ask what diesel models they have on the lot. Check back frequently and let them know you're keeping an eye on their inventory.

If you are looking for a Volkswagen, TDI Clubs provide strong regional networks of diesel VW enthusiasts. Check out www.tdiclub.com and click on "forums" to connect with Midwest club members who may be selling cars.

Websites such as www.ebay.com, www.craigslist.org, and www.autotrader.com provide nationwide search engines for used cars and trucks. Make sure you enter "diesel" as a key word in your search. Also check out local buy/trade newspapers, and the classified sections of city and regional newspapers.

Car-Shopping Tip 1

When deciding between a new or older model vehicle, keep in mind what you intend to do with the car, what your budget is, whether you will maintain the vehicle yourself or have it professionally serviced, and how long you want it to last.

Car-Shopping Tip 2

Have a mechanic check the compression to tell if the motor is in good condition. Also look at the valve cover gasket for leaks (expensive to repair on many models), and the glow plug system and relays to be sure that they are functioning properly.

Biodiesel vs. Straight Vegetable Oil

Biodiesel is vegetable oil that has been chemically processed through the addition of alcohol and a catalyst such as lye. Biodiesel can be used directly in an unmodified diesel engine, whereas straight vegetable oil requires making some modifications to the vehicle. Straight vegetable oil is generally a preferable option for Culver's franchise owners because once the vehicle is converted, there is no need to chemically process the oil. However, a converted car still requires some diesel or biodiesel to start up and shut down. You can acquire biodiesel from the following sources:

Great Lakes Biofuels
P.O. Box 259881
Madison, WI 53725
(608) 333-BIOD
www.greatlakesbiofuels.net

PrairieFire BioFuels Cooperative
1894 E. Washington Ave.
Madison, WI 53703
(608) 441-5454
www.prairiefirebiofuels.org

Twin Cities Biodiesel Cooperative
Order line: (612) 605-1788
Co-op Manager: (612) 229-8065
www tcbiodiesel.com



Why does the engine need to be converted?

In order to effectively use straight vegetable oil fuel in a diesel vehicle, some minor mechanical adjustments must be made to the engine, using a conversion kit. Picture your restaurant's fryer oil after it is removed from the fryer and cooled. Because it is thick and viscous, that oil must first be heated to 160-180 degrees Fahrenheit in order to work in the engine. Otherwise, it would gum up your car's hoses and cylinders. Diesel or biodiesel fuel is necessary to start the engine and heat the vegetable oil until it becomes liquid (normally just a few minutes), at which point the engine will switch over to running on vegetable oil. Also, before turning off the engine, it must run on diesel or biodiesel for a few seconds to purge any remaining vegetable oil which would thicken when it cooled.



Volkswagen Beetle TDI
with Frybrid conversion

Where can I purchase a conversion kit?

Several companies sell ready-made conversion kits containing all the parts your diesel engine needs to run on straight vegetable oil, including heat exchanger, valves, filter, pump, temperature sensor and switches. *Dual tank* conversion kits (Greasecar) require the addition of a second fuel tank to hold the vegetable oil, while *single tank* kits (Elsbett) employ the vehicle's existing fuel tank. Based on Madison Environmental Group's research, we recommend the following three brands of conversion kits:

Greasecar (www.greasecar.com) Cost: \$795 (car) - \$1,100 (truck)

Greasecar is the most established brand of conversion kit in the U.S. It has been on the market since 2001 and has a record of over a two million road miles on over 2,000 vehicles. The complete dual tank kit includes a hand crafted aluminum heated fuel tank, quick-flush switching and 5 micron filter. Unlike the automatic Frybrid system, Greasecar's system includes a dashboard switch for the driver to manually control the shift from diesel to vegetable oil. Greasecar offers a digital automatic switching system as an option.



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Elsbett (www.elsbett.com) Cost: starts at \$600

The German company Elsbett Technologie has been investigating vegetable oil as an alternative fuel since the 1970s. Their single tank conversion kit includes custom injector nozzles that increase injection pressure, stronger glow-plugs, and a system to pre-heat the fuel. Once converted, you can put any combination of vegetable oil, biodiesel, and diesel directly into the fuel tank and you do not need to worry about switching from one fuel to another. The engine starts easily and burns cleanly from the start, even in cold temperatures. However, installing the Elsbett kit requires more engine modification than is necessary for the dual tank kits.



*Greasecar
conversion kit*

Greasecar

How do I install the conversion kit?

You have several options for installing the conversion kit. First, you may contact one of the following mechanics who specialize in converting diesel cars and are interested in contracting their services to Culver's franchisees. They will charge from \$1,000 to \$2,500 to install the conversion kit.

Luke Matthews, (608) 212-2247, lucasnmatthews@charter.net

Ryan DeWald, (608) 442-9115, ryandewald@gmail.com

Second, you may select a local mechanic to install the kit for you. Here are some guidelines if you choose this option:

- Select a mechanic who has significant experience with diesel vehicles.
- Be aware that many mechanics are unfamiliar with the concept of vegetable oil fuel and may be hesitant to modify a diesel engine in this way.
- Inform the mechanic that this is not a new idea, but has been around since the late 1800's when Rudolf Diesel designed the diesel engine with vegetable oil fuel in mind.

Finally, if you are mechanically inclined, you may choose to install the kit yourself using the instructions provided with the kit.



Fueling up at Culver's®

You can turn your Culver's into a personal fueling station for your "Blue & Green Enviro Machine." Once you set up a system to filter, store and pump the oil, fueling up will be clean and efficient. Components of this system include:

- A hose or pipe to carry the used oil from the fryer to a storage container
- A series of filters to thoroughly filter the oil before it is stored
- A durable metal storage container to hold the fuel
- A pump and hose to carry the fuel from the storage container through the back wall of your restaurant

Fueling System Components

Equipment Needed

Metal storage container (*see next page*)

120-volt fuel pump

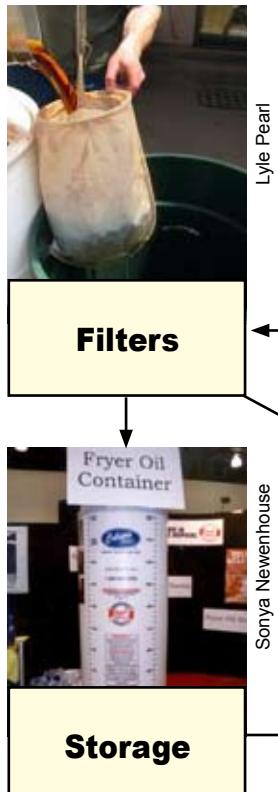
Filters to 5 microns

Hoses and pipe

Dispensing nozzle



Sonya Newenhouse



Lyle Pearl

Sonya Newenhouse

Russ Trzebiatowski



Greasecar





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Filtering and Storage System Options

1. Professional Fryer Oil Storage Systems

For a high quality, efficient and clean system with large storage capacity, you may consider purchasing one of the following professional storage systems:

- **250-gallon Grease Guzzler inside storage system.** Cost: \$2,500

Base dimensions: 2.5 feet by 4 feet. Height: 6 feet. This system includes a “transporter” to conveniently collect and pump the used fryer oil into the storage container.

Contact: The Anamax Group, (608) 846-5466, www.burbankgrease.com/guzzler.html

- **200-gallon Direct Connection inside storage system.** Cost: \$3,500 (includes tank, stand, fryer adapter kit, and installation) Base dimensions: 31 inches round. Height: 7 feet. Available in translucent polymer or stainless steel. This system can be connected to your existing fryer so you can direct grease through a filter and into the storage container with the flip of a switch. Includes a patented low watt heater. Mahoney Environmental can also install a system to pump vegetable oil from the storage tank into your vehicle.

Contact: Sonny Nuccio, Mahoney Environmental, (800) 892-9392, www.mahoneyenvironmental.com

- For restaurants without inside storage space, Onkins Company in Illinois manufactures a **300-gallon outside storage tank** with a patented low watt heater system. Cost: \$3,025 (tank and pump)

Contact: John Trone, Onkins Co. (309) 329-2121

2. Simple and Cost-Effective Filtering Options

- Purchase one or two 55-gallon metal drums, bag filters, a pump and a dispenser. Cost: approximately \$200 Contact for metal drums: Negus Container and Packaging, (608) 251-2533. Or look up a supplier near you at: www.enviroyellowpages.com/listings/USA/WI/ and click on “barrels and drums.”

• Greasecar sells a stationary filtration kit for \$850: www.greasecar.com

- Filter your oil on an as needed basis by simply pouring it through a bag filter into a bucket, then pour the filter through a funnel into your vehicle’s fuel tank.

Note: Whatever option you choose, take care to avoid pumping oil from the bottom of the storage container, where food particles and water settle. Particles and water can potentially damage the vehicle engine.

Stationary filtration system



Greasecar



Lyle Pearl

As needed filtering

Technical Assistance is Available

See Additional Resources on page 11 for mechanics who have experience setting up vegetable oil fueling stations and are interested in contracting their services to Culver’s franchisees.



Step 4 Promote your Car

You and Culver's® are alternative energy pioneers—share your story.

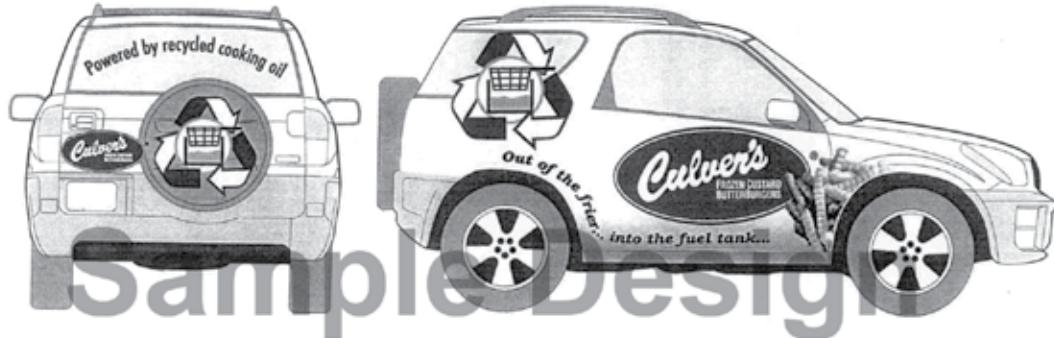
Culver's is the first major restaurant chain to actively promote vegetable oil as fuel, as far as we know. Once you convert your car or truck to run on waste vegetable oil, you will join a small but growing number of franchisees who are pioneering the use and awareness of this clean, renewable fuel. We strongly encourage you to share your story with the public so people will know that Culver's is leading the way toward a more sustainable energy future. Many other restaurant owners may follow your lead and benefit from a fuel source that is readily available to them.

How to purchase a vehicle wrap

You can order a custom-made vehicle wrap that advertises that your car is powered by recycled cooking oil, "out of the fryer and into the fuel tank." Cost of installation ranges from \$900-\$1,500 and can be done by Signs Now or another PDAA (Professional Decal Applicators Association) member. As of February 2005, the cost of a vehicle wrap at Signs Now was \$1,323 + installation for a VW Beetle and \$1,634 + installation to wrap a Ford Excursion. Please call CFSI for design options. The design below is one example of a vehicle wrap.

This moving billboard costs considerably less than a standard roadside billboard and will achieve maximum visibility!

To order your wrap, contact:
Holly Muth,
Business Development
Signs Now
(262) 789-8006
holly_signsnnow@tds.net
www.signsnnow.com



How to share your story with the press

Once your "Blue & Green Enviro Machine" is operating, you are ready to get the word out to the media. During this time of uncertain oil supplies, the press is very likely to have an interest in your story. Here's how to let them know about it.

First, use the press release template provided on page 12. All you have to do is insert a few details and a quote.

Then, email or fax the press release to the following media outlets:

Wisconsin Public Radio: You may contact one of the following two reporters who have demonstrated interest in alternative energy and vegetable oil fuel: Gil Halsted (Madison), (608) 263-4110, halsted@wpr.org, or Chuck Quirmbach (Milwaukee), (414) 227-2040, quirmbach@wpr.org. You may also contact your local Wisconsin Public Radio station. Find their contact information at www.wpr.org/regions/.

Your local TV news stations: If you know of a reporter who covers environmental or community news, address your press release to them. Look up the station in the phone book or on the web, call the general number and ask for the news director. Ask for the fax number or email address for sending a press release.

Your local newspapers: If you know of a reporter who covers environmental or community news, address your press release to them. Call the newspaper and ask for the news director, then ask for a fax number or email address for sending a press release.



Used vegetable oil from your Culver's® is a valuable resource.

We hope that this guide has convinced you that operating your own “Blue & Green Enviro Machine” is a viable way to satisfy your personal or business transportation needs. However, you may decide that it is not the best option for you at this time. If that is the case, we encourage you to consider other ways to make use of your vegetable oil fuel.

Option 1: Share your fuel with local organizations.

Recycling waste vegetable oil into fuel is a desirable option for many organizations who wish to save money and at the same time help preserve Wisconsin’s air quality by using a cleaner alternative to fossil fuels. Culver’s can partner with a local business or nonprofit organization by donating your leftover fryer oil. By becoming partners in clean, renewable energy use, you will both benefit from positive media attention. To locate environmentally aware businesses and nonprofit organization in your area, search on the Internet or put a small ad in your local newspaper. For a listing of environmental organizations in Dane County, visit www.sustaindane.org and for a listing of organizations in southeast Wisconsin visit www.besmart.org/greenpages/. In the Ashland area, contact the Alliance for Sustainability at www.allianceforsustainability.org, and in Door County visit www.greenfund.com.

Option 2: Share your fuel with local individuals.

Another way to share your resources and gain positive publicity is to make your vegetable oil available to individuals who are already driving converted diesel vehicles. To locate people in your area who can use waste vegetable oil for fuel, you can post an announcement on the Wisconsin section of <http://forums.bioldieselnow.com> or on Frybrid’s on-line discussion forum: www.frybrid.com/forum/. You may also place an ad in your local newspaper.

For Both Options

If you choose to share your waste vegetable oil by either of the methods above, we recommend that you set up a fueling station at your restaurant (see Step 3). Users will be able to pull in to your restaurant lot and fuel up via a hose that pumps the oil out of your storage tank. And you’ll be ready if you decide to convert your own vehicle at some time in the future.





Additional Resources

Books

Pahl, Greg. 2004. *Biodiesel: Growing a New Energy Economy*. Chelsea Green Publishing.

Tickell, Joshua. 2003 *From the Fryer to the Fuel Tank: The Complete Guide to Using Vegetable Oil as an Alternative Fuel*. New Orleans: Joshua Tickell Media Productions.

Informational Websites

www.greasenotgas.com

www.veggiepower.net

Vehicle Conversion Kits

www.greasecar.com

www.elsbett.com

www.greasel.com

www.plantdrive.com

www.vegpowersystems.com

Diesel Vehicles

journeytoforever.org/biodiesel_UScars.html

www.autotrader.com

www.cars.com

www.craigslist.org

www.ebay.com

www.tdiclub.com

Online Discussion Forums

www.greasecar.com/forum.cfm

www.forums.biodieselnw.com

Biodiesel Distributors

PrairieFire BioFuels Cooperative, www.prairiefirebiofuels.org

Great Lakes Biofuels, www.greatlakesbiofuels.net

Twin Cities Biodiesel Cooperative, www.tcbbiodiesel.com

Mechanical Assistance

University of Minnesota Diesel Help Line, (651) 330-0450, streb002@umn.edu

These mechanics are available to help Culver's franchisees convert vehicles and set up filtering/storage systems:

Luke Matthews, (608) 212-2247, lucasmatthews@charter.net

Ryan DeWald, (608) 442-9115, ryandewald@gmail.com

Did you know?

Rudolf Diesel invented the diesel engine in 1893 and demonstrated it at the World Exhibition in Paris in 1900 using peanut oil as a fuel. Diesel's aim was to boost agricultural markets with a fuel derived from crops rather than petroleum. More than a century later, we are returning to Diesel's original intention!

Vehicle Wraps

Holly Muth, Signs Now, (262) 789-8006, holly_signsnow@tds.net

Waste Oil Storage Systems

The Anamax Group, (608) 846-5466, www.burbankgrease.com

Mahoney Environmental, (800) 892-9392, www.mahoneyenvironmental.com



Press Release Template

This should appear on Culver's letterhead:

PRESS RELEASE

Date: _____

Contact: _____ (*Insert your name and contact information*)

Rebecca Grossberg, Madison Environmental Group, 608-280-0800

Barbara Behling, Culver's Franchising System, 608-644-2103

Culver's® in _____ (city) Recycles Vegetable Oil into Vehicle Fuel

Culver's® in _____ (city) is the latest Culver's in Wisconsin to begin recycling the restaurant's used cooking oil into vehicle fuel. This effort was facilitated by a partnership between Culver's® restaurants and the consulting firm Madison Environmental Group, who received a technology feasibility grant from the state energy office to systematically increase the use of vegetable oil as a fuel source in Wisconsin.

Culver's owner _____ (*name*) converted a _____ (*type of vehicle*) (*Insert details about use of car and quote from owner*)

Diesel cars and trucks are capable of running on straight vegetable oil after a conversion process involving slight modifications to the diesel engine and the addition of a vegetable oil fuel tank. Used cooking oil can then be transferred from a restaurant's fryer, through a filtering system, and into the fuel tank of a converted vehicle. Vegetable oil used as a biofuel produces zero net greenhouse gas emissions, zero sulfur emissions, and less particulate matter ("soot") than diesel or gasoline.

Culver's was happy to be asked to partner with Madison Environmental Group for this project that provides a real-world testing ground for vegetable oil fuel, which to date has been used almost exclusively by hobbyists. "At Culver's we're committed to being a good neighbor and an environmentally conscious company," said Craig Culver, co-founder of Culver's. "This project is an exciting opportunity for our franchise owners to turn a waste product into a fuel source, and be environmentally responsible at the same time."

To facilitate the adoption of vegetable oil fuel, Madison Environmental Group developed an Easy How-To Guide and provides technical assistance to interested franchisees. With the cost of gasoline over \$2.00 per gallon and the cost of diesel over \$2.50 per gallon, switching to vegetable oil fuel can save franchisees hundreds of dollars per month after initial installation costs. Additional details about the project and its progress are available from Madison Environmental Group's Web site (www.madisonenvironmental.com).

About Culver's Restaurants:

Culver's restaurants are independently owned and operated in over 300 locations in 15 states across the nation. The owner/operator concept has been the cornerstone of growth and success for Culver's since the first location opened in Sauk City, Wis., on July 18, 1984. Culver's is committed to the communities it serves. Culver's invests deeply in partnerships and programs, including its VIP college and technical school scholarship program, the annual Day of Warmth and countless other franchise-driven local efforts. For more information on Culver's locations, promotional programs, menu selections and other areas of interest, visit www.culvers.com.

About Madison Environmental Group:

Madison Environmental Group is an interdisciplinary consulting firm assisting businesses and individuals with innovative resource and cost saving solutions that contribute to a healthy community and environment.

For more: www.madisonenvironmental.com.

www.madisonenvironmental.com