North Carolina 2007
Clean Fuel and Advanced Transportation Technology Options

Biodiesel

Biodiesel is a clean burning alternative fuel, produced from domestic, renewable resources. Biodiesel contains no petroleum, but it can be blended at any level with petroleum diesel to create a biodiesel blend. Biodiesel can be used in any compression-ignition (diesel) engines with little or no modifications. Biodiesel is simple to use, biodegradable, nontoxic, and essentially free of sulfur and aromatics. Biodiesel also helps diversify our nation's fuel supply and supports energy security initiatives by being domestically produced.

B20 (20 percent biodiesel and 80 percent petroleum diesel) and higher blends are widely available in North Carolina through a State Purchasing Contract in all 100 NC Counties and the network of local producers and distributors.

Biodiesel weekly State Fuel Pricing for NC government: www.doa.state.nc.us/PandC/dynfuels/fuelcost.asp
Biodiesel fact sheet and NC biofuel retail & distributors: www.ncmobilecare.org/3/miscellaneous4.htm

Ethanol

Ethanol is a renewable, domestic, environmentally preferable fuel that enhances the nation's economy and energy independence. There are two ethanol blends used in NC:

- **E10** is a premium blend of 10% ethanol with 90% conventional gasoline and can be used in any gasoline vehicle. **E10** is available to local government, school systems and state government fleets through a state purchasing contract in all NC counties.
- **E85** is an 85% blend of ethanol with 15% gasoline used in flexible fuel vehicles (FFVs) that are designed to operate on E85 and/or gasoline. There is no additional cost to purchase a FFV as compared to same gasoline model. An E85 state wide contract will be in place by July 2007.

2007 E85 Flexible Fuel Vehicles (highlighted vehicles are on state purchasing contract)

Vehicle Category	Manufacturer	Year	Brand	Model	Engine Displacement (lts)
Minivan	Daimler Chrysler	**2007**	Dodge	**Caravan, Grand Caravan, Cargo Van**	**3.3**
Van	General Motors	**2007**	Chevrolet	**E-150**	**5.3**
Van	General Motors	**2007**	Chevrolet	**Express**	**3.9**
Van	General Motors	**2007**	GMC	Savana	3.9
Pickup	General Motors	**2007**	Chevrolet	**Silverado (V8)**	**5.3**
Pickup	Nissan	2005-2007	Nissan	Titan	5.6
Pickup	Daimler Chrysler	**2007**	Dodge	**Dakota, Dakota Club Cab**	**4.7**
Pickup	Ford	**2007**	Ford	**Ranger**	**4.7**
Pickup	General Motors	**2007**	GMC & Chevrolet	**Sierra & Silverado**	**5.4**
Pickup	Ford	**2006-2007**	Ford	**F-150 (3-valve)**	5.4
Pickup	Daimler Chrysler	**2007**	Dodge	**Ram 1500**	4.7
Sedan	Ford	**2006-2007**	Ford	**Crown Victoria (2 valve, except taxi and police)**	4.6
Sedan	Ford	2006-2007	Lincoln	Towncar (2 valve)	4.6
Sedan	General Motors	**2006-2007**	Chevrolet	**Impala**	3.5
Sedan	Mercedes-Benz	2007	Mercedes	C230 automatic and manual transmission	2.5
Sedan	Mercury	2006-2007	Mercury	Grand Marquis (2 valve)	4.6
SUV	General Motors	2007	Buick	Terrazza	3.9
SUV	General Motors	2007	Chevrolet	Avalanche	5.3
SUV	General Motors	**2007**	GMC	**Suburban, Tahoe, Yukon XL**	**5.3**
SUV	General Motors	**2007**	Chevrolet	**Uplander**	**3.9**
SUV	General Motors	2007	Saturn	Relay	3.9
SUV	Daimler Chrysler	2007	Chrysler	Aspen	4.7
SUV	Daimler Chrysler	**2006-2007**	Dodge	**Durango**	4.7
SUV	Daimler Chrysler	2007	Jeep	Commander	4.7
SUV	Daimler Chrysler	**2007**	Jeep	**Grand Cherokee**	**4.7**
SUV	Nissan	2007	Nissan	Amada	5.6

North Carolina State Government vehicle purchasing information: www.doa.state.nc.us/PandC
E10 weekly State Fuel Pricing for NC government: www.doa.state.nc.us/PandC/dynfuels/fuelcost.asp
NC Ethanol fact sheet and NC biofuel retail & distributors: www.ncmobilecare.org/3/miscellaneous4.htm

Hybrid Electric Vehicles

Hybrid-electric vehicles (HEVs) combine the benefits of gasoline engines and electric motors that are configured to obtain different objectives, such as improved fuel economy, increased power, or additional auxiliary power for electronic devices and power tools.

2007 Hybrid Electric Vehicles (^available on the state purchasing contract)

Compact
1.3L Honda Civic (50 mpg)
3.5L Lexus GS 450h (26 mpg)

Mid-size
1.5L Toyota Prius^ (55 mpg)
2.4L Toyota Camry (39 mpg)
3.0L Honda Accord (31 mpg)

SUV
2.3L Ford Escape 2WD (34 mpg)
2.3L Ford Escape 4WD (31 mpg)
3.3L Lexus RX 400h (29 mpg)
2.3L Mercury Mariner (31mpg)
3.3L Toyota Highlander (29 mpg)
2.4L Saturn Vue (29 mpg)

Truck
5.3L Chevy Silverado 2WD (19 mpg)
5.3L Chevy Silverado 4WD (18 mpg)
5.3L GMC Sierra 2WD (19 mpg)
5.3L GMC Sierra 4WD (18 mpg)

**Combined MPG reflects city & hwy driving*
www.fueleconomy.gov/feg/hybrid_sbs.shtml

Heavy Duty Hybrids such as hybrid trucks and hybrid buses are showing improved fuel efficiency, while simultaneously reducing vehicle emissions. Heavy-duty trucks can easily be hybridized and can make positively impact fuel economy and emissions. There are several different hybrid buses available that can be used in shuttle, transit, school and trolley applications
View available heavy-duty hybrids at: www.eere.energy.gov/cleancities/progs/afdc/hsearch_hybrid2.cgi

Learn more about HEVs from EDTA: www.electricdrive.org
Learn more about HEVs from EV World: www.evworld.com
HEV Cost Calculator Tool: www.eere.energy.gov/cleancities/hev/cost_calc.html

Low Speed Vehicles

A **Neighborhood Electric Vehicle (NEV)** is a Low-Speed Vehicle (LSV) with top speeds of 20 to 25 miles per hour that complies with certain U.S. National Highway Traffic Safety Administration (NHTSA) standards. North Carolina allows NEVs to be operated on streets and highways where the posted speed limit is 35 mph. NEVs can be titled and licensed as private passenger vehicles.

Low speed vehicles that are not NEVs may take the place of conventional vehicles in certain campus settings. These vehicles are not plated and permitted on public streets. These vehicles help reduce petroleum consumption and emissions by operating on biodiesel, electricity, propane and/or compressed natural gas

On state contract: review state contract 020A for listing of utility vehicles and prices at the following website: www.doa.state.nc.us/PandC/020a.pdf . All vehicles listed in the contract have diesel engines or can be ordered with a diesel engine option.

NEV & LSV Vendors:

Carolina Industrial Equipment, Inc.,
[John Yoxtheimer, Sales Manager, 800-476-2434]
- Columbia Par Car Company, www.parcar.com
- E-Ride Industries, www.e-ride.com
- Tiger Truck, LLC., www.tigertruck.com *(LSVs only)*

Bleecker Electric Car Co. www.theelectriccarco.com
[Steve Shattuck, Commercial Truck Manager, 800-849-3495]
- Dynasty Electric Car, www.itiselectric.com
- Zenn Motor Company, www.zenncars.com
- Miles Automotive Group, www.milesautomotive.com

Eco Vehicles; www.ecovehicle.com
[John Dabels, (704) 544-9907 or (704)968-1628 (m)]
- LSVs & hybrid electric retrofits

Global Electric Motorcars, LLC www.gemcar.com
[Lenny Szabo, SE Sales Manager, 407-688-1646]
- several distributors in NC

B.I.G. Man; www.bigmanev.com
[Cory Blackledge 1-877-4BIGMAN]
- LSVs

NHTSA safety standards for NEVs and LSVs: www.nhtsa.dot.gov/cars/rules/rulings/lsv/lsv.html

Compressed Natural Gas (CNG) & Propane (LPG)

CNG and LPG are the cleanest fossil fuels. Compared to gasoline and diesel, their use could bring about a significant reduction in tailpipe emissions of carbon monoxide (about 70%), nitrogen oxides (about 50%), and ozone-causing pollutants (about 90%). Honda is the only company that manufactures a light duty dedicated CNG vehicle. Currently most CNG vehicles are up fitted by companies that have received certification by the U.S. EPA.

Original equipment manufacturers (OEMs) that offer CNG vehicles:

- **Honda Civic GX CNG** – North Carolina dealers below
  Appletree Honda (Asheville) – Jason Locke– 828-684-4400
  Flow Honda (Winston Salem) – Frank Parro – 336-785-3380
  Hendrick Honda (Charlotte) – Larry Strawn – 704-552-2090

EPA Certified conversions to CNG and LPG

BAF Technologies; www.BAFtechnologies.com Bill Calvert (214)-231-1450 ext 458 bcalvert@baftechnologies.com Dave Loper (214) 231-1450 ext 469 dloper@baftechnologies.com 4.6 L Ford Crown Victoria, Lincoln, Mercury 5.4 L E350, and plans for the F150/250 pickup 6.8 L E450 Cutaway. Also CNG or LPG for the GM 6.0 and 8.1 liter engines; Dual-Fuel diesel to natural gas systems for trucks and buses --- Baytech Corporation; www.baytechcorp.com/ Rebecca Royer (650) 949-1976 6.0L L/M/HD (GM, Isuzu, Workhorse – pick-ups, vans/stepvans, CFs, cutaways) 8.1L (Topkick/Kodiak, cutaways)	Cummins Westport; www.cumminswestport.com/ Greg Campbell, 864-316-7624 5.9L "B Gas Plus" – 195-230hp 8.9L "ISL-G" – 250-320hp (replaces 8.3L "C Gas Plus" and 8.9L "L Gas Plus") 15L "ISX-Gas" – 450hp (**Transeco** will sell/install) --- Emission Solutions Inc. Jim Moore (972)-369-0092 jimmoore@emissionssolutionsince.com Ira Dorfman (301)229-3663 (w), (202) 255-6050(m) idorfman@emobilityintl.com CNG replacement of 7.6L International DT466 engine with Phoenix NG – 175-265hp --- John Deere, 319-292-5220, cummingstome@johndeere.com 8.1L HN04 – 250-280hp ('til 12/07)

Conversion engine installer	***Small Appliance Fuel Provider***
Transeco Energy, www.transecoenergy.com, Install conversion units in vehicles and refueling stations Miles George, (828) 210-8146 miles@transecoenergy.com	FuelMaker, www.fuelmaker.com Paula Herbert, 800-898-3835, usinfo@fuelmaker.com

List of CNG businesses and services: www.ngvc.org/buz_dir/index.html
Learn about CNG vehicles: www.eere.energy.gov/afdc/afv/gas_vehicles.html
CNG vehicle manufacturers and up fitters: www.ngvc.org/mktplace/factsheets.html
Propane vehicles and equip: www.propanecouncil.org/files/2006_PropaneProducts_FINAL_10.16.06.pdf
Information about NC CNG filling stations: www.daq.state.nc.us/motor/cng/

Idle Reduction Technologies

Truck idling technologies fall into two general categories: stationary and mobile. Mobile idle reduction technologies (MIRTs) include direct-fired heaters, auxiliary power units (APUs), and automatic engine idling reduction systems. Stationary technologies include truck stop electrification (TSE) and advanced truck stop electrification (ATSE). TSE refers to a system of pre-wired distribution components that connect shore power to a truck's on-board equipment to provide heat, air conditioning, and other amenities without needing to run the main engine. ATSE systems consist of stationary structures near each parking space that deliver heat air conditioning, and other amenities.

Stationary Idle Reduction Technologies

ATSE ~Electrified Parking Spaces: Single System

(this requires technology only in the ground)

IdleAire Technologies Corporation www.idleaire.com
Carol Doty, 865-342-3606

TSE ~Electrified Parking Spaces: Dual System

(this requires technology both on the truck and in the ground)

Shurepower™, LLC www.Shurepower.com
Joe Licari joe.shurepower@gmail.com 315-838-4876, 315-404-5613

Phillips and Temro Industries www.phillipsandtemro.com
Cab Power system - technology on truck to connect to TSE space
18 Distributors in North Carolina, call 800-328-6108 for list

Mobile Idle Reduction Technologies

Automatic Shut-Down/Start-Up Systems

Cummins Engine Company, Inc.
Kenly, 888-288-7181
Greensboro 336-275-4531
Charlotte 704-596-7690
Wilson 252-237-9111
www.cummins.com/na/pages/en/products/powergeneration/index.cfm,

TAS Distributing, Inc.
Gary Krofchalk -612-386-7794, gfk@airmail.net
www.tempastart.com

Diesel Driven Heating Systems

Automotive Climate Control (ACC)
Bud Rambow–(574) 264-2190,
sales@accclimatecontrol.com
diesel fired heater, AC system, battery pack system
www.accclimatecontrol.com

Webasto Product North America, Inc.
Setra of North America, Greensboro 800-882-8054
www.techwebasto.com

Thermo King Corporation
Jim Christian 704-596-2652, 704-904-9406 (m)
jchristi@tk-net.com
www.thermoking.com,

Auxiliary Power Unit or Generator Set

Carrier Transicold MidAtlantic–NC Distributors
Will Volcano, Kevin Miller, Charlotte 704-9404930
Raleigh 919-661-1186

Double Eagle Industries
Tommy Milham, 800-227-4121
tommym@doubleeagleind.com
www.doubleeagleind.com/gen-pac.htm;

Gates Corporation –Cab Runner
Chuck Hollis, 615-373-1144, chollis@gates.com
www.gates.com

Frigette Truck Climate Systems
Rod Waco, (817) 293-5313,
rwaco@scsfrigette.com
Pat Minton, (817)-929-1945,
www.scsfrigette.com/html/products/,

Kool-Gen
W.H. Lowe, 979-849-3773,
koolgen@cmaaccess.com
www.kool-gen.com,

Midwest Power Generators
midwestpowergen.com 320-352-3663

Pony Pack, Inc.
Carl Pierce, 501-231-2442, carl@ponypack.com
www.ponypack.com

AAP Inc.
Bill Harris, 804-633-9454, bill@aap.com
www.aap.com

Generator and Air Services -Truck Gen
Gino Kennedy, (239) 693-8211,
genair@telcove.net
www.truckgen.com

AuraGen
Mitchell Zeitlin, 800-909-2872
mzeitlin@aurasystems.com
www.aurasystems.com/

W&M Truck Clinic- Rig Master Power
Mike Pietruszka, 704-394-2358 ext 119,
mikep@wmtruck.com
www.rigmasterpower.com/

Paddock Solar
with Espar heating and Southwest Solar cooling
Ray Paddock, 888-793-9899, paddock.group@verizon.net
www.paddocksolar.com,

Battery Powered

Autotherm Division Enthal Systems, Inc
Don Boyer, 847-726-1717 ext 12,
dboyer@autothermusa.com
www.autothermusa.com,

Bergstrom Inc.
NITE system battery powered heat and AC
Over 30 local retailers in NC
www.nitesystem.com/, 866-204-8570

EPA list of idle reduction technologies: www.epa.gov/smartway/idlingtechnologies.htm#loco-mobile-sdsu

Diesel Retrofit Technologies

Diesel retrofit technologies are pollution control devices designed to reduce harmful exhaust emissions on existing diesel engines. The two most common retrofits are **diesel particulate filters** (DPFs) and **diesel oxidation catalysts** (DOCs). DPFs are ceramic devices that collect particulate matter in the exhaust stream. DPFs must be used in conjunction with ultra low sulfur diesel (ULSD) and result in a 60 to 90 percent reduction in particulate matter (PM), hydrocarbons (HC), and carbon monoxide (CO). DOCs are devices that use a chemical process to break down pollutants in the exhaust stream into less harmful components. DOCs can reduce emissions of PM by 20 percent and HC by 50 percent and CO by approximately 40 percent. When possible, **closed crankcase ventilation system** should be combined with a DPF or DOC to further reduce emissions.

The U.S. Environmental Protection Agency (EPA) and California Air Resources Board (CARB) have verification processes for the approved use of diesel retrofit technologies.

For a list of **EPA verified technologies** see: www.epa.gov/otaq/retrofit/retroverifiedlist.htm.
For a list of **CARB verified technologies** see: www.arb.ca.gov/diesel/verdev/vt/vt.htm

Following are companies that provide diesel retrofit technologies to the North Carolina market.

EPA or CARB Verified Technologies

Caterpillar Emissions Solutions *Oxidation Catalysts, Diesel Particulate Filters* Brett Alkins, alkins_brett_d@cat.com Office: 309-578-1869, Cell: 309-258-8254 www.cat.com	**Clean Diesel Technologies** *Fuel born catalyst with DOC, DPF* Glen Reid, greid@cdti.com Office: 203-327-7050, Cell: 203-376-6678 www.cdti.com
International Truck Engine Corp. *DOCs & DPFs* Roger Kuchar, roger.kuchar@nav-international.com Office: 630-753-6217, Cell: 847-727-6437 www.greendieseltechnology.com	**Cleaire Horizon** *Active and Passive regeneration system and DPF* Tom Swenson, Tom.swenson@cleaire.com Office: 916-689-0248, or toll free 1800-308-2111 www.cleaire.com
Donaldson Company, Inc. *Oxidation Catalysts* Mike Zimovan Office: 803.767.7158 www.donaldson.com/emissions	**Engine Control Systems, Inc**. *DOCs & DPFs* David Secord, dvsc@enginecontrolsystems.com Office: 905-952-2439, Cell: 416-710-3611 www.enginecontrolsystems.com

Learn more about diesel retrofit technologies from:

EPA's Clean School Bus Program www.epa.gov/otaq/schoolbus/index.htm

Diesel Technology Forum www.dieselforum.org

Southeast Diesel Collaborative www.southeastdiesel.org

Manufacturers of Emission Controls Association www.meca.org

Environmental Defense's Cleaner Diesel Handbook www.cleanerdieselhandbook.org

Lubricants

Three options are available for replacing conventional petroleum based lubricants and motor oils: synthetics, re-refined oils and bio based products. One of the main differences between hydrocarbon based petroleum lubricants and synthetic lubricants is the formulation of the base oil. In synthetic lubricants, the base oil is 100% synthetic. Synthetic lubricants are more stable, flow at lower temperatures, more resistant to boiling off, and less susceptible to oxidation, which causes thickening with prolonged high temperatures. Synthetics keep the engine cleaner through improved sludge and varnish protection, reduce engine wear at high temperatures with more stable viscosity, protect the engine when it's running under severe conditions at high temperatures, provide better cold-temperature starts with faster oil flow at ignition and improve fuel efficiency.

More information can be found at: www.royalpurple.com/techrp/ncsu021112.pdf

State agencies can be procure synthetic and re-refined motor oil from:
North Carolina Correction Enterprise www.doc.state.nc.us/EPRISE/products/oillubes.htm

Bio-based motor oils and lubricants perform like conventional petroleum based products but are produced from renewable resources such as soybeans. Manufacturers of bio lubricants include:
Renewable Lubricants, Inc. www.renewablelube.com
West Central Soy www.soypower.net

Conservation

Reducing fuel consumption, or conservation, is an important strategy for meeting petroleum reduction goals.

1. Establish a fuel-efficient vehicle procurement policy
2. Keep fleet vehicle tires properly inflated, aligned, and use low rolling resistance (LRR) tires
3. Get regular tune-ups, filter changes and engine lubes.
4. Provide transit incentives for employees to ride public transit and offer ride sharing incentives.
5. Offer employees a telecommuting option.
6. Offer safe bicycle storage; arrange safe bicycling instruction.
7. Require fleet vehicles cars be driven at posted speed limit.
8. Encourage combining multiple out-of-office errands/trips.
9. Establish idle reduction policies; eliminate unnecessary idling
10. Educate Employees and the Public

More information can be found at: www.fueleconomy.gov
www.fypower.org/save_gasoline
oee.nrcan.gc.ca/english/saving-fuel.cfm

Contact for more information
Anne Tazewell, NCSC Clean Transportation Manager
(919) 513-7831 CleanTransportation@ncsu.edu

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