ATTACHMENT A

A RESOLUTION ACCEPTING THE STAFF REPORT ON THE ENVIRONMENTAL ADVISORY BOARD RECOMMENDATION ON BIODIESEL IN THE TOWN OF CARRBORO
Resolution No. 37/2004-05

WHEREAS, the Carrboro Board of Aldermen seeks to ensure that its existing and proposed policies and regulations are conducive to employing alternative fuel options and overall increased energy efficiency; and

WHEREAS, staff has provided an appropriate assessment of the Environmental Advisory Board recommendations on biodiesel in the Town of Carrboro that provides the Aldermen with sufficient information on which to base decisions related to biodiesel use,

NOW, THEREFORE BE IT RESOLVED by the Carrboro Board of Aldermen that the Aldermen accept this staff report and direct staff to proceed with final plans for implementing a trial period for use of B100 in a maximum of two town vehicles for a minimum of six months and a maximum of one year. In addition, the Carrboro Board of Aldermen directs staff to share information regarding emissions of kerosene, B20, and B100 with Chapel Hill Transit staff.

Town of Carrboro
Environmental Planning

STAFF REPORT

To: **Steve Stewart, Town Manager**
Mayor and Board of Aldermen

From: **Noah Ranells, Environmental Planner**

Date: **8 October 2004**

Subject: **Biodiesel Recommendation from Environmental Advisory Board**

Definition of Biodiesel (B100): *A fuel consisting of long-chain fatty acid alkyl esters made from renewable vegetable oils, recycled cooking greases, or animal fats " that meets ASTM standards ASTM D6751; A high BTU renewable fuel with properties similar to No. 2 petroleum diesel fuel.*

The Town of Carrboro has been using B20, a mix of 20% biodiesel (B100) and 80% #2 petroleum diesel (B-zero), since 9 August 2002 in all vehicles and equipment with diesel engines. On an annual basis, B20 costs the Town of Carrboro an additional $7, 334 compared to petroleum diesel, while B100 would cost $36,670 (Table 1).

Table 1. Annual quantity and incremental cost of diesel, B20, and B100; Town of Carrboro (Aug.2002 to Aug 2004)

	Fuel Use	Incremental Fuel Cost compared to petroleum diesel
B-zero (estimated)	25,823	$0
B20	25,823	$7,334
B100 (estimated)	25,823	$36,670

Based on statistical regression, B20 reduces emissions of particulate matter (PM), carbon monoxide (CM), and unburned hydrocarbons (HC) by ~13 to 20%; Emissions of nitrous oxides (NOx) are increased by ~1 to 2% (Figure 1). Emissions from B100 are reduced up to ~50% for CM and PM and up to ~ 70% for HC. Of concern however, is the increase of NOx emissions up to ~10%. New research on NOx emissions have yielded fuel additives that eliminates the increase NOx emissions and may further decrease these undesirable emissions.

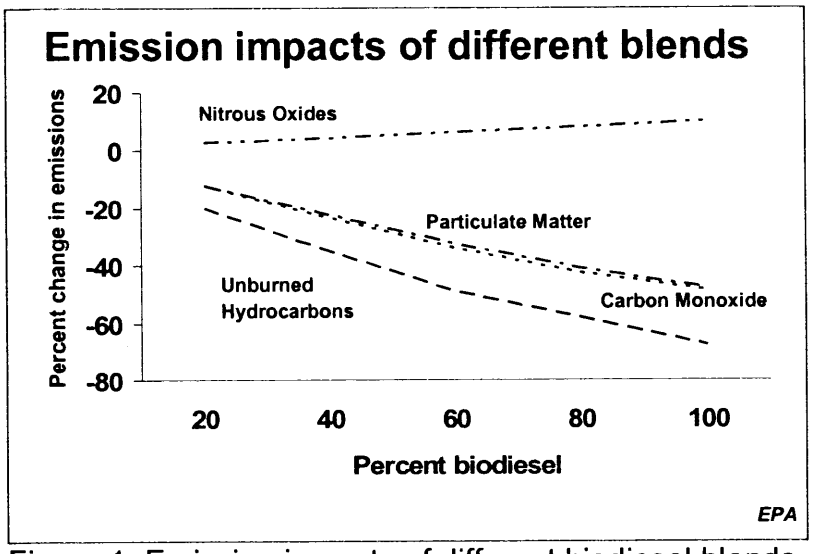

Figure 1. Emission impacts of different biodiesel blends

The Environmental Advisory Board submitted a list of four recommendations to the Board of Aldermen on 7 September 2004 regarding the use of biodiesel in Carrboro. Each of the four recommendations is cited below and followed by a staff comments.

1. Request town manager to submit a letter to the health department in support of a survey of local restaurants that Carolina Biodiesel is authoring that would ascertain which area restaurants might supply yellow grease to a local biodiesel producer.

Based on a telephone conversation with Bo Lozoff on 28 September 2004, the survey was already conducted with assistance from the Commissioner Jacobs and the Orange County Environmental Health Department.

2. Examine the Town of Carrboro's existing contract on biodiesel supply and think about either terminating that contract or modifying it so that local yellow grease biodiesel operations would have an opportunity to sell us their biodiesel

No current contract for biodiesel. When a fuel purchase is required, the Public Works department bases the decision to purchase diesel on cost and service record of fuel vendors. The purchase of a full tanker truck of fuel is a requirement to purchase on state contract. Yet, the town is unable to accommodate a full load and therefore B20 is purchased on the open market.

3. Explore the feasibility of a pilot project evaluating the cost and mechanical efficiency of running selected town vehicles on B100 vs. B-zero and B20.

Discussions are ongoing with the Public Works department regarding a trial period for B100. To date, there appears to be agreement that this effort can be undertaken for a period of six months. Cost considerations for this project include 1) a B100 tank and pump, as well as 2) the incremental cost of B100 fuel compared to B20.

Provided that an associated Public Works agreement with Piedmont Biofuels proceeds to implementation, a 500-gallon B100 tank will be placed at the PW yard (Item # X on 12 October 2004 Board of Aldermen Meeting). This effort is funded by a Clean Cities grant to Piedmont Biofuels to place six B100 fueling sites in the Triangle area. This site at PW will provide for the Town of Carrboro's fleet as well as allow for once-a-week fueling for a maximum of 12 Piedmont Biofuels co-op members. Provided that this project is approved and implemented, there will be no cost associated for installing an above ground tank for this B100 trial in town vehicles.

The incremental cost of B100 compared to B20 is currently ~$2.00 per gallon. Two fleet vehicles have been identified for this trial and will be fueled exclusively with B100. Annual fuel use for this vehicle is ~500 gallons. A six-month period would require ~$1,000 to support this effort.

Ramifications of a successful trial period of B100 may result in consideration of switching all town diesel vehicles and equipment to B100 from B20. Given the ~26,000 gallons of biodiesel and the 2-yr average incremental cost (estimated from B20; multiplied by 5) of $1.42 per gallon, the impact on the budget would be ~$37,000 on an annual basis.

Previous Town of Carrboro documents have addressed the issue of switching to B100. A memo dated 27 August 2002 from former Environmental Planner Phil Prete to former Town Manager Robert Morgan outlined actions and a timetable agreed to by the Planning and Public Works Department and addressed the issue of using B-100 on Page 3, Items 4 and 5.

4. *Switch to B-100 for new orders beginning January 1, 2003. B-100 will be mixed with the fuel in the tank at that time producing a mixture that would be between B-20 and B-100.*
5. *Continue with monitoring, and provided there are no undesirable consequences, subsequent purchases of fuel would be for B-100 resulting in a fuel that would eventually approach 100 percent biodiesel.*

Industry related concerns shared by Public Works staff over cold weather gelling and "shelf life" of B100 have warranted a delay in converting to B100. In addition, fiscal impact of a switch to B100 for all town vehicles must be thoroughly explored prior to taking action.

There is currently only a single storage tank for biodiesel fuel that is used for B20. While the Public Works department is willing to conduct a trial comparing B20 to B100, including B-zero in the trial does not appear feasible.

Evaluation of B20 and B100 will be limited to records on maintenance and fuel use. Testing for hydrocarbons, particulates, nitrous oxides, carbon monoxide, air toxics, and mutagenicity will not be conducted.

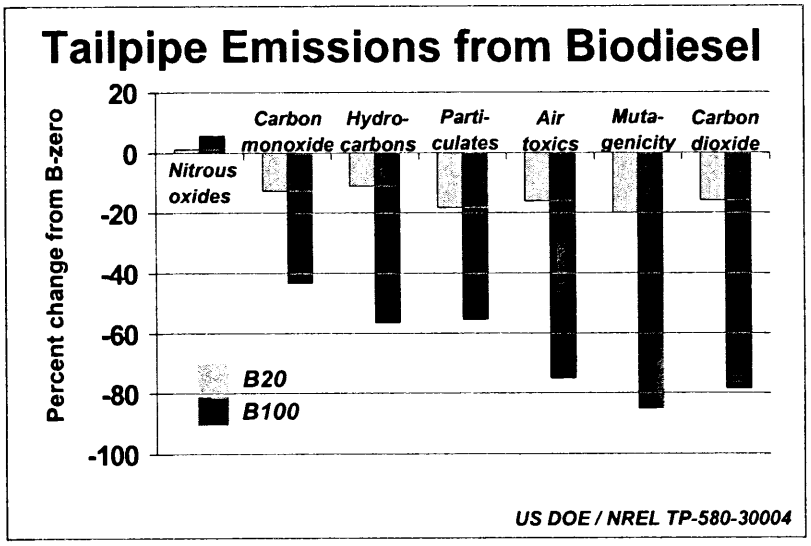

Figure 2. Comparison of emissions from B20 and B100

4. Request that Chapel Hill Transit explore the idea of converting some buses to biodiesel, again attempting to test B100 versus B20 and kerosene in terms of cost effectiveness, fuel efficiency, and emissions.

Currently, Chapel Hill Transit buses are using kerosene fuel, also called No. 1 Diesel. Information obtained from the *NOx Solutions for Biodiesel* report published by the National Renewable Energy laboratory (NREL/SR-510-31465) indicated that kerosene emissions of NOx and CO are lower than B20 or B-zero, while particulates are lower than B-zero and similar to B20. Total hydrocarbons are similar among B20 and B-zero, which are both lower than kerosene.

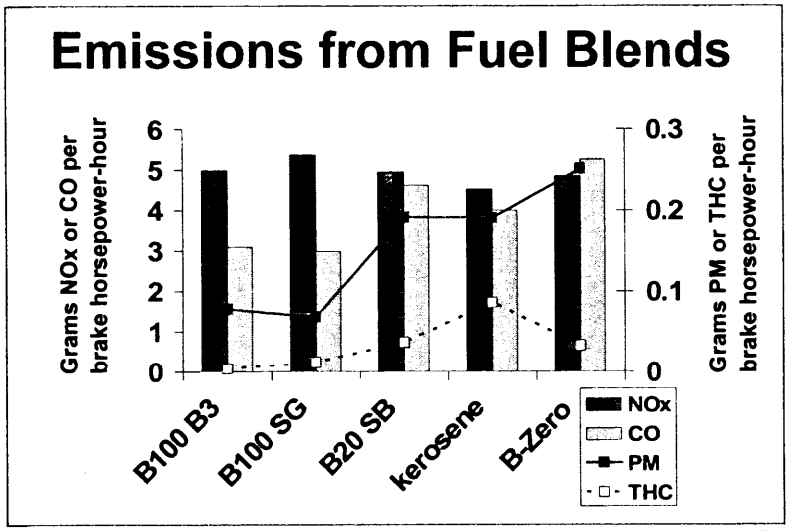

Figure 3. Emissions from B100, B20, kerosene, and B-zero

Given the information above, B100 does offer lower emissions of CO, THC, and PM compared to kerosene. As new fuel additives are utilized, there is the opportunity for NOx emissions to also be equal to or lower than kerosene.

Additional supporting information

When compared to other alternative fuels, biodiesel emissions do not generally reduce emissions as much as electric vehicles (especially solar) or compressed natural gas vehicles (Figure 4).

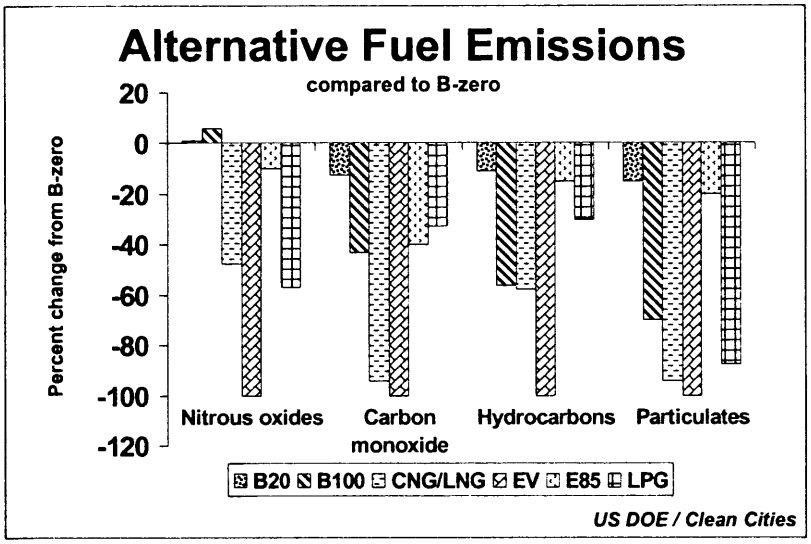

Figure 4. Emissions of nitrous oxides, carbon monoxide, hydrocarbons, and particulates for alternative fuels.

From a fiscal perspective, fuel costs can vary greatly depending on market forces and world events. Renewable fuels that can be produced locally, regionally, and nationally provide the most sustainable options for short and long term fuel

needs. Comparing costs across fuels can be done on the basis of gallon of gasoline equivalent (GGE) (Table 1).

Table 1. Cost of Alternative transportation fuels delivered to vehicle on Gallon of Gasoline Equivalent (GGE basis)

	US$ per Gallon of gasoline equivalent
Diesel	1.5
Gasoline	1.5
Liquefied petroleum gas	1.5
Ethanol	1.5 to 3.0
Methanol	2.7 to 3.5
Compressed natural gas	1.5
Compressed hydrogen	3 to 4
Liquid hydrogen	5 to 6
Electricity	3.4

Pew Center for Global Climate Change, May 2003

SUMMARY

Based on the information in this staff report, EAB recommendations 1 and 2 do not require additional action at this time.

Recommendation 3, "Explore the feasibility of a pilot project evaluating the cost and mechanical efficiency of running selected town vehicles on B100 vs. B-zero and B20," is currently being addressed by Public Works and Planning staff, and noted in the resolution provided to Board of Aldermen.

Regarding recommendation 4, "Request that Chapel Hill Transit explore the idea of converting some buses to biodiesel, again attempting to test B100 versus B20 and kerosene in terms of cost effectiveness, fuel efficiency, and emissions," staff has compiled relevant information and suggests formally transmitting this information to Chapel Hill Transit administrators. This item is also included in the resolution provided to the Board of Aldermen.

ATTACHMENT C

TOWN OF CARRBORO
ENVIRONMENTAL ADVISORY BOARD

Meeting on September 2, 2004
Carrboro Century Center
Carrboro, North Carolina

RECOMMENDATION

Collaboration with Carolina Biodiesel

Since Carrboro is now part of a "non-attainment" region for pollution as designated by the EPA and thereby needs to reduce the amount of pollution it contributes to the town and the region, and since the town has repeatedly proclaimed its commitment to supporting local, sustainably manufactured produce and goods as a founding member of the Triangle Clean Cities Coalition and as the first local municipality to test biodiesel in town cars, the Carrboro EAB advocates cooperation with efforts to establish a local yellow grease biodiesel producer. We recommend that the town:

1. Request town manager to submit a letter to the health department in support of a survey of local restaurants that Carolina Biodiesel is authoring that would ascertain which area restaurants might supply yellow grease to a local biodiesel producer.
2. Examine the town of Carrboro's existing contract on biodiesel supply and think about either terminating that contract or modifying it so that local yellow grease biodiesel operations would have an opportunity to sell us their biodiesel
3. Explore the feasibility of a pilot project evaluating the cost and mechanical efficiency of running selected town vehicles on B100 vs. regular diesel and B20.
4. Request that Chapel Hill Transit explore the idea of converting some buses to biodiesel, again attempting to test B100 versus B20 and kerosene in terms of cost effectiveness, fuel efficiency, and emissions.

Motion was made by Kathy Buck, and seconded by Neil Flanagan

VOTE:
AYES (4; Buck, Flanagan, Taylor, White); NOES (0); ABSENT/EXCUSED (1; Myers)

Rickie White., Jr., Chair 2 September 2004

ATTACHMENT D

A regular meeting of the Carrboro Board of Aldermen was held on Tuesday, May 18, 2004 at 7:30 p.m. in the Town Hall Board Room.

Present and presiding:

Mayor	Michael Nelson
Aldermen	Joal Hall Broun
	Mark Chilton
	Jacquelyn Gist
	John Herrera
	Diana McDuffee
	Alex Zaffron

Town Manager	Steven E. Stewart
Town Attorney	Michael B. Brough
Deputy Town Clerk	Sharmin Mirman

REQUEST FROM CAROLINA BIODIESEL

Bo Lozoff, with The Human Kindness Foundation, addressed the Board on behalf of Carolina Biodiesel. The Mayor and Board of Aldermen are agreeable to building a relationship with them and it was suggested that Mr. Lozoff meet with staff (Town Manager, Public Works, Purchasing Officer) and make a presentation to the Environmental Advisory Board.

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TOWN OF CARRBORO
ENVIRONMENTAL ADVISORY BOARD - MINUTES

Meeting on **3 JUN 2004** at 7:00 p.m.
Carrboro Century Center
Carrboro, North Carolina

Board Members		Guests	Staff
Present	Absent		
Kathy Buck		Bo Lozoff (15 min.)	Noah Ranells
Neal Flanagan (arr 7:10 PM)		Joe Peters (15 min.):	
Sarah Myers			
Bob Taylor			
Rickie White			

Call to Order/Opening Comments. The meeting of the Environmental Advisory Board was called to order by chair, Rickie White at 7:00 pm.

Minutes
No minutes to approve.

Biodiesel
Rickie introduced Bo Lozoff, longtime Director of the Human Kindness Foundation (HKF) and more recently Carolina Biodiesel (CB). With Lozoff was Dr. Joe Peters, an Adjunct Professor of Natural Resource Management with Grand Valley State University, currently working in Hanoi, Vietnam. Peters is visiting Kindness House this week.

Lozoff indicated his desire to obtain EAB guidance on his efforts to promote yellow grease biodiesel production. He confirmed that EAB members received the material he sent in advance via email. The Human Kindness Foundation has been working with prisoners and former prisoners for 30 years. A sequence of events, allowed the HKF to obtain a site that is suited for small scale biodiesel refining.

Producing biodiesel from yellow grease, a 100% post-consumer waste, incorporates the long-term job training goals of HKF with an environmentally friendly technology that builds local sustainability. As much as possible, CB wants to work in partnership with local governments.

Currently most biodiesel is made from soybean oil that originates from the Midwest. Vendors obtain their biodiesel from Aurora, NC and blend to a B20 (80% petrodiesel: 20% biodiesel) for local deliveries. This results in a product that is more expensive than regular diesel fuel. Because of this Chapel Hill Town Manager recently recommended eliminating the B20 program in town fleet vehicles to save $34,000, but the Town Council did not approve the recommendation

Biodiesel production from soybeans is the least efficient way to make biodiesel, but the strong support of biodiesel incentives from the farm constituencies support the $2 to $3 per gallon production cost of soy diesel. Other crops such as rape, sunflower, cottonseed, and mustard seed can be up to 3 times efficient for biodiesel production. A more economical way to produce biodiesel may be possible using yellow grease from restaurant oil.

Lozoff indicated that the next phase of this project would be to gather data on yellow grease production and collection in the local area. He indicated that a survey would help provide facts to develop a plan. He is currently involved in planning a survey with collaboration from Diane Reid, Barry Jacobs, and Ron Holdaway. A main question is what the fee is for yellow grease removal from restaurants and cafeterias. He would like support from the town and county, which he hopes will lead to a high rate of return of surveys.

He also would like to partner with local government on educating the public about biodiesel and finally would like local governments to agree to purchase a fixed amount of B100 biodiesel, put in an extra tank for it and keep careful fuel use and mechanical records for several years so a good database can be established.

White inquired as to the current contracts for biodiesel Myers indicated that her impression was that use of B100 required a modification to the vehicle. Lozoff responded that for vehicles manufactured before 1991 likely have pure rubber seals that may be degraded with B100. Vehicles manufactured after 1991 have seals made from phyton that is B100 safe.

Myers asked about the price difference between biodiesel and petro diesel. Lozoff responded that there is currently a $0.15 to $0.20 per gal. premium for biodiesel. Lozoff added that the business plan includes a tipping fee associated with the collection of yellow grease and the CB goal is to match or be cheaper than B20 and perhaps petro diesel. Flanagan inquired about the emissions of particulates from combustion of biodiesel. Lozoff replied that there was a 47% reduction in particulates from B20 compared to petro

diesel. NO_x production from biodiesel is an issue that CB is working on, but is certain that NO_x will be less than petro diesel.

Taylor asked about "shelf life" of B100. Lozoff indicated that there would be an additive to deal with NO_x issue and enhance shelf life. B100 is less stable than petro diesel. . Maximum storage is ~ 6 months due to risk of yeast with greater than 6 month storage.

Lozoff replied that Alex Hobbs of the NC Solar Center has provided expertise. It has been suggested that NC legislature provide funds for an ASTM lab at the NCSU Solar Center to allow for fuel testing. Emissions data has been exhaustively studied. There is improvement in all categories except for NO_x, where biodiesel produces the same or up to 3 to 5% more NO_x, depending on the engines. However, Lozoff added that B100 will not make ozone worse and can help reduce acid rain sulfate to zero.

White commented that this could be a concern. Lozoff commented that NO_x is only one constituent of the pollutants and this in itself doesn't mean it produces a greater ozone threat

Myers asked about the waste stream and waste products from biodiesel production. Yellow oil is filtered, potassium hydroxide (lye) and alcohol are added, and the mixture is centrifuged or heated to 120 degrees. Methanol and lye exchange for glycerin to produce methyl esters. The Methanol can be recovered and the lye is consumed by the reaction. There are some commercial uses for glycerin so there might be a market for what is produced. Some process technologies use a water wash 1 million gallon production of biodiesel would use 1,000 gallons of water daily and 1million pounds of glycerin per year. The wastewater has some salts, soaps, and hydroxides and similar to gray water from a house. The site will need to have on-site wastewater treatment and Hal House an expert in alternative wastewater treatment will be designing this component.

White extended his appreciation to Lozoff for the presentation on Carolina Biodiesel and Lozoff left the meeting.

White asked for some discussion on this topic. Buck suggested that the EAB write a letter of support to the Board of Aldermen indicating support of project. Taylor added emphasized the fact that this project does not put folks out of business or take money away from existing enterprises.

Buck asked how would individuals access biodiesel. White suggested that there might be an opportunity for an existing service station to apply for a revolving loan to put in necessary equipment to carry BD. White asked whether the Town of Carrboro has its own tank. Ranells indicated that the Public Works Department has a B20 tank and a second tank may be needed to provide B100. Ranells added that there has been some concern over biodiesel cost in Town of Carrboro and offered that perhaps fewer vehicles could be on B20 to allow some pilot vehicles to go on B100 and not cause a budget problem. Buck noted that is was the cost of the fuel not the cost of the tank that is of concern.

Myers added that there would be positive environmental benefit for town by using a local waste stream and a local factory. The following is the draft of the recommendation the White will type up and distribute via email

Since Carrboro is now part of a "non-attainment" region for pollution as designated by the EPA and thereby needs to reduce the amount of pollution it contributes to the town and the region, and since the town has repeatedly proclaimed its commitment to supporting local, sustainably manufactured produce and goods, the Carrboro EAB advocates cooperation with Carolina Biodiesel. We recommend that the town:

1. Instruct staff to cooperate with and support a survey of local restaurants that Carolina Biodiesel is authoring so that they can find out which area restaurants might contribute yellow grease to their operation.
2. Examine the town of Carrboro's existing contract on biodiesel supply and think about either terminating that contract or modifying it so that Carolina Biodiesel would have an opportunity to sell us their biodiesel
3. Test some town vehicles to see whether they function sufficiently using pure B100 (100% biodiesel) rather than 100% diesel or B20 (80% diesel).
4. Request that Chapel Hill Transit explore the idea of converting some buses to biodiesel, again attempting to test B100 as the best, least polluting alternative.

. . .