



## USDA Biodiesel Education, Research, and Production Incentive Programs

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Office of the Chief Economist

Office of Energy Policy and New Uses



**Office of the Chief Economist**

**Program Contact: Jim Duffield**

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**Program Title: National Biodiesel Fuel Education Program**

**Program Description:** Authorized by the 2002 Farm Bill this program was allocated \$1 million/yr for FY 2003 through FY 2007, a total of \$5 million. The primary objective of the Program is to educate government and private entities that operate vehicle fleets about the benefits of biodiesel use. The Program is implemented by USDA through continuation grants: one to NBB and the other to the University of Idaho. The Program is monitored by the USDA Biodiesel Education Oversight Committee, which includes one DOE representative (Mark DeCot).



## **Biodiesel Education Program Objectives**

- Enhance current efforts to collect and disseminate information
- Coordinate with other biodiesel programs
- Create a nationwide networking system that delivers consistent information
- Identify and document the benefits of biodiesel
- Gather data pertaining to information gaps
- Help insure fuel quality and consumer confidence
- Evaluate industry and program progress



## Target Markets

- Government Fleets
- School Bus Fleets
- Trucking
- Home Heating
- Agriculture
- Marine
- Mines
- Railroad



# **Biodiesel Education Program Highlights**

## **National Biodiesel Board Activities**

- Research Focused Workshop on technical Issues
- National Biodiesel Conference
- Developed support materials and presentations for biodiesel school bus workshops
- Developed biodiesel curriculum guide for grades K-12
- Train the trainer program – conducted at Clean Cities and NBB conference
- Coordinating with automakers and engine manufacturers – John Deere and Jeep now have biodiesel factory fills



## **Biodiesel Education Program Highlights**

### **National Biodiesel Board Activities**

- Addressing fuel quality -National Biodiesel Accreditation Program BQ-9000
- Survey to identify consumer awareness and perception of biodiesel – 33 % of consumers have heard of biodiesel
- Biodiesel Education Network (BEN) – Located on NBB website and the Petroleum Marketers Association website
- Developing a National Biodiesel Education Program Website



## **NBB Partners**

Association Insight

DC Long Association

MN Biodiesel Council

The Mahe Group

Doc on the Dial/Dr. Fishman

Chesapeake Bay Foundation

Advanced Fuel Solutions

Florida Gold Coast Clean Cities

Blue Ridge Clean Fuels

Cytoculture/Ecology Center

Kansas State University/Dr. Nelson

ASG Renaissance

Center for Diesel Research

MARC IV

NEED

Tickell Media

University of Missouri

Enersol Resources



## **Biodiesel Education Program Highlights**

### **University of Idaho**

- State Department of Transportation workshop in Boise, Sept 15-16
- Conducted DOT survey to identify barriers to biodiesel use
- Developed *Technotes*, a technical newsletter on biodiesel
- Symposium on biodiesel use in school buses at NBB conference
- Conducting a study on cold flow and lubricity additives
- Investigated 3 separate fuel quality concerns
- On-site visits - students, state officials, ag companies, universities, and international visitors



## **Biodiesel Education Program Achievements**

### **Targeting New Audiences**

- Expert Speakers Bureau – over 20 speakers located throughout the country
- State Departments of Transportation Offices
- American Lung Association DC
- Doc on the Dial Program: WMAL “Living with Asthma”
- Motor Week featured biodiesel
- Press Releases and Press Events, e.g., pump opening with Willie Nelson and the opening of biodiesel plant in Virginia with President Bush



# **Biodiesel Education Program Achievements**

## **Educational Materials**

- Biodiesel Quarterly Technotes
- Dr. Peterson is working on Q&As
- Updated training aids, including VCS tapes for training sessions and user testimonies



# **Biodiesel Education Program Achievements**

## **Coordination With Other Programs**

- National Biomass State and Regional Partnership group
- DOE Clean Cities Program
- NREL
- EPA Clean Diesel Program
- European Biodiesel Board
- Canadian Renewable Fuels Association
- Other USDA Programs (Farm Foundation Workshop in St Louis)



## **Biodiesel Education Program Activities for FY 2006**

The market has expanded rapidly, so emphasis is moving from basic consumer awareness and promotion to quality control. A quality control program has been developed called BQ-9000 that certifies companies with a “Seal of Approval.” Qualified companies must meet ASTM standards and have a quality system in place that covers storage, blending, shipping, and distribution. A BQ-9000 workshop is held each year at the NBB national conference.



## **Biodiesel Education Program Activities for FY 2006**

- Outreach efforts are expanding into the private sector (i.e., the Willie Nelson effect). Will be working with the American Trucking Association.
- Launched trucker website, [www.biotrucker.com](http://www.biotrucker.com), to provide information to truckers, e.g., truck-stop locations across the country that sell biodiesel
- Increasing outreach efforts aimed at mines, railroads, marine, home heating, and agricultural sector



**Agricultural Research Service (ARS)**

**Program Contact: Don Erback**

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**Program Title: Improving the Performance of Alternative Fuels and Co-Products from Vegetable Oils**

**Program Leader: Sevim Erhan**, National Center for Agricultural Utilization Research, Peoria, IL  
[erhansz@ncaur.usda.gov](mailto:erhansz@ncaur.usda.gov).

**Program Description:** Specific objectives for this project include

- 1) Improve cold weather start up and operability performance.
- 2) Develop fuel formulations that reduce regulated exhaust emissions such as nitrogen oxides.
- 3) Improve fuel quality through enhanced oxidative stability and development of new, rapid analytical methods for assessing biodiesel fuel quality.
- 4) Development of specialty chemicals from biodiesel co-products.



## ARS Programs Continued

**Program Title:** Production of Value-Added Lipids, Biofuels, and Biobased Products from Fats, Oils

**Program Leader:** Tom Foglia, Eastern Regional Research Center, Philadelphia, PA  
[tfoglia@arserrc.gov](mailto:tfoglia@arserrc.gov)

**Program Description:** Expand the use of animal fats, vegetable oils, and their coproducts by developing new and/ or alternative processes to exploit the potential of these feedstocks as biobased products and biofuels. Targeted areas include developing:

- 1) Alternative processes for producing biodiesel from intact oils and fats and/or less expensive lipid feedstocks
- 2) Methodologies for improving the quality and performance of biodiesel fuels.
- 3) New uses for glycerol.



## **ARS Programs Continued**

**Program Title: Wind-Biodiesel Hybrid Electric Power Generation**

**Program Leader: Nolan Clark**, Renewable Energy and Manure Management  
Research, Bushland, TX [rnclark@cprl.ars.usda.gov](mailto:rnclark@cprl.ars.usda.gov)

**Program Description:** Specific objectives for this project include

- 1) Measure performance of engines burning biodiesel operating in a wind/hybrid electric power network
- 2) Determine the reduction in emissions from engines using biodiesel instead of petroleum diesel



## **ARS Programs Continued**

**Program Title: Beltsville Agricultural Research Center (BARC)  
Biodiesel Demonstration**

**Program leaser: Ron Korcak, [KorcakR@ba.ars.usda.gov](mailto:KorcakR@ba.ars.usda.gov)**

**Project Description:** The Beltsville Agricultural Research Center uses biodiesel to operate farm vehicles and to fuel their furnaces. BARC has become a major advocate of biodiesel use in the Washington DC/Baltimore area. A number of biodiesel workshops and other events have been held in BARC facilities over the past few years. Public tours of the center highlight the use of biodiesel.



## **Farm Service Agency**

**Program Contact: Jim Goff**

*James\_Goff@wdc.usda.gov*

### **Program Title: CCC Bioenergy Program**

**Program Description:** Established by USDA in FY 2001 as a temporary (two years) program to encourage ethanol and biodiesel production. Cash payments, not exceeding a total of \$150 million, were made available from the CCC to commercial bioenergy (ethanol and biodiesel) producers in the United States that increase their bioenergy. Eligible commodities for FY 2001 included barley, corn, grain sorghum, oats, rice, wheat, soybeans, sunflower seed, canola, crambe, rapeseed, safflower, sesame seed, flaxseed, mustard seed, and cellulosic crops (such as switchgrass and short rotation trees). Payments were based on size of operation (shown below) and price of the feedstock, e.g., the payment rate on biodiesel made from soybean oil was based on the current value of a bushel of soybeans.

- Under 30 million gallons, payment on 1 bushel for every 2.5 bushels of corn or soybeans used for production
  
- 30 million gallons or more, payment will be 1 bushel for every 3.5 bushels of corn or soybeans used for production



## **CCC Bioenergy Program Changes in FY 2002**

In January 1, 2002, USDA announced that biodiesel producers who use animal fats and oils produced in the U.S. to produce biodiesel may participate in the program. Production increases from animal fats and oils between January 1 and September 30, 2002 were made eligible for program payments. Payments were determined by size as shown on the previous slide and the current price of the animal fat or oil used. USDA made \$150 million available for 2002.

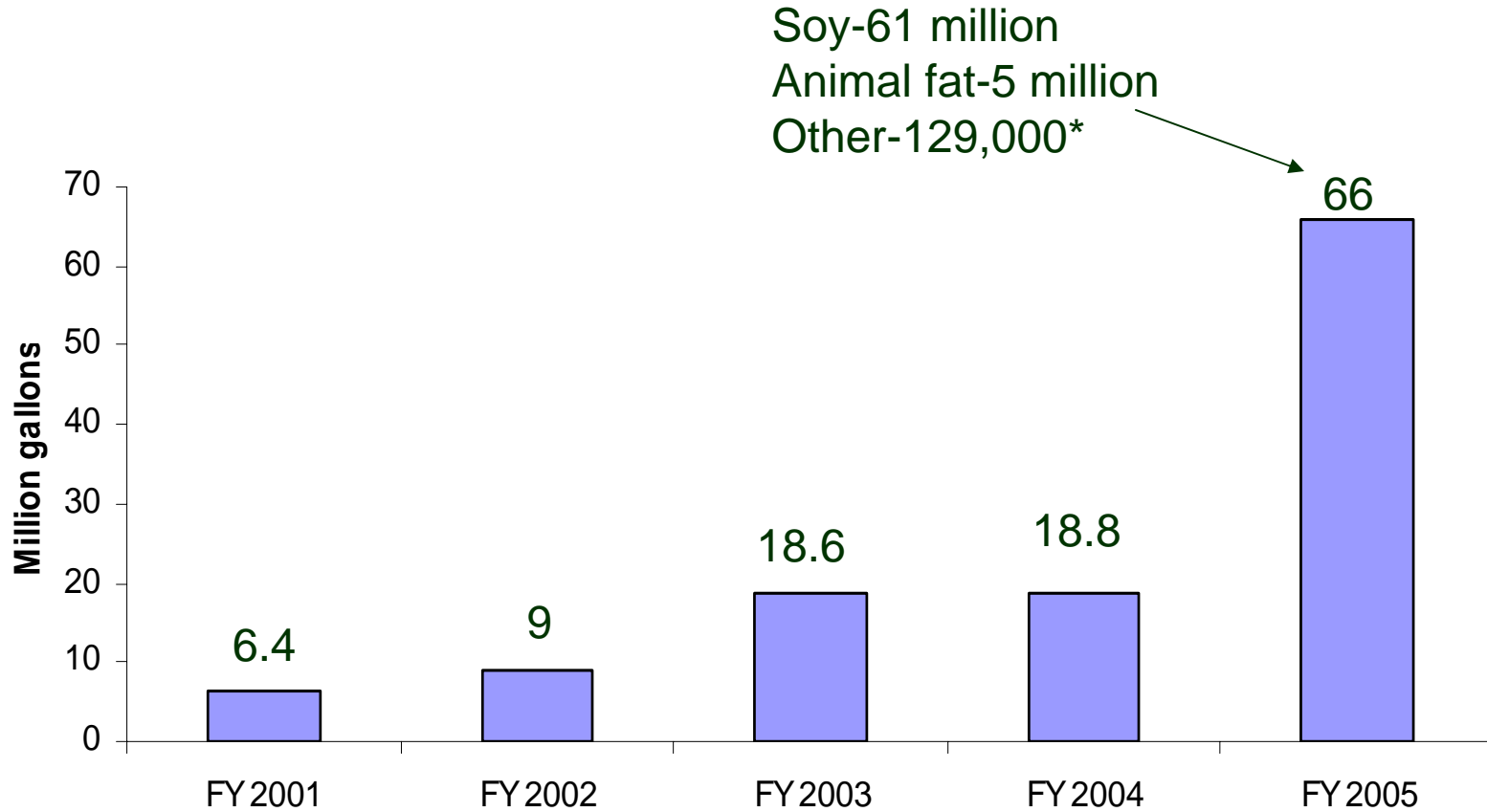


## **The Farm Security and Rural Investment Act of 2002 Revised the CCC Bioenergy Program**

- Extended the Program to FY 2007
- Added payments on base for biodiesel producers. The level of benefits paid for base production are gradually phased down from 50 percent in 2003, to 30 percent in 2004, and 15 percent in 2005. Base payments are eliminated in 2006
- Payment rates on biodiesel made from non-soybean oils and fats were adjusted to be more equitable to biodiesel made from soybeans
- The Secretary can use up to \$115.5 million for FY 2003 and up to \$150 million annually for FY's 2004-06.



## CCC Program Biodiesel Production



\*Other includes corn, canola and sunflower oil

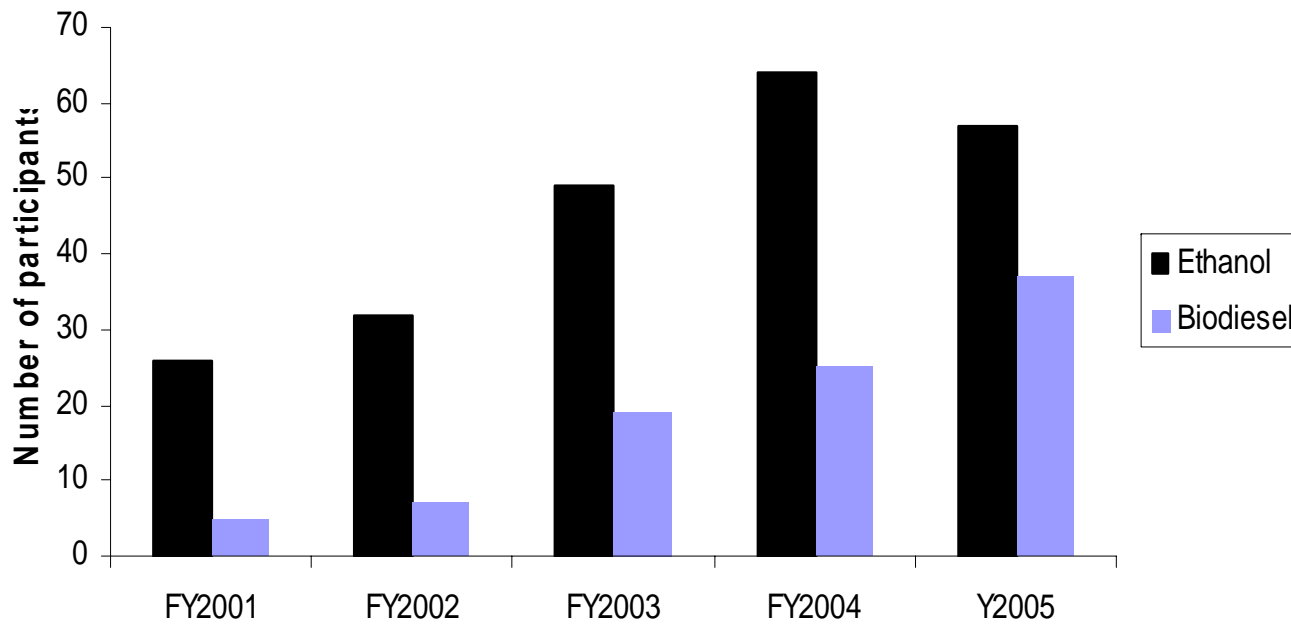


## **The Average Payment Rate is Declining for the CCC Bioenergy Program**

- The number of biodiesel participants increased from 5 in FY 2001 to 25 in FY 2004, to 37 in FY 2005
- The number of ethanol participants increased from 26 in FY 2001 to 64 in FY2004, and was 57 in FY 2005
- The full \$150 million was available in FY 2004, but the program was limited to \$100 million in FY2005

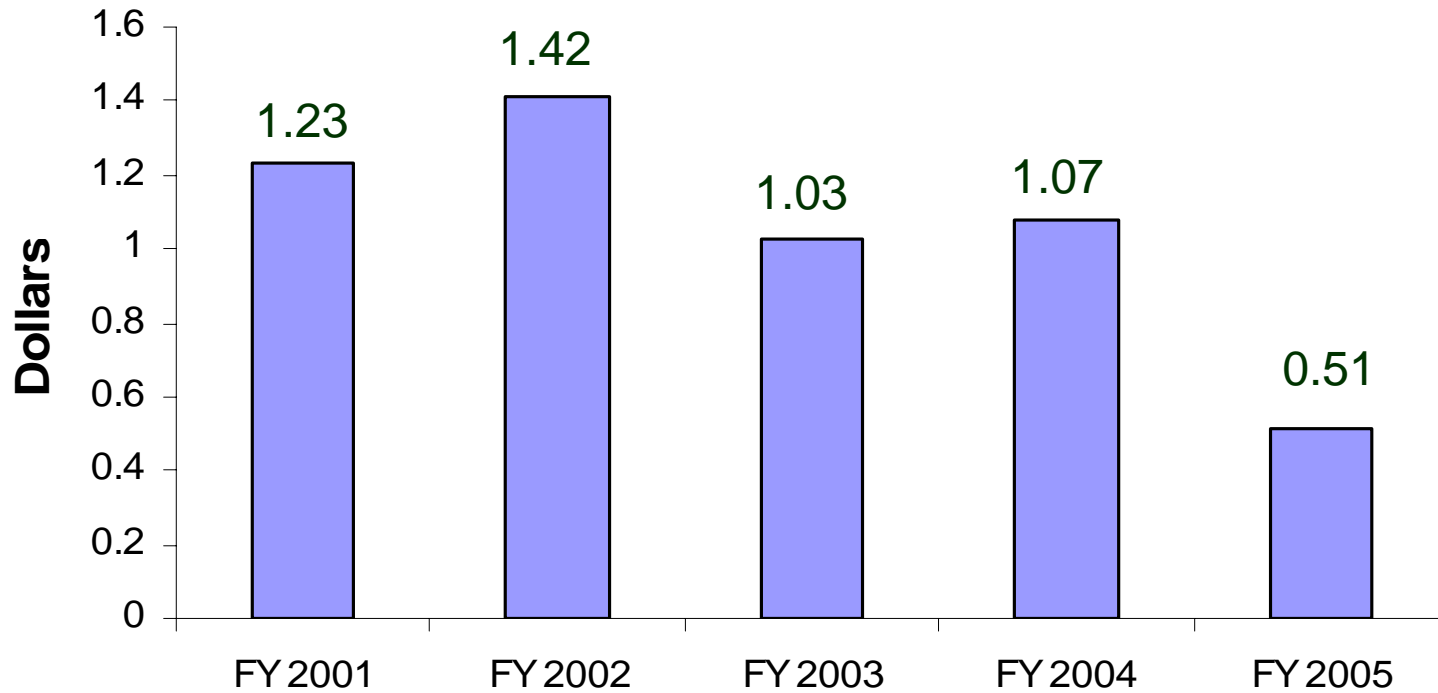


# CCC Program Participation





## Program Payment/Gallons Ratio FY2001-FY2005





## **Cooperative State Research, Education, and Extension Service**

**Program Contact: Carmela Bailey**

*CBAILEY@CSREES.USDA.GOV*

### **Program Title: CSREES Competitive Research Grant Programs**

**Program Description:** CSREES is USDA's principal link to academia and offers a portfolio of projects that support biodiesel research and development, with a focus on conversion technologies. Funding for these projects include formula funds to land grant institutions, Small Business Innovative Research (SBIR) grants, and special research grants.

### **CSREES Feedstock Development Projects**

**Recipient:** Mississippi State University

**Description:** Evaluation of alternative feedstocks such as mustards, hesperis, flax, and camelina, and animal-based lipids including catfish and poultry fats; innovative extraction such as co-solvent amended supercritical extraction and propane extraction.

**Recipient:** Mississippi State University

**Description:** Cellular uptake and biological effects of synthetic macromolecules for enhancement of lipid-containing biomass



## **CSREES Feedstock Development Projects Continued**

**Recipient:** Emerald Ranches, Washington

**Description:** Use of biosolids as fertilizer for canola feedstock and determine effects on yield and fatty acid profile.

## **CSREES Conversion Technologies Projects**

**Recipient:** University of North Dakota

**Description:** Process improvement utilizing non-alcohol alkylating agent in a column reactor packed with a solid acid catalyst for the production of methyl esters from soap stocks

**Recipient:** Montec

**Description:** Comparison of thermal hydrolysis, enzymatic hydrolysis by lipase enzymes, or solid acid catalyst for hydrolysis of animal fats and recycled vegetable oil, followed by solid acid catalyst esterification



## CSREES Conversion Technologies Projects Continued

**Recipient:** United Environment & Energy LLC

**Description:** Test feasibility of two separate reactions using heterogeneous solid acid catalyst and solid base catalyst for esterification and transesterification of waste cooking oils

**Recipient:** University of Idaho

**Description:** Production of erucic acid and biodiesel from high erucic acid seed oils by combining enzymatic hydrolysis and/or transesterification

**Recipient:** Iowa State University

**Description:** Separation of saturated from unsaturated fatty acids using transition metal ions in extraction, distillation, and membrane separation processes



## CSREES Fuel Quality Projects

**Recipient:** Bioplastic Polymers & Composites

**Description:** Chemical modification (ozonolysis) of methyl soyate to yield fully saturated esters and methyl digesters to improve cold temperature properties and oxidative stability

**Recipient:** Mississippi State University

**Description:** Using ethanol-biodiesel blends with petroleum diesel to improve cold flow

**Recipient:** University of Nebraska

**Description:** Determine phase behavior of ethanol-biodiesel-diesel blends; evaluate micro-emulsion regions for critical fuel and physical properties

**Recipient:** University of Illinois

**Description:** Emissions and performance testing on biodiesel/diesel blends, with cetane improver and higher alcohols to reduce NO<sub>x</sub>; ethanol-diesel blend plus an additive for co-solvency and lubricity enhancement



## CSREES Added Value/Glycerol Projects

**Recipient:** Iowa State University

**Description:** Novel fermentation process for the anaerobic conversion of glycerol and CO<sub>2</sub> into succinic acid using engineered E. coli

**Recipient:** University of Georgia

**Description:** Producing a suite of specialty chemicals by biocatalytic fixation of glycerol with CO<sub>2</sub> that is generated from gasification of biomass

**Recipient:** Montana State University

**Description:** Glycerol is converted to glucose and then to ethanol using a two step bioreactor

**Recipient:** Purdue University

**Description:** Development of glycerin-based aviation de-icers/anti-icers



## **CSREES Education Projects**

**Recipient:** University of Idaho

**Description:** Developing curriculum for biorefinery process analysis and design that includes transesterification of rapeseed oil

## **CSREES Economics Projects**

**Recipient:** University of Idaho

**Description:** Life cycle analysis for energy and environmental assessment of oil crops and biodiesel production in the Pacific Northwest; determining biodiesel composition and quality based on radiation spectrum and engine tests



## **Natural Resources Conservation Service (NRCS)**

**Program Contact: Felix Spinelli**

**Felix.Spinelli@usda.gov**

### **Program Title: Conservation Security Program (CSP)**

**Program Description:** The program focuses on energy conservation but includes a renewable energy component.

- Gives payments to farmers for using renewable fuels, such as biodiesel and ethanol. For example, a farmer receives \$50 for using 200 gallons of biodiesel. Using 850 gallons of ethanol would qualify for a \$200 payment. In FY 2004, 218 contracts were approved for replacing petroleum based liquid fuels with either biodiesel or ethanol.
- Gives payments to farmers for renewable energy generation, e.g., anaerobic digesters. The operator earns \$2.50 per 100 kilowatt-hours.



## **Natural Resources Conservation Service Programs**

### **Program Title: Environmental Quality Incentives Program (EQIP)**

**Program Description:** Incentive and cost-share payments to improve air and water quality, land erosion, nitrogen management, and energy conservation

- **Conservation Innovative Grants** fund the development of conservation approaches and technologies, including anaerobic digesters, on-farm solar and wind technologies



**Foreign Agricultural Service**

**Program Contact: Paul Provance**

***Paul Provance-FASNJ.GW.OCE\_NET***

**Program Title: Global Agriculture Information Network (GAIN)**

**Program Description:** Conducts market studies of biodiesel in Europe, Brazil, and other countries producing biodiesel to determine the potential effect on world production and trade of oilseed crops. For example go to:[www.fas.usda.gov/scriptsw/attacherep/attache\\_lout.asp](http://www.fas.usda.gov/scriptsw/attacherep/attache_lout.asp)