Is There Biodiesel in Your Future?

Author’s Note – This article begins with congratulations and accolades to Render, The International Magazine of Rendering, on its fortieth year of service to the industry. Frank A. Burnham, the first editor of Render, and his granddaughter, Tina Caparella, upon assuming the editor and publisher role in 1996, have for forty years brought the industry to international recognition. To their credit and their influence in keeping biodiesel and biofuel as well as other rendering issues in the international media limelight for four decades has been an exemplary asset to the rendering industry.

It was in the October 1992 Render that Frank Burnham used the above title to introduce biodiesel to the rendering industry. The article reported on a small biodiesel pilot plant in Kansas City, KS, designed and built by GraTech, a subsidiary of STRATCO that was an established supplier of high-tech subsystems for gasoline refining. It was at this facility that the Fats and Proteins Research Foundation (FPRF) initiated a project for the development of processes of using animal tallow for the commercial development of bio-diesel fuel in the United States.

The American Soybean Association (ASA) was also at this time testing on-the-road vehicles fueled by soy-based biodiesel. The National Soy Fuels Advisory Committee (NSFAC) was formed in May 1992 to pursue the project. The committee was made up of the Qualified State Soybean Boards of Missouri, Iowa, Illinois, and South Dakota to position soy diesel as the biodiesel of choice in the United States. Soon thereafter, the NSFAC was disbanded and the National Soy Diesel Development Board (NSDB) was formed. This organization provided for a budget, research, market development, and a staff structure to receive and fund research grants. More importantly, it provided a funding source from the United Soybean Board/ASA via the soybean checkoff program. That funding process was initiated October 1, 1992, and subsequently provided millions of dollars for biodiesel development.

Kenlon Johannes from the Missouri Soybean Merchandising Council was appointed the NSDB executive director and in his early correspondence wrote, “Biodiesel development itself will also require a planned cooperative effort from all feedstock providers.” However, “The NSDB will initially include only those interested in soy diesel, but as other groups interested in biodiesel feedstocks became identified, they may be brought into the organization with the possibility of ultimately forming an American Biodiesel Development Coalition.” His vision was profound and his mannerism always very personable and respectful. However, as the development process evolved it became very evident that “those who have the gold make the rules.”

The biodiesel pioneers from the rendering industry were the three “Freds” and a Dennis – Dr. Fred Bisplinghoff, Fred Wintzer, Fred Wellons, and Dennis Griffin. These FPRF leaders attended the early NSDB meetings and explored pilot plant facilities that could esterify animal fats for the production of experimental biodiesel. It was the initiation of the quest in pursuing the vision that animal fats and oils deserved a place in the biodiesel/biofuels marketplace. I joined these pioneers in October 1993 in Kansas City, MO, in meeting with the NSDB members, all of which were soybean farmers. Again, all were very courteous and friendly, but likewise focused on seeing their checkoff dollars invested in soy oil utilization, a normal reaction from any good business person. Thus the reality and the learning process began in earnest.

The idea to use vegetable oils as fuels for diesel engines is more than a hundred years old. Rudolf Diesel himself conducted engine tests using plant oils. One of his engines was exhibited at the World’s Exhibition in Paris, France, in 1900 that ran on peanut oil. It performed so smoothly that visitors needed to be made aware of the fuel source. However, it was only during the 1970s that transesterification and biodiesel became commonplace in a number of European countries. Dr. Martin Mittelbach, University of Graz, Austria, was an innovative researcher that provided process technologies utilized in the expansion of the commercial market abroad, and also assisted with the U.S. development process.

Trials and Tribulations

Certainly there have been several trials and tribulations along the way. The decade of the 1990s brought several issues of great magnitude to the rendering industry. It brought the reality that the industry could have been decimated by the events of bovine spongiform encephalopathy (BSE). The decade began with tallow prices in the very low teens and even single digits per pound. At the end of the decade renderers and packers were burning their fats and oils to replace the unprecedented prices for burner fuels.

FPRF was fortunate to establish a dedicated biodiesel fund in 1993. Jerry Smith, then chairman of the National Renderers Association (NRA), made the plea at the 1993 annual NRA meeting for contributions to the fund that generated an amount exceeding six figures. This initial pledge and the continued generosity of the rendering industry provided the funding to support a neutral feedstock specification and regulatory and legislative agendas. Those battles have now been assumed by NRA. Maintaining parity among feedstocks within legislative and regulatory actions has been a constant challenge. Certainly, actions have not always resulted in the
From its birth, biodiesel has been recognized as an environmentally friendly liquid fuel. However, to validate those claims despite the vast amount of tailpipe data, the Environmental Protection Agency (EPA) demanded that a massive and seven-figure health effects study be conducted. The protocol included a number of laboratory animal species exposed to biodiesel fumes over extended periods of time, sacrificed, and their tissues subjected to numerous chemical and histological testing. The test fuel was soy-based in an effort to eliminate duplicating the seven-figure project cost. The EPA reluctantly consented to allowing the test fuel to represent both vegetable- and animal-based feedstocks. This project, predominately funded by the National Biodiesel Board, was the first to complete the Tier 1 and Tier 2 health effects study on behalf of the industry and contracting its use to fuel producers.

New Decade Brings New Challenges, Opportunities

The new millennium had brought the still fledgling biodiesel industry to a status of accelerated progress that exceeded that of other alternative fuels, i.e., ethanol, which started its mission some four decades ago. Several soy-based production facilities were on-stream. Griffin Industries had brought its facility online in 1998 in Butler, KY. Several other rendering companies followed: Anamax, Central Bi-Products, Rothsay, with others in consideration.

The new decade brought exponential growth in biodiesel in both the United States and Europe as Chart 1 illustrates.

Biodiesel and biofuels have become an important and substantial consumer of animal fats and greases. In 2009, over 23 percent of U.S. produced biodiesel used these lipid feedstocks, providing a market for approximately nine percent of U.S. annual production. As the decade ends and 2010 data becomes available, undoubtedly the picture will darken. During the past year, and really throughout the last decade, the struggle to acquire a long-term energy policy that instills confidence in attracting long-term investments has not been evident. The on and off actions among regulations and legislation has not been consistent with a national policy of making the United States more energy independent. The recent lapse of the per-gallon blender credit on December 31, 2009, shut down a number of production facilities and essentially halted any new investments. The recent vote

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Source: National Biodiesel Board, European Biodiesel Board; USDA/Foreign Agricultural Service estimates for 2009 EU production.
to reinstate the credit for 2011 and retroactively for all of biodiesel sold in 2010 is positive, but those actions are not likely to result in an immediate rejuvenation of the biodiesel industry. The stability of the blender’s credit still lingers as well as export duties imposed by a number of countries, hampering export opportunities.

As previously noted, the new decade brought new challenges, beginning with a period of unprecedented high prices for burner fuels such as fuel oils, natural gas, and propane. This challenge actually became an opportunity for animal fats and oils to be used as burner fuels. Just as Burnham had described the historical use of tallow for heat and light by our ancient predecessors in his book, Rendering: The Invisible Industry, renderers converted their energy sources to burning their own fuels.5

FPRF contracted to convert the heating facility at the University of Georgia, Athens, GA, to heat its campus using tallow, choice white grease, poultry fat, and used cooking oil on a rotational basis as the fuel source during the winter of 2002. The resultant final project report became one of FPRF’s most requested and published Director’s Digest.6 This work provided the basis for a major rendering industry project to monitor emissions and energy data from facilities using biofuels. This data was compiled and used in satisfying EPA, state, and local permit requirements.

Illustrating the continued interest in the use of fats and oils as burner fuels, a subcommittee of ASTM met in December 2010 to establish specifications for fats and oils for use in industrial boilers. This will be a great asset for rendered animal products as the ASTM specifications could then lead to United Laboratories’ approval for use by burner and boiler manufacturers of new equipment and legacy testing can be applied to existing equipment.

Unfortunately, after biodiesel and biofuels had made some inroads, on December 23, 2003, the diagnosis of BSE in the state of Washington in an imported Canadian cow brought the regulatory and critics to an “invigorated frenzy.” Proposed feed rule changes were published in the Federal Register on October 5, 2005. As important, it aroused the queries as to the safety of biodiesel and biofuels. It was forecast that all of these invisible prions would be exiting the tail pipes and smoke stacks all across North America.

Major conferences were held to discuss the associative transmissible spongiform encephalopathy (TSE) risks of using animal fats and oils as fuel sources. Advanced Technologies and Fuels Canada commissioned an international team of experts to conduct an extensive literature search to investigate any chemical and biological evidence that could result in any potential for adverse health effects. FPRF participated in the formative stages of the project and provided inputs into the selection of the collaborative authors of the final report in 2005. Scientists and researchers at Clemson University’s Animal Co-Products Research and Education Center contributed significantly to the project.

The conclusion: “Biodiesel produced from animals infected with TSE poses a negligible risk to human and animal health. This conclusion extends even to the use of specified risk material as a source of tallow.”7

Into the Future

Biodiesel and biofuels could become a book of its own. This highlight of significant accomplishments, trials, and tribulations omits a number of resources and personnel that contributed to the process. In reality, the progress made has been phenomenal. Unfortunately, the progress in making the United States less dependent upon foreign sources of petroleum-based energy has been minimal. As we enter the decade of 2011 with fuel prices on the rise again and projected to go higher, the importance of alternative sources must be recognized. The stabilization of energy prices is an important component for the country’s continued economic recovery. An extraordinary level of cooperation between policymakers, feedstock producers, and industry organizations as well as the research community will be required.

Collective efforts serve progress in a way fragmentation cannot. Past actions have exemplified the resolve that the rendering industry possesses. With that continued commitment, rendered fats and oils will continue to be a strong and sustaining component of biodiesel and biofuels in the future. Without doubt, Render will be translating the message to the world community. R

References:
2. Dr. Fred Bisplinghoff, FPRF president 1988-1993; Fred Wintzer, president, G.A. Wintzer and Sons; Fred Wellons, Chemol; and Dennis Griffin, president, Griffin Industries, Inc.

Additional Credits:
Bev Thessen, National Biodiesel Board
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Jim Conway, Griffin Industries, Inc., and treasurer, National Biodiesel Board